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One Session of TTM-Tailored Condom Use Feedback: A Pilot Study Among At Risk Women in the Bronx

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Abstract

There is an urgent need to implement interventions to curb the spread of sexually transmitted infections (STI's), especially HIV. Consistent condom use is an effective preventive strategy, yet especially among those at highest risk, condom use remains too low. This paper describes changes in condom use and stages of condom use over 2–3 months time following a single session with an interactive multimedia computer-delivered Transtheoretical Model (TTM) tailored expert system originally designed for at risk adolescents. The intervention provided immediate TTM-tailored feedback to diverse urban women based on their stage of condom use and other TTM variables. Previous work found this system was acceptable. These data showed that 89% of women returned for a second session 2–3 months later, further supporting this system's utility. After just one feedback session, 21% of women not using condoms at baseline started using condoms consistently at follow-up, with a trend for a relationship to baseline stage of condom use. These results support further randomized controlled research on the reach and efficacy of computer-based TTM-tailored and individualized condom use interventions.

Keywords

women; stages of change; TTM-tailored intervention; Transtheoretical Model; condom use; computer-delivered intervention

Developing effective behavioral strategies to prevent heterosexual HIV transmission is an important national and international priority. Heterosexual sex accounts for most HIV transmissions worldwide. In the US, heterosexual transmission most acutely affects women, especially poor women of color living in urban environments. In 2007, 83% of HIV among women was transmitted through heterosexual contact and Black women accounted for 66% of cases, but comprised only 14% of US female population (CDC, 2009). This dramatic sexual health disparity underscores the need for more effective interventions. New York is one of the top four states in the US for diagnosis of HIV among women, with a rate of 22.5 per 100,000 in 2007. New York City (NYC) has one of the highest cumulative AIDS case rates for women (654.9 per 100,000 at the end of 2006) of any metropolitan city in the nation (NYSDOH, 2008).

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Condom use remains one of the most effective HIV and STI prevention strategies, yet studies have found low rates of consistent condom use, especially among those at highest risk. In a general population study of people with multiple partners, only 17% reported always using condoms (Catania et al., 1992). Another study with at-risk women replicated this figure with 18% reporting consistent condom use (Evers et al., 1998). In fact, stages of condom use were linearly associated with increases in consistent condom use over one year (Evers et al., 1998). Condom use remains a primary preventive strategy for women.

The need to implement effective methods for sexual behavior change, especially among economically disadvantaged women, can hardly be overstated. The Transtheoretical model (TTM) has been a promising approach to health behavior research with minorities (NIH, 1992), in part because the TTM evaluates individual's needs and tailors interventions specifically to important behavior change variables (Redding et al., 1999). Tailoring health