Applying the Theory of Planned Behavior to Sexually Transmitted Infection Screening

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Abstract

The Theory of Planned Behavior (TPB) has been used to predict several health behaviors. Significant prior research has extensively applied the theory to predicting condom usage as an STI preventative behavior. The present study sought to extend the theory to manipulate intention to engage in another preventative behavior: sexually transmitted infection (STI) screening. Subjects were recruited from a small liberal arts college campus. Self-report data examining the central components of the TPB model including attitudes, subjective norms, perceived behavior control, and intention to get screened were collected from 405 students at baseline. Students were then exposed to a month-long campus wide sexual health outreach campaign consisting of a series of posters, placed in highly trafficked areas. Posters contained messages targeting normative beliefs and subjective norms pertaining to STI screening. From the initial sample, 189 students completed post intervention measures. Full within-subjects analyses were run for just a portion of those students (N = 67) for whom Time 2 data could be matched with Time 1. The intervention increased knowledge that STIs can be asymptomatic, but was found to have no significant effect on attitudes, subjective norms, perceived behavior control, or intention to get screened. Attitudes were found to significantly predict intention at time one, where subjective norms significantly predicted intention post intervention. Consistent with the model, attitudes, subjective norms, and perceived behavior control all related significantly with intention following the intervention (r = .356, r = .443, and r = .249, respectively). Implications for future studies with larger samples and longer exposure intervals are discussed.
Applying the Theory of Planned Behavior to Sexually Transmitted Infection Screening

Sexually transmitted infections or diseases (STIs or STDs) pose a major threat to the health of the United States’ citizens with roughly 20 million new cases per year (Centers for Disease Control and Prevention (CDC), 2016). STIs are viral or bacterial infections transmitted through vaginal, anal, or oral intercourse and include chlamydia, gonorrhea, syphilis, trichomonas, hepatitis B&C, herpes, human papilloma virus (HPV), and human immunodeficiency virus (HIV) (CDC, 2016). Beyond their unpleasant clinical symptoms and the life-threatening consequences associated with HIV, untreated STIs can lead to reproductive, fetal, and perinatal health problems as well as cancer (“Sexually Transmitted Diseases,” 2017). The economic impact of STIs on the United States’ healthcare system is massive. Owusu-Edusei et al. (2013) report a total lifetime medical cost of approximately $15.6 billion for the 19.7 million cases of STI that occurred in 2008.

Adolescents and young adults are at the highest risk for STI exposure with 15- to-24-year-olds accounting for roughly 50% of all new cases (CDC, 2016). The Centers for Disease Control and Prevention (CDC) identify several factors that contribute to the heightened risk in this population, including the tendency to have multiple sex partners, the lack of access to health insurance or transportation, and discomfort communicating with health care providers about sexual health. This group accounted for 9 million cases of infection in the year 2000, amounting to $6.5 billion in lifetime medical costs (Chesson, Blandford, Gift, Tao, & Irwin, 2004). STI exposure in 15- to 24-year-olds is a pressing public health problem that, because of its scope, demands large-scale attention and aggressive prevention. The CDC reports abstinence, condom usage, vaccination, and decreasing the number of sexual partners as important primary prevention efforts (CDC, 2017). However,
primary prevention will not improve the health of those who are already infected. Screening is necessary to identify infected individuals, connect them to treatment, and prevent the spread of their infections. Many cases of STI are neither properly diagnosed nor reported; this means that the 20 million new cases of STIs identified per year may represent only a fraction of the actual incidence of STIs (CDC, 2017).

To better identify, treat, and reduce the spread of STI’s, it is imperative to increase the number of 15- to 24-year-olds screened for STIs each year. Considerable research at the intersection of public health and psychology has been devoted to understanding how patterns of behavior, and the underlying cognitive processes that precede them, contribute to preventative or harmful health behaviors. The study of health behaviors is based on the assumption that preventable causes of disease stem from patterns of behavior that are modifiable (Conner & Norman, 2005). Several frameworks have been used to model and predict health related behaviors; in tandem, they identify a number of potential social and cognitive precursors to behavior. Conner & Norman (2005) identify the following common themes across models: accessibility of healthcare services, attitudes about the care, perceptions of threat/susceptibility, knowledge of the disease, social network characteristics, and demographic factors.

The Health Belief Model (HBM) and the Theory of Planned Behavior (TPB; Ajzen, 1991) have been applied widely in the study of STI preventative behaviors. They incorporate several of these factors (Montanaro & Bryan, 2014). The HBM posits that an individual’s attitudes, perceived benefits of and barriers to action, perceived threat, as well as self-efficacy, contribute to the execution of a health behavior. The TPB is more
comprehensive, including norms, a highly relevant and important intra-personal factor in decision-making.

In the present study, we evaluated the efficacy of an outreach campaign designed to increase STI screening in a sample of college students in the United States. Informed by the TPB, the campaign aimed to change normative beliefs and to explore other factors identified in the model as important predictors of health-related behaviors like condom use and smoking. Although minimal study has extended the theory to STI screening, a considerable body of research has established its utility to predict the use of condoms for the prevention of STI’s. In the below review, we look closely at the TPB and how it evolved, summarize the literature on the TPB with respect to condom use, identify related factors that influence screening behaviors, and consider the application of the TPB to STI screening on a college campus.

**The Theory of Planned Behavior**

The Theory of Planned Behavior is a theoretical approach to understanding the social and cognitive precursors to the execution of a certain behavior and the intention to engage in that behavior. The theory’s original authors, Martin Fishbein an Icek Ajzen, initially developed the Theory of Reasoned Action (TRA). The TRA draws on several of the common themes enumerated by Norman & Conner (2005): attitudes and social network characteristics. It states that behavior is preceded by intention to perform the behavior. Attitudes and subjective norms (social pressure to perform a behavior) then, in turn, predict intention to engage in the behavior (Icek Ajzen, 1991). Fishbein and Ajzen came to understand that the TRA had a major limitation: it failed to account for behaviors in which individuals have no volitional control. They explain that intention can only translate into
behavior if the individual can freely perform the behavior in question (Icek Ajzen, 1991).

To address this shortcoming, the authors developed a second iteration of their model, now named The Theory of Planned Behavior, which included perceived behavioral control to the list of factors that predict intention. This theory posits that attitudes, subjective norms, and perceived behavioral control all predict intention to engage in a behavior, which, in turn, predicts future behavior (Icek Ajzen, 1991). The TPB is outlined in Figure 1.

Ajzen (1991) used the term *attitude* to refer to one’s favorable or unfavorable evaluation of the behavior in question. The second predictor, *subjective norms*, refers to perceived social pressure to perform or not perform the behavior. Third, *perceived behavioral control* refers to the perceived ease or difficulty of performing the behavior and reflects past behaviors as well as obstacles to future behavior (Icek Ajzen, 1991). For example, women may perceive less control over their partner using a condom than men may perceive about their own use. The relative contribution of each component varies when applied to different behaviors of interest. However, the general idea is that the more favorable the attitude and subjective norm and the greater perceived behavioral control, the more likely an individual is to perform a given behavior.

Several additional factors contribute to the establishment of attitudes, norms, and perceived control. Individuals form beliefs about behaviors, which then contribute to attitudes, by associating their execution with certain outcomes (positive or negative). Evaluations of outcomes lead to either favorable or unfavorable attitudes towards a behavior (Icek Ajzen, 1991). When applied to the context of sexually transmitted infections, the theory suggests that someone with a positive evaluation of the behavior (who believes that STI screening will benefit them) will be more likely to engage in the behavior. One kind
of belief is normative beliefs, which refer to the likelihood that important referent individuals or groups approve or disapprove of a given behavior (Icek Ajzen, 1991). In the case of STI screening, these referent individuals would be romantic or sexual partners, and groups would typically refer to peers, physicians, friends, or family. Normative beliefs are distinct from, but contribute, to subjective norms (the latter referring to perceived social pressure around a behavior). If one perceives that their friends, family, or partner approves of a behavior, they will feel increased pressure to engage in the behavior, the theory suggests.

Yet another type of beliefs, control beliefs, contribute to perceived behavioral control and concern resources and opportunities that contribute to the perceived ease or difficulty of performing a behavior. These beliefs involve the presence or absence of relevant resources and opportunities as well as obstacles and impediments. Applied to STI screening, positive control beliefs indicate that one perceives access to the resources and opportunities that facilitate STI screening (i.e. proximity to a clinic and time to attend), increasing their perceived behavioral control, and thus intention.

The above model provides interesting insight into the socio-cognitive factors that influence decision-making and may have promise in predicting STI screening behaviors. Although we would suspect varying attitudes across the population, individuals may have relatively positive attitudes towards screening (feel screening is positive towards their health). Similarly, individuals may also perceive relatively high volitional control over the execution of an STI screening. However, it may be unlikely that positive subjective norms are widely held for STI screening behaviors. As Azjen (1991) explains, normative beliefs contribute to subjective norms. So a population with low normative beliefs will not
perceive high social pressure (subjective norms) to engage in a behavior. If there is significant room for improving normative beliefs, they may be a promising target for improving STI screening. It is important to better understand the relationship between the TPB and STI-preventative behaviors. And because little prior research has been devoted to the applicability of the TPB to STI screening, we turn to the deep body of literature investigating the TPB and condom usage for insight into the cognitive precursors to STI prevention.

**The Theory of Planned Behavior and Condom Usage**

Relevant to the present discussion, much research has applied the TPB to understanding and predicting condom use as an STI-preventative behavior. A meta-analysis of the TPB and condom usage by Albarracín, Johnson, Fishbein, & Muellerleile (2001) found that perceived control over condoms use and intention to use condoms correlated with future condom use, $r = .25$ and $r = .45$, respectively. They found that attitudes towards the behavior were the strongest predictor of intention ($r = .58$), and that perceived control and subjective norms correlated with intention to use condoms, $r = .45$, and $r = .39$, respectively (Albarracín et al., 2001). The above findings are consistent with the others presented in the greater body of literature.

Reinecke, Schmidt, & Ajzen (1996) surveyed a sample of 650 heterosexually active individuals aged 14 to 24 years old over the course of one year to assess whether attitudes, subjective norms, and perceived control predicted their intentions to use condoms. Survey items used largely 7-point scales to assess intention, attitudes, subjective norms and perceived control at initial screening and after one year. For example, the authors gauged intention, asking, “Suppose you met a new partner and wanted to have sex with him/her,
would you use a condom? ... 1 (very likely) to 7 (very unlikely)." Responses at follow-up were only included for the 172 (26.5%) of respondents that had sex with a new partner within the year. Their analyses concluded that attitudes, norms, and PBC all predicted intention to use condoms (Reinecke et al., 1996). Further, that perception of control and intentions, measured at follow-up, predicted actual reported condom usage, consistent with the findings of Albarracín et al. (Albarracín et al., 2001; Reinecke et al., 1996). Montanaro & Bryan (2014) compared the theoretical constructs in the TPB and the Health Belief Model (HBM), introduced above, which excludes perceptions of pressure to engage in a behavior, in an intervention to increase preparatory condom use (behaviors precluding usage, like buying condoms and talking to partners). They reported greater predictability by the TPB than the HBM over condom use because the distinct elements of the HBM, namely perceived susceptibility to disease, did not strongly predict intention or behavior. Although the HBM includes factors outside of the TPB, these authors indicated that the factors within the TPB more closely accord with intention. And although both theories account for attitude and self-efficacy, the TPB’s exclusion of perceived susceptibility made it a better overall predictor of intention.

**Applying the Model Across Subpopulations**

As mentioned above, Albarracín et al. (2001) found that attitudes, subjective norms and PBC predict intention variably. A number of authors highlight this variation across subpopulations, also reporting stronger predictability of intentions by attitudes than by either norms or PBC. Jemmott & Jemmott (1991) investigated survey data from over 100 hundred female, black university students on their attitudes, subjective norms, and condom
use. They found that both attitudes and norms predicted intention to use condoms, but that attitudes had a stronger predictive influence (Jemmott & Jemmott, 1991).

Barbara Rye (1999) reported that attitudes and subjective norms significantly predicted intention, where PBC did not, in their survey of undergraduate women. The study examined whether the TPB had additional predictive utility above the Theory of Reasoned Action, which does not include perceived behavioral control. Chan & Fishbein (1993) present similarly found poor predictability of PBC in college women. They explain that there are more barriers to condom use for women (like embarrassment discussing with partners), potentially limiting female’s perceived control over this behavior. Neither they nor Rye (1999) survey and compare their samples to males, so it is inappropriate to draw conclusions about sex differences from these findings. But, for the sake of this review, it is important to reiterate that both Rye (1999) and Chan & Fishbein (1993) reported that attitudes and subjective norms predicted intention in their female populations. Ross & McLaws (1992) similarly found that PBC did not predict intention in homosexually active men, reporting that subjective norms were the most salient predictor (over both PBC and attitudes) in this subpopulation.

A more recent meta-analysis by Albarracín et al. (2004) indicated additional variation in the predictability of attitudes, norms, and PBC in different segments of the population. They divided the population into societal groups that either ‘lack power’ or have ‘greater access to informational social support.’ The former group contained females, younger people, ethnic minorities, and those with lower education levels. Perceptions of control correlated more strongly with intention to use condoms than attitudes or subjective norms in this group. Norms had the largest influence on the intention to use
condoms in the latter group, which was comprised of males, ethnic majorities, and those with higher levels of education (Albarracín et al., 2004).

Despite the group differences presented above, Albarracín et al. (2001) determined their initial meta-analysis model worked across subpopulations, indicating that the TPB plausibly predicted behavior across groups. Essentially, they indicate that the correlations they found between attitudes, subjective norms, and PBC with intention ($r = .58$, $r = .39$, and $r = .45$, respectively) endure despite group differences, affirming that attitudes are the strongest predictor of intention in the general population.

To complete this review, it is imperative to highlight the influence of a salient factor outside of the TPB model given its high predictability over behavior: past behavior. Albarracín et al. (2001) found that past behavior, or prior condom usage, is a salient predictor of future intention to use condoms. They reported a stronger correlation between intention and past behavior ($r = .57$) than between intention and future behavior ($r = .47$). This finding is consistent with several other findings (Reinecke et al., 1996; Kashima et al., 1993; Albarracín, Kumkale, & Johnson, 2004; Ross & McLaws, 1992). Albarracín, Fishebein, & Middlestat (1998) report that past condom usage predicted intention in a Caribbean population. And, in direct support, Jostein Rise (1992) reports a stronger effect of past behavior on intention than either attitudes or norms in Norwegian adolescents.

Although extra-model factors can predict behavior, the above review indicates that the TPB shows strong predictive influence over behavior and intention. Specifically, that attitudes, followed by subjective norms and PBC, are the strongest predictors of intention to use condoms in the general population, (Albarracín et al., 2001; Montanaro & Bryan, 2014; Jemmott & Jemmott, 1991; Rise, 1992). It is important to note that there is
heterogeneity across studies; certain subpopulations may be more responsive to norms and PBC as a mediating influence of intention than others.

**Factors that Influence STI Screening**

Past application of the TPB to condom use has some utility in helping identify and prioritize targets for STI screening interventions. However, there are considerable differences between choosing to use a condom and choosing to get screened for an STI. There are distinct barriers to STI screening that do not influence condom usage. Where one can privately purchase and use condoms, one must schedule and execute an STI screening in a more public setting. Particularly on college campuses, scheduling and attending an appointment with a health care provider involves more effort and increased risk of being identified by friends and classmates (for example, while waiting at a clinic area. STI screening can involve invasive or uncomfortable procedures, like pap smears or blood samples. Additionally, as cited above, the CDC reports discomfort discussing sexual health, in general, in the age cohort most susceptible to infection (15-24 year olds).

It is likely that the role of normative beliefs, as defined in the TPB model, is particularly salient here. Although minimal study has been devoted to the TPB’s prediction of STI screening behaviors, a number of researchers explore related factors that mediate the behavior. As expected, unsupportive normative beliefs and stigma emerge as pertinent barriers to screening (Barth, Cook, Downs, Switzer, & Fischoff, 2002; Mulholland & Wersch, 2007; Lichtenstein, 2003; Goldenberg, Shoveller, Koehorn, & Ostry, 2008; Fortenberry et al., 2002). Lichtenstein (2003) conducted focus group interviews to evaluate the factors contributing to disproportionately high STI rates in the American Deep South. He uncovered that STI-related stigma influences individuals’ willingness to seek screening.
More specifically, religious ideation about promiscuity, fear of privacy at local clinics, and shame or fear of being ‘tainted’ inhibited screening in the population. Mulholland & Wersch (2007) also confirmed the influence of STI-related stigma on screening attendance. In interviewing 10 patients at a genito-urinary medicine clinic, they found that shame contributed to the stigma surrounding STIs, which influenced participants’ willingness to attend the clinic. Fortenberry et al. (2002) found that previous suspicion of having gonorrhea and low levels of stigma were independently associated with screening. Conversely, subjects without a gonorrhea or HIV test in the last year reported higher levels of stigma and shame. These findings indicate that self-reported perceptions of stigma and shame coincide with willingness (or a lack there of) to get screened. These authors provide insight into a number of factors that may contribute to social perception and pressure to get screened, but devote little attention in their research to the explicit study of norms themselves. Although the salience of norms is not well studied in the general population, evidence suggests that normative beliefs may influence STI screening behaviors in college students.

**Barriers to Screening in Undergraduates**

Barth et al. (2002) interviewed a population of undergraduates to isolate the factors that mediate treatment seeking in this population. They commonly found that participants were concerned with what others think, were embarrassed to get screened, perceived negative social norms, or felt that sex and STI screenings are private matters. Although the authors do not precisely define norms, they measured concerns with ‘what others think’ in their survey, which maps more closely to the definition of normative beliefs (approval or disapproval of referent groups) than subjective norms (perceived pressure to engage in a
behavior) used by Icek Ajzen (1991) in the TPB. Godin et al. (1993) also investigated norms in their examination of the socio-cognitive influences of seeking care promptly if STI symptoms are detected in college students. They explained that the perceived advantages and ease of access to care and social norms among friends accounted for a large portion of the variance in intention to get screened. These authors similarly did not map their norm definitions directly to the TPB. They measured perceived norms similarly to normative beliefs, asking subjects to rate how strongly they think their friends (referent group) think they should seek STI care. These results provide support that negative normative beliefs are barriers to screening in the college population.

It is important to reiterate that the TPB model indicates that normative beliefs influence subjective norms. Subjective norms correlate more strongly with intention than normative beliefs do with respect to condom usage. It is unclear whether this is the case with STI screening. Barth et al. (2002) and Godin et al. (1993) indicated that normative beliefs might relate more closely to intention to seek STI screening than subjective norms. However, little study has carefully defined and applied normative beliefs to STI screening within the TPB model. This represents an important gap in this literature. Because of this, the present study aims to closely measure associations between normative beliefs, subjective norms, STI screening behaviors, and intention.

**The TPB and Other Screening Behaviors**

Several authors have investigated the role of normative beliefs and subjective norms, within the TPB, over non-STI screening behaviors in a clinical setting. Norman & Conner (1993) indicated that support from referent groups (normative beliefs), attitudes about the efficacy of seeking treatment, and perceived behavioral control all predicted
TPB AND STI SCREENING

Attendance at non-STI related health checks such as heart screenings. Although these authors examined constructs that are included in the TPB model, they did not apply the theory directly to predicting screening. Their findings highlight that normative beliefs correlate with intention to attend health checks. This creates further demand that the present study carefully defines and measures attitudes, norms, and PBC to provide concrete extension of the TPB into screening behaviors. Sweeney, McAnulty, Reeve, & Cann (2015) evaluated the influence of a TPB-based intervention on screening in the context of HPV risk reduction in college-aged women. Facilitators lead a single group counseling session providing an HPV educational message guided by the TPB. The intervention increased knowledge of HPV, behavioral intentions, and HIV testing. Increases in attitudes and subjective norms towards risk reduction behavior were uncovered post-intervention, but not at one month follow up, contrary to hypotheses. The authors concluded that their intervention was not successful in changing perceived social pressure (Sweeney et al., 2015). This is the case, they explain, because norm scores were low pre-intervention and did not change much following the intervention. Sweeney et al. (2015) explain that participants did not perceive much social pressure to engage in risk-reducing behaviors. Because the author’s intervention failed to significantly influence norms, it is inappropriate to draw conclusions about the efficacy of a norms-based intervention at changing screening behavior. However, these findings indicate some potential complexity in building interventions that aim to manipulate norms. Norms may be too robust and difficult to influence in a short single session intervention. With this in mind, the present study will consider longer exposure intervals for sharing norming messages.

**Previous Interventions to Improve STI Screening**
Looking outside of the TPB model, a number of previous researchers document the efficacy of clinic, community, and social marketing-based interventions to increase screening for a number of STIs. Peterman & Carter (2016) tout the efficacy of clinical interventions that aim to make STI screening an automatic addition to other tests, discussing an example: automatically screening for syphilis in men who have sex with men when they draw blood for indicators of HIV. Automatic screening programs, they report, are low cost and highly effective interventions to prevent syphilis. Relevant to addressing STI-related stigma, Frye et al. (2017) discuss the implementation of project CHHANGE. This project involved community engagement in anti-stigma and anti-homophobic messaging via workshops with local residents, business and community-based organizations as well as pop-up events and a bus stop ad campaign. The authors conclude that their model feasibly penetrated the community, improving the perception that gay and HIV-related spaces are important, non-stigmatized, community resources. They also discuss, in accordance with the above review, the importance of this stigma improvement to reducing barriers to screening. It is important to recognize, however, that community based interventions, like this one, are both resource and time intensive.

Media driven marketing campaigns have demonstrated the ability to reach large populations, improving STI-related knowledge, awareness of the consequences of risky behavior, and normative perceptions and expectations around sexual health behaviors (Friedman & Colleagues, 2016). The Get Yourself Tested (GYT) campaign is a national prevention campaign combining on-the-ground events with social media outreach on Facebook and Twitter. This multi-faceted approach contributed to 140,000 referrals on their STD testing locator, an online service that connects users with clinics in their area,
between 2009 and 2010 (Friedman et al., 2014). From April 2008 to 2010, the researchers observed a 71% increase in STD testing at 118 affiliated Planned Parenthood clinics that coincided with campaign activities (Friedman et al., 2014). Health communication campaigns, like GYT, have tested several approaches to improving STI screening and prevention. Friedman & Colleagues (2016) review and identify the common themes that make health communication and social marketing interventions successful. Relevant to the present analysis, they advise that good interventions include a basis in behavioral theory, access to resources to support behavior change (STI screening in this case), adequate audience exposure to the campaign, as well as audience tested outreach materials.

The Current Study

The present study built on the recommendations of Friedman & Colleagues (2016), including a basis in the TPB, linking outreach materials with a contact for the health center, and attempting to saturate the campus with ubiquitous distribution. Given the novelty of the application of normative belief messaging in STI screening and the time constraints of the project, materials were not pre-tested by the audience. The resulting intervention is informed by the above review. Given that subjective norms are so central to predicting condom usage, the present study will further investigate their role in screening behavior. The findings of Barth et al. (2002) and Godin et al. (1993) indicate that normative beliefs may have important predictive power over screening behaviors as well. The potential predictive power of both normative beliefs and subjective norms over screening behavior provides clear rationale for the design of the present study. In light of this support, this study aims to target both normative beliefs and subjective norms as a means to improve screening rates. And because the TPB has shown such promise in predicting condom usage
as an STI prevention behavior, the present study aims to explore the importance of normative beliefs, subjective norms, and attitudes, within the TPB model in an intervention to improve intention to get screened.

The current study examined the influence of an intervention, primarily targeting normative beliefs, over both intention to get screened for STI’s and actual screenings at a small liberal arts campus. It involved two short-term studies with a pre- and post-test design. Both studies employed the use of a single outreach campaign primarily targeting normative beliefs in between two time points. Study 1 addressed whether the outreach campaign alters attitudes, norms (normative beliefs and subjective norms), perceived behavioral control, and ultimately, the intention to get screened for STI’s. Study 2 sought to examine whether the outreach campaign affected changes in attempts to get screened (behavior) based on anonymous data that was to be collected from the campus health center.

The above review indicates that attitudes and past behavior are the most salient predictors of intention to use condoms. However, consistent with our discussion, we suspect that normative beliefs and subjective norms may be even more salient predictors of STI screening, particularly in a college campus setting. We conducted a brief survey the year prior that indicated norms might be more salient in targeting STI screening than condom usage. These unpublished survey data indicated that students perceived their friends (referent group) to hold STI screening as less important to their health as condom usage. Students rated higher agreement on a 7-point likert scale with a condom norming statement (M=1.84, SD=1.114) than with an STI one (M=2.96, SD=1.294), in Figure 2 below. Because STI screening norms were so poorly established (relative to condom usage), and
because STI screening is not discussed often (compared to condom usage), we suspected that a norming messaging campaign could change perceived norms significantly. Essentially, there is a lot more room for improvement with respect to screening norms than condom use norms. We anticipated this significant room for improvement would enable a manipulation of normative beliefs to significantly influence intention and screening behavior. We predicted that past behavior would remain a central predictor of intention for STI screening, as it is with condom use. We also predicted that women would have higher overall intention to get screened because women may encounter screening resources more often than men with regular visits to a gynecologist. Because men may have more room for improvement in this regard, intention should change more over time in men than in women.

Our marketing intervention centered on increasing the perception that students’ peers get screened regularly for STIs. Increasing this perception should target normative beliefs, increasing the perception that one’s peers approve of frequent STI screening. Because normative beliefs contribute to subjective norms, we suspected that the intervention would influence subjective norms as well. The norming messages are described in the methods section below. Based on this information, and the data provided in Figure 2, we generated the following hypotheses:

**Study 1:**

1. A behavioral messaging intervention would increase both normative beliefs and subjective norms around screening.
2. The intervention will improve attitudes about screening.
3. The intervention will increase intention to get screened.
4. Attitudes, norms, and PBC will mediate changes in intention, but norms will account for the most change in intention.¹

5. At each time point attitudes, norms, and PBC will predict intention.

6. Past behavior will be a strong predictor of intention.²

And the following Exploratory Hypotheses:

7. Women will have higher intention to get screened.

8. Intention will increase more over time in men than in women.

9. Social norms will increase more over time in men than in women.

10. Women will have more prior screenings than men.

Study 2:

1. The intervention will increase screening behaviors (both the number of appointments made at the school health center, and the number of phone calls to make appointments).³

Methods.

The present study targeted the entire student body at Haverford College, a small liberal arts college outside of Philadelphia, Pennsylvania that houses 1318 students (633 males, and 685 females).

Study 1.

Students were asked to complete a series of measures online both before and after the outreach campaign that assessed attitudes, subjective norms, normative beliefs, PBC,

¹ This hypothesis differs slightly from the one submitted in preregistration due to an error on behalf of the authors.

² Here we mean that PBC will correlate strongly with intention.

³ Because attitude, norm, and intention data are collected via survey and behavior data is collected by the health center, we cannot link participants’ survey and behavioral data. We therefore could not draw conclusions about changes in attitudes, norms, or intention, and corresponding changes in behavior.
intention to get screened, as well as knowledge about STI’s, screening history and demographic information. Students were recruited with a pre-intervention survey via the ‘hc-allstudents’ email list serve. Survey one (Time 1 (T1)) was disseminated between January 29th and February 5th, 2018. We launched and ran our messaging campaign (described below) from February 6th to March 6th, 2018. The post-intervention survey (Time 2 (T2)) was sent only to those students who completed Time 1 and was active between March 6th and March 13th, 2018. The battery of measures completed at Time 1 and Time 2 were identical. Data from each time point were analyzed separately to establish relationships among variables included in the TPB model. We also conducted within-subjects t-tests and related samples ANOVAs to examine change over time with respect to the model components.

**Design and Measures**

**Sample.** Our subjects were mostly white (n = 52 White, 6 Black, 5 Asian, and 4 Hispanic), 19 (28.4%) males, (67.2%) females, and 3 (4.4%) gender non-binary.

**Measures.** Survey measures were adapted from similar questions in condom TPB studies. Our measures evaluating attitudes, subjective norms, PBC, intention, and confidence in ability to get screened were adopted from the TPB measures used by Montanaro & Bryan (2014). Additional self-efficacy items were adopted from Brien, Thombs, Mahooney, & Wallnau (1994) partner disapproval and assertiveness measures. Although these are self-efficacy measures, they have previously been used to evaluate PBC (E. Montanaro, Personal Communication, November 17, 2017). We exclude Brien et al.’s (1994) measures of condom mechanics and intoxication because of limited relevance to the present analysis.
One item each, regarding norms and PBC, were adopted from Reinecke et al., 1996. Item-by-item changes to measures are tracked in Appendix 1.

Attitudes were measured using a 7-point likert scale evaluating individual’s beliefs about how valuable, healthful, beneficial, pleasant, good, enjoyable, and rewarding condom usage is. These items were modified to ask about STI screening and the attitude scale consisted of 6 items at T1 ($\alpha = .726$) and at T2 ($\alpha = .804$). Subjective norms were measured using a 7-point agreement scale evaluating individual’s perceptions of referent approval or disapproval over condom usage. The subjective norms scale was modified again to ask about STI screening and consisted of 12 items at both T1 ($\alpha = .881$) and T2 ($\alpha = .888$). PBC items were also modified to measure STI screening, asking subjects to rate their perceived ability to execute a future screening using 7-point likert scales. This scale consisted of 7 items at both T1 ($\alpha = .812$) and T2 ($\alpha = .741$). The intention scale consisted of 4 items at both T1 ($\alpha = .647$) and T2 ($\alpha = .818$). This scale asked subjects to rate the likelihood that they would get screened and discuss screening with a partner in the next 3 months. According to Nunnally, J.C. (1978), scales with alpha values above .700 are considered reliable. Because our alpha value for intention at T1 did not pass this threshold, analyses for intention were also run using solely the first item in the scale, which asks, "How likely is it that you will get an STI screen in the next three months?" Although we do not have a validated measure for normative beliefs we used item one, of Montanaro & Bryan’s (2014) 11-item measure to track normative beliefs. This item measures perceptions of subjects’ friends’ screening behavior, which we suspect corresponds very closely with friend’s approval of the behavior. The study also tracked changes in the knowledge that STIs are sometimes asymptomatic.
**Study 2 Design and Measures.** Study 2 aimed to evaluate the influence of our intervention on STI screening behavior exclusively. We planned to compare anonymous patient data from the school’s health center across two time periods. We tracked the number of sexual health visits from November 2017 to March 2018 (pre and post intervention) and sought to compare the number of visits both before and after the intervention and during the same period the year prior. Because the health center had limited staff and there was a limit to the number of sexual health appointments they can execute on a given week, we also planned to track the number of students who called to schedule a visit during the same interval. By these methods we sought to measure both the number of STI screens (main behavioral outcome) before and after the intervention and across the same time period the year prior. We also aimed to measure changes in the demand for STI screening appointments (secondary behavioral outcome) before and after the intervention.

**The Intervention.** The intervention will distribute norming messages across the campus in two main ways: large visual posters in the dining center and highly trafficked campus buildings and through flyers posted in the dining center and campus cafe. The norming messages will attempt to influence normative beliefs. These messages are informed by the clinical expertise of Dr. David Bell, the Medical Director of the Young Men’s Clinic at Columbia University Medical Center/New York Presbyterian Hospital in New York. The CDC recommends that sexually active women under 25 should get screened for chlamydia and gonorrhea at least once per year (“Screening Recommendations,” 2016). However, Dr. Bell advises that the intervention should establish the perception that all sexually active persons (regardless of gender) under 25 should get screened at least once
per year (D. Bell, Personal Communication, November 16, 2017). He urges that doing so will help decrease the prevalence of chlamydia and gonorrhea in this high-risk undergraduate population. Dr. Bell advises that the marketing campaign include the following messages:

1. That students on campus engage in regular STI screening.
2. That STIs are often asymptomatic. (D. Bell, Personal Communication, November 16, 2017).

These messages are packaged to include this information while targeting normative beliefs. In consulting with Dr. Bell, we decided that the most effective way to increase perceived referent approval over screening behavior was to increase the perception that one's peers get screened regularly. Although the messages do not target changes in approval directly, we suspect that changes in perception of approval will directly correspond with changes in perception that one's peers get screened regularly. The messages include acknowledgement of the fact that STIs can be asymptomatic because Dr. Bell urged that it was important to include a more urgent reason that all students should seek screening in the outreach campaign. The campaign comprised of five separate quotes from an anonymous student:

1. “I get screened every January like I go to the dentist because STIs often don't show symptoms.” - Haverford College Student.
2. “I think my friends and I should get screened for STIs every year.” - Haverford College Student.
3. “I aim to ask my partners if they know their status because STIs are often asymptomatic.” - Haverford College Student.
4. “My partner and I just started dating and we both got tested together even though neither of us had symptoms.” - Haverford College Student.

5. “I get tested between partners because STI symptoms are easy to miss” - Haverford College Student.

Health Communication efforts enable the public health community to increase a target audience’s knowledge and awareness of certain issues, refute misconceptions, and prompt action (“Making Health Communication Programs Work,” 2010). Social marketing campaigns aimed at college students have demonstrated efficacy in increasing awareness of health issues and improving relevant behaviors related to alcohol abuse and sexual assault (Turner, Perkins, & Bauerle, 2008; Sharyn J. Potter, 2010). Given the significance of norms as a barrier to screening behaviors, we anticipate a public outreach campaign will impact these behaviors.

In approaching the design of our marketing campaign, we followed the recommendations of the U.S. Department of Health and Human Services as outlined in their “Making Health Communications Programs Work” guidebook. They advise entities to A) define the campaign goal effectively, B) define the intended audience effectively, and C) to create messages effectively. To this end, we A) aimed to increase intention to seek STI screening on a college campus, B) targeted a subpopulation of high-risk young adults, and C) consulted with a family planning expert to craft salient messages that target our hypotheses.

Results

Study 1
Subjects. The T1 survey was distributed to the ‘all-students’ email list serve and returned 405 responses. Emails were collected separately from answers from 365 of these respondents. The T2 survey was sent only to these 365 students because we aimed to run within-subjects analyses. In order to maintain anonymity, we asked subjects to come up with a 6-digit code at T1 to provide again at T2. T2 yielded 189 respondents. After data cleaning, we were able to match answers for only 67 subjects. Thus, our total sample was much smaller than what we had sought. Subjects were excluded if they spent less than 3 minutes on the survey and if they failed to provide an identifying code.

Manipulation check. Analyses were run twice for our first three hypotheses to compare results from all 67 subjects with those who report proper exposure to the intervention. The first set of t-tests was run with all 67 of our subjects. The second set attempted to remove subjects that failed our manipulation check. Subjects were excluded from analyses if they reported not seeing the intervention and/or if they failed to accurately report on the content of our posters. Subjects were asked to report back the content of the messaging campaign in a ‘select all that apply’ survey item. Subjects that selected ‘STI screening’ and no more than one additional incorrect answer were deemed appropriately exposed to the intervention. The second set of t-tests was run again with the remaining 42 subjects who were exposed to the intervention.

Preliminary results. In the last 6 months, 49 subjects reported having intercourse. Over half of our 67 participants reported being screened for an STI within the past year (55.2%; n = 37). Of the 37 screened, 10 were screened on campus at the health center, 15 were screened off campus (non-gynecologist), 9 were screened off campus at a gynecologist, and 3 were screened elsewhere. Correlational analyses were run at each time
point to test the extent to which each of the variables within our model relate to one another. The surveys revealed significant correlations between attitudes, subjective norms, PBC, and intention at each time one and time two (Table 2 & Table 3.) Further bivariate correlation analyses revealed that past behavior correlated significantly with intention at T1 \( r = .33, p < .01 \) but not at T2 \( r = .22, p = .074 \), per hypothesis 6.

**Study outcomes.** Our first three hypotheses predicted that the behavioral intervention would increase subjective norms, attitudes, and intention to get screened, respectively. A composite score (average) was computed for each of our multi-item measures (attitudes, norms, PBC, and intention) and paired-samples t-tests were run to compare means. Counter to our hypotheses, the behavioral messaging campaign had no significant effect on attitudes, subjective norms, PBC, or intention (Table 4). The first item on the intention measure was analyzed again separately because it more closely measures intention to seek STI screening than the composite of all four items. There was no significant difference in answers to item 1 (Table 4). We repeated the above analyses for the 42 subjects that passed our manipulation check. Again we found no significant influence of the intervention over time on attitudes, subjective norms, PBC or intention. Analyses were run a final time to remove sexually inactive subjects (reporting no intercourse in the last 6 months). This also yielded no significant results. Compatible with hypotheses, we found that the messaging campaign had a significant influence on the knowledge that STIs are often asymptomatic (Table 4). Subjects rated higher familiarity with this knowledge at T2 \( M = 5.99, SD = 1.20 \) than at T1 \( M = 5.46, SD = 1.52 \), \( t(66) = -2.97, p = .004 \). This indicates that short exposure to a public messaging campaign can
significantly impact knowledge. Implications for educational campaigns are discussed below.

Hypotheses 4 anticipated that attitudes, norms, and PBC would all statistically predict intention. To test whether these variables predict intention, we ran a multiple regression. Attitudes, subjective norms, and PBC all relate significantly with intention to get screened at each time point (except for PBC at time one), consistent with the literature review above. Multiple regression analyses were run for each time point to assess the extent each variable predicts intention. Attitudes, subjective norms, and PBC explained 24.3% of the variance in intention at T1 ($R^2 = .243, F(3,63) = 6.73, p < .005$). Of these factors, only attitude independently predicted intention ($b = .296, p < .05$). At T2 attitudes, subjective norms, and PBC accounted for 21.4% of the variance in intention ($R^2 = .214, F(3,66) = 5.422, p < .005$). At this time period, subjective norms, but not attitude, significantly predicted intention ($b = .354, p < .05$).

**Normative Beliefs.** As mentioned in the methods section above, the first item of Montanaro & Bryan’s (2014) 11-item norms measure was used to track normative beliefs (“Most of my friends get screened for STIs regularly?”). A separate paired-samples t-test was run to test the effect of the intervention on normative beliefs. There was no significant difference in answers to item 1 between T1 ($M = 3.05, SD = 1.68$) and T2 ($M = 3.14, SD = 1.90$), $t(64) = -1.10, p = .277$. After controlling again for exposure, there were still no significant differences between T1 ($M = 3.29, SD = 1.38$) and T2 ($M = 3.60, SD = 1.41$), $t(41) = -1.59, p = .119$.

**Exploratory Hypotheses.** Investigating gender differences, we stated four exploratory hypotheses: that women will have higher overall intention to get screened, that
intention will increase more over time for men than women, that norms will increase more over time for men than women, and that will have more prior screenings than men. A repeated measures ANOVA between sex and intention (item #1) revealed no significant main effect of time on intention $F(1,62) = .629, p = .421$. Nor was there a significant interaction between gender and intention $F(2,62) = .047, p = .954$. Intention did not differ significantly for men and women regardless of time $F(1,62) = .319, p = .728$. Similarly, a repeated measures ANOVA between gender and subjective norms revealed no significant main effect of time on norms $F(1,62) = .000, p = .986$. There was no significant interaction between gender and norm scores $F(2,62) = .189, p = .388$. Subjective norms did not differ significantly for men and women regardless of time $F(2,62) = .211, p = .810$. An independent samples t-test revealed no significant differences in past behavior (prior screening at T1) between men ($M = 1.84, SD = .375$) and women ($M = 1.60, SD = .375$), $t(62) = 1.91, p = .061$.

**Study 2.**

The school’s Health Center was unable to provide reliable data for our analyses. As explained above, we asked them to record phone calls for incomplete appointment requests between November 2016- March 2017, as well as provide numbers of documented appointments between November 2016- March 2017 and November 2017- March 2018. Despite repeated requests and instructions on how to collect data per the research design, data were not collected for phone calls resulting in incomplete appointment request. Data for the interval December 2018- March 2018 differed from data that had been recorded previously. We received a handwritten list rather than anonymous patient data from a master database. It was unclear whether data for this interval coincided
with actual appointments in the Center’s medical records. What data were collected were incomplete and inconsistent, and, in our estimation, unreliable. Moreover, the nurse that typically sees sexual health appointments suffered an unfortunate accident in the early Fall of 2017. She was unable to see patients through March 2018 and this significantly hindered the Health Center’s ability to fulfill sexual health appointments. We suspected that any analysis of these data collected would lead to misinformed results and we therefore decided to abandon the second portion of the study.

**Discussion.**

The present study sought to explore the effects of a behavioral messaging campaign targeting subjective norms and normative beliefs on intention to seek STI screening. The fact that the campaign significantly increased knowledge that STIs are asymptomatic demonstrates that our campaign was able to effectively disseminate accurate information about STIs to students. However, our effectiveness in increasing knowledge did not extend to an ability to sufficiently manipulate attitudes, norms (subjective or normative beliefs), PBC, or intention to get screened. The lack of significant effects could be attributed to several factors including the following: A) our analyses lacked statistical power due to too few subjects, B) the measures adopted from the condom literature did not adequately measure the constructs central to our messages, C) subjects were not exposed sufficiently to the messaging campaign; or D) the messages did not meaningfully address factors that influence intention.

Nearly all of our analyses yielded no significant results with our 67 useable subjects. As previously mentioned, subjects were asked to come up with a 6-digit identifying code and share it with us at both time points. They were prompted to use some combination of
their birthday, address, phone number, or other easy to remember set of numbers. We initially aimed to ask subjects for a simple combination of their phone number and birthday to ensure retention. However, the school’s Institutional Review Board indicated that codes needed to be more random to ensure anonymity. Although 189 participants took both surveys, only 60 remembered their codes at the time of the second survey. Data for the remaining 7 subjects were obtained by matching IP addresses with background information, like sex, race, and age. Future similar studies should collect identifying data to prevent loss of valuable data. As noted when comparing means in the above results section, there were observable increases in both norms and intention between time points. It is possible that these increases would carry statistical significance with a larger sample size. The observed increase in knowledge following the intervention indicated that subjects saw and retained information on our posters. We are hopeful that they also retained some of the subtler norming messages, causing a small increase in both subjective norms and intention.

With respect to measurement, it is possible that our measures did not accurately capture the intended constructs. Because of the lack of published literature on the application of TPB toward STI screening, our measures were adapted from condom studies. To support our analyses we thought it best to rely on validated tools that measure TPB constructs in the context of STI prevention. Further, the Cronbach’s alpha values presented above indicate that these measures had strong internal validity. However, we examined our measures more closely and uncovered some interesting limitations. Foremost, three of the four items on the measure for intention involve plans to discuss screening with existing or future partners; discussing plans makes more sense in the context of condom usage than
STI screening. Although discussing prior screening may be important to decisions to use contraception, it may not relate closely to intention to get screened in the future. The act of using condoms occurs during sexual activity, which involves one’s partner. In contrast, one can, and may, seek screening in private, without consulting past, present, or future partners. Thus, discussing STI screening is not as closely related to intention as is discussing condom use. For this reason, we ran our intention analyses with the first item in this measure only, which explicitly measures intention to seek screening. Measuring intention with only one item, rather than an entire validated measure, may have hindered our ability to accurately capture and track changes in intention over the course of this study. Moving forward, researchers should seek to better operationalize and measure intention.

Another limitation pertains to how we measured norms. For the purpose of this analysis, we were interested in tracking subjective norms (perceived social pressure to engage in screening) and normative beliefs (perceived approval or disapproval of referent groups over screening behavior). The norms measure we adopted from Montanaro & Bryan’s (2014) subjective norms condom measure raised similar concerns regarding how well items translated to STI screening. The first item in this measure tracks perceptions that a subject’s friends get screened regularly, which we thought relates to perceived approval of the behavior (or normative beliefs). The remaining ten items track whether or not certain referent groups (friends, family, partners, and doctors) think one should or should not get screened.

In the context of screening, this seems like an accurate way to capture normative beliefs. However, when asking whether or not referents think one should or should not
engage in condom usage, these items may more closely measure perceived pressure to engage in the behavior (subjective norms). To clarify, these items may track subjective norms with respect to condom usage and normative beliefs with respect to screening, even with similar wording, because of the context in which one engages in each behavior. Because condom usage is more commonplace in this population (compared to screening), perception that referents think one should use condoms translates more directly to *pressure to engage* in this behavior. In contrast, the perception that referents think one should get screened translates more closely to *approval* over the behavior than social pressure to engage in it. Essentially, it is expected that one uses condoms more readily than one gets screened. Because the items used in the present analysis are a validated subjective norms measure, it is inappropriate to apply them, in this study, to normative beliefs. It is important that future researchers create and define items that carefully measure both types of norms to disentangle the influence of subjective norms and normative beliefs on intention to get screened. However, it is important to note that these measure were selected intentionally because of their validation in related studies. Despite these limitations, this measure gave us valuable insight into norms held by students. It is more likely that a lack of statistical power accounted for the insignificant change in norms, than the limitations of this measure. This measure showed predictability over intention in a study with 204 participants; it may not be as effective in smaller samples (Montanaro & Bryan, 2014).

Regardless of the ability of these items to separately measure the influences of both types of norms, the present analyses revealed no significant influence of the intervention on attitudes, norms of any kind, or PBC. Although the intervention targeted normative
beliefs, we anticipated the campaign would influence attitudes as well. It is important to note that this intervention only ran for 4 weeks. This interval was selected because we felt confident that we could effectively disseminate information and penetrate norms in our intimate and small campus. Messages were placed in areas that are trafficked often and by many students. Although we thought this exposure paradigm would prove sufficient, it is possible that it was too short to significantly influence the socio-cognitive precursors to behavior. The intervention improved knowledge that STIs are often asymptomatic, but this message was a more overt part of the campaign. The norming messages were far subtler. It is likely that norms (both subjective and normative beliefs) are more robust, or difficult to change than knowledge. With this in mind, we must consider that our intervention did not run long enough to significantly influence norms. It is possible that a similar intervention with a longer exposure period could impact normative beliefs and we urge future authors to consider this in the design of later studies.

This outreach format shows promise for future educational campaigns. However, future communications efforts that aim to manipulate norms ought to consider the ability of posters to influence norms. It is likely that norms are more difficult to influence than knowledge. Perhaps posters in public locations are too passive and unidirectional to change normative beliefs. When one encounters one of our posters, they are not forced to interact with it beyond a brief reading. The poster may not elicit any discussion (internal or amongst peers) about norms. And without further engagement after reading, it is likely that subjects forget the content of the posters. And, thus, it is quite likely that they do not retain the subtler messages presented by the campaign.
One additional and final explanation for the failure of this study to influence norms and attitudes is that the messages did not accurately capture and target the constructs relevant to screening intention. As explained in the methods section, our messaging campaign sought to increase the perception that one’s peers get screened regularly. We thought that increasing this perception would correlate directly with increased perceptions of approval to get screened. Although the campaign sought to target normative beliefs, it did not target them directly. Instead of trying to increase the perception that peers get screened regularly, perhaps the intervention should have directly targeted perceptions of approval. For example, instead of posting, “I get screened every January like I go to the dentist because STIs often don’t show symptoms,” a direct manipulation of normative beliefs would read, “My friends should get screened every January like they go to the dentist because STIs often don’t show symptoms.” Instead of increasing perceptions that others get screened, the latter message insinuates that one's peers think they should get screened regularly. However, the present messages were selected and designed intentionally. Given the brevity of our exposure period, we thought it would be more complicated to target and change perceptions of what others think one should do, than to change perceptions of what others actually do. Future researchers should seek to target normative beliefs directly, with longer exposure periods.

Given past findings that normative beliefs are a salient mediator of STI screening behaviors, we remain confident that an intervention successfully targeting these beliefs could improve intention to get screened. Future study must address the methodological limitations of the present analysis, namely messaging duration, construct measurement, and sample size. Addressing these factors, further study into the relationship between
normative beliefs, intention, and screening behavior is justified. Future study must build off of these limitations as well as the success of projects like CHHANGE and GYT to design paradigms that adequately reach and expose target populations, manipulate norms, and reduce stigma. These projects indicate that interventions with long exposure periods and effective messages that normalize treatment seeking have the potential to reduce barriers to screening. Because of the limitations of the present analysis, we deem this investigation into the influence of a normative belief messaging campaign on intention to seek screening inconclusive. Our small sample size and short exposure interval likely accounted for our inability to measure change in this study. Had we recruited more subjects and exposed our population to norming messages for a longer interval, it is possible that we would have seen significant changes to normative beliefs and intention.

By the data presented above, one cannot evaluate the importance of normative beliefs on intention to get screened. The correlational analysis above indicate that, despite problems with our measures, the TPB model can accurately capture the relationship of attitudes, norms, and PBC with intention to seek STI screening. In the context of our review of the literature and the correlations between attitudes, norms, PBC, and intention we support the continued exploration of the TPB to STI screening behaviors. Our regression analyses indicate that both subjective norms and attitudes may have the ability to predict intention to get screened. Future studies must account for the limitations addressed in this section to better elucidate the TPB’s ability to predict screening behaviors. Specifically, later studies must clarify their measurements of subjective norms and normative beliefs and reconcile discrepancies with translating measures from the condom literature. Later interventions should directly target perceptions of approval over screening behaviors,
consider longer exposure intervals, and ensure the recruitment of larger subject pools.

Regular STI screening is critical to the reduction of STI rates in high-risk populations.

Targeting normative beliefs to improve intention to screen is a promising vehicle to address this pressing public health concern.
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Figure 1. The Theory of Planned Behavior. This figure indicates that attitudes, norms, and perceived behavioral control all predict intention, which predicts behavior, per the original model (Icek Ajzen, 1991).
Table 1

Preliminary Norms Survey Items

<table>
<thead>
<tr>
<th>Item</th>
<th>Question</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condom Norms</td>
<td>I think that my friends believe that condoms are an effective means</td>
<td>1.84</td>
<td>1.11</td>
</tr>
<tr>
<td></td>
<td>of preventing pregnancy and/or the transmission of STIs and HIV.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screening Norms</td>
<td>I think that my friends believe that getting screened for STIs is an</td>
<td>2.96</td>
<td>1.30</td>
</tr>
<tr>
<td></td>
<td>important part of maintaining their overall health</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: The two items in this figure attempt to measure students’ perceived norms with respect to condom usage and STI screening, respectively. Using a likert agreement scale (from 1-7), the mean reflects students’ average level of agreement with the norming statement. A higher mean reflects weaker norm agreement, or less agreement with the statement. It is important to note that these questions are not validated measures (and do not measure normative beliefs nor subjective norms) and that these analyses are preliminary, serving only to inform our hypotheses.

Table 2

Correlations Between Attitude, Subjective Norms, PBC, and Intention at Time One

<table>
<thead>
<tr>
<th>Variable</th>
<th>Attitude (T1)</th>
<th>Subj. Norms (T1)</th>
<th>PBC (T1)</th>
<th>Intention (T1)</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude (T1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.86</td>
<td>0.88</td>
</tr>
<tr>
<td>Subj. Norms (T1)</td>
<td>.600*</td>
<td></td>
<td></td>
<td></td>
<td>4.93</td>
<td>0.91</td>
</tr>
<tr>
<td>PBC (T1)</td>
<td>.318*</td>
<td>.277*</td>
<td></td>
<td></td>
<td>5.77</td>
<td>0.91</td>
</tr>
<tr>
<td>Intention (T1)</td>
<td>.450*</td>
<td>.430*</td>
<td>.179</td>
<td></td>
<td>3.70</td>
<td>1.26</td>
</tr>
</tbody>
</table>

*Note: Correlation between PBC and intention is not statistically significant. All other correlations, marked ‘*’ are significant to p < .05.
Table 3

*Correlations Between Attitude, Subjective Norms, PBC, and Intention at Time Two*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Attitude (T1)</th>
<th>Subj. Norms (T1)</th>
<th>PBC (T1)</th>
<th>Intention (T1)</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude (T1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.85</td>
<td>.88</td>
</tr>
<tr>
<td>Subj. Norms (T1)</td>
<td>.534*</td>
<td></td>
<td></td>
<td></td>
<td>5.01</td>
<td>.88</td>
</tr>
<tr>
<td>PBC (T1)</td>
<td>.364*</td>
<td>.347*</td>
<td></td>
<td></td>
<td>5.69</td>
<td>.91</td>
</tr>
<tr>
<td>Intention (T1)</td>
<td>.356*</td>
<td>.443*</td>
<td>.249*</td>
<td></td>
<td>3.82</td>
<td>1.46</td>
</tr>
</tbody>
</table>

*Note: All correlations marked ‘*’ are significant to \( p < .05 \).*
Table 4

Results of t-Tests for Effect of Intervention on Attitude, Subjective Norms, PBC, Intention, and Asymptomatic Knowledge

<table>
<thead>
<tr>
<th>Outcome</th>
<th>M (T1)</th>
<th>SD (T1)</th>
<th>M (T2)</th>
<th>SD (T2)</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>4.84</td>
<td>.87</td>
<td>4.73</td>
<td>.90</td>
<td>.562</td>
<td>66</td>
<td>.576</td>
</tr>
<tr>
<td>Subjective Norms</td>
<td>4.93</td>
<td>.91</td>
<td>5.01</td>
<td>.88</td>
<td>-1.01</td>
<td>63</td>
<td>.315</td>
</tr>
<tr>
<td>PBC</td>
<td>5.74</td>
<td>.93</td>
<td>5.66</td>
<td>.93</td>
<td>.966</td>
<td>64</td>
<td>.338</td>
</tr>
<tr>
<td>Intention Composite</td>
<td>3.68</td>
<td>1.26</td>
<td>3.79</td>
<td>1.47</td>
<td>-.776</td>
<td>64</td>
<td>.441</td>
</tr>
<tr>
<td>Intention Item #1</td>
<td>2.94</td>
<td>1.83</td>
<td>3.14</td>
<td>1.90</td>
<td>-1.10</td>
<td>64</td>
<td>.277</td>
</tr>
<tr>
<td>Asymptomatic Knowledge</td>
<td>5.46</td>
<td>1.52</td>
<td>5.99</td>
<td>1.20</td>
<td>-2.97</td>
<td>66</td>
<td>.004</td>
</tr>
</tbody>
</table>
Figure 2. Bivariate Correlations and Multiple Regressions at Time 1. This figure shows the correlations between variables at Time 1. The correlation between PBC and intention was insignificant. The bold, curved line shows attitudes significantly predicted intention to get screened.
Figure 3. Bivariate Correlations and Multiple Regressions at Time 2. This figure shows the correlations between variables at Time 2. The bold, curved line shows subjective norms significantly predicted intention to get screened.
Appendix: Study Measures

Items about Demographics/Background Information

1. How old are you?
   a. 17
   b. 18
   c. 19
   d. 20
   e. 21
   f. 22
   g. Other___

2. The (next/first) questions are about sexual intercourse. By sexual intercourse, we refer to oral sex (mouth to penis, vagina, or anus), vaginal penetration, and/or anal penetration.
   Now please think about the past 6 months. In the past 6 months, have you had sexual intercourse, even once?
   a. Yes
   b. No

3. What year are you at Haverford?
   a. First Year
   b. Sophomore
   c. Junior
   d. Senior
   e. 5th + Year

4. What best describes your racial or ethnic background? (select all that apply)
   a. Black or African American
   b. White or Caucasian
   c. Asian
   d. Hispanic/Latin(-o,-a,-x)
   e. Other _______

5. My biological sex is:
   a. Male
   b. Female
   c. Other___

6. My gender identity is:
   a. Male
   b. Female
   c. Transgender
   d. Other___
Items about Past Behavior

1. I have been screened for any form of STI (Sexually Transmitted Infection, i.e. Syphilis, Chlamydia, HPV, etc.) in the last 6 months.
   a. Yes
   b. No

2. I have been screened for any form of STI (Sexually Transmitted Infection, i.e. Syphilis, Chlamydia, HPV, etc.) in the last year.
   c. Yes
   d. No
Items Measuring Attitudes (Montanaro & Bryan, 2014)

We are interested in how you feel about STI screening. 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, getting screened for STIs would be...

Unhealthy 1 2 3 4 5 6 7 Healthy

Harmful 1 2 3 4 5 6 7 Beneficial

Unpleasant 1 2 3 4 5 6 7 Pleasant

Bad 1 2 3 4 5 6 7 Good

Worthless 1 2 3 4 5 6 7 Valuable

Unenjoyable 1 2 3 4 5 6 7 Enjoyable

Punishing 1 2 3 4 5 6 7 Rewarding
**Items Measuring Subjective Norms** (Montanaro & Bryan, 2014)

We’d like to know how your friends and the people who are important to you feel about getting screened.

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<td>Disagree Strongly</td>
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1. Most of my friends get screened for STIs regularly*.
2. Most of my family thinks that I should get screened regularly.
3. Most of my family thinks that I should get screened regularly.
4. My friends think that I should get screened regularly.
5. My friends think that I should not get screened regularly.
6. My doctor thinks that I should get screened regularly.
7. My doctor thinks that I should not get screened regularly.
8. Most people who are important to me think I should get screened regularly.
9. Most people who are important to me think I should not get screened regularly.
10. My partner thinks that I should get screened regularly.
11. My partner thinks I should not get screened regularly.

**Additional Norm Items:**

12. Think of your three closest friends. How supportive are they of you getting screened for STIs at least once per year? (Reneicke et al., 1996)
   - a. Very Supportive
   - b. Supportive
   - c. Somewhat Supportive
   - d. Neutral
   - e. Somewhat Unsupportive
   - f. Unsupportive
   - g. Very Unsupportive
**Items Measuring Confidence in Ability to Get Screened** (Montanaro & Bryan, 2014)
These next questions ask about your confidence in your ability to schedule and execute an STI screening.*

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1. I feel confident that I could schedule an STI screening appointment without embarrassment.
2. I feel confident that I could talk to my partner about STI screening (If not currently in a relationship, consider how you would feel in a relationship).
3. I feel confident that I could talk to a new partner about STI screening.
4. I feel confident that I could schedule an STI screening appointment.
5. I feel confident that I could refuse to have sex if my partner they would not get screened.

5. I know how to schedule myself an STI screening.
Items Measuring Intention to Get Screened (Montanaro & Bryan, 2014)
These next questions ask about your plans to get screened over the next three months

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<td>Not at all likely</td>
<td>Neither likely nor unlikely</td>
<td>Very likely</td>
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1. How likely is it that you will get an STI screen in the next three months?
2. How likely is it that you will talk to a potential sex partner about getting screened in the next three months?
3. How likely is it that you will discuss screening with your partner (If not currently in a relationship, consider how you would feel in a relationship)?
4. How likely is it that you will discuss screening with your next new partner.
Perceived Behavioral Control Measures (Montanaro & Bryan, 2014)

1. Whether or not I get screened for STIs in the next three months is entirely up to me.

   1 2 3 4 5 6 7

   Strongly Disagree  Strongly Agree

2. How much personal control do you feel you have over getting screened in the next three months?

   1 2 3 4 5 6 7

   Very Little Control  Complete Control

3. How much do you feel that whether you get screened in the next three months is beyond your control?

   1 2 3 4 5 6 7

   Not at all  Very much so

4. I believe I have the ability to get screened in the next three months.

   1 2 3 4 5 6 7

   Definitely Do Not  Definitely Do

5. To what extent do you see yourself as being capable of getting screened in the next three months?

   1 2 3 4 5 6 7

   Very unlikely to  Very likely to

6. How confident are you that you will be able to get screened in the next three months?

   1 2 3 4 5 6 7

   Very unsure  Very sure

7. If it were entirely up to me, I am confident that I would be able to get screened in the next three months.

   1 2 3 4 5 6 7

   Strongly Disagree  Strongly Agree
Additional PBC Measures:

8. How likely is it at the present time, that you could schedule yourself an STI screening? (Reneicke et al., 1996)
   a. Very Likely
   b. Likely
   c. Somewhat Likely
   d. Neutral
   e. Somewhat Unlikely
   f. Unlikely
   g. Very Unlikely
Condom Use Self-Efficacy Scale (Brien et al., 1994)

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<td>Disagree</td>
<td>Undecided</td>
<td>Agree</td>
<td>Strongly Agree</td>
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**Partner’s Disapproval**
1. If I were to suggest screening to a partner, I would feel afraid that they would reject me.
2. If I were unsure of my partner’s feelings about screening, I would not suggest it.
3. I would not feel confident suggesting screening to a new partner because I would be afraid they would question my sexual identity.
4. I would not feel confident suggesting screening to a new partner because I would be afraid he or she would think I have a sexually transmitted disease.
5. I would not feel confident suggesting screening to a new partner because I would be afraid they would suspect I thought they had a sexually transmitted disease.

**Assertive**
1. I feel confident in my ability to discuss screening with any partner I might have.
2. I feel confident in my ability to suggest screening with a new partner.
3. I feel confident that I could suggest screening without my partner feeling “diseased”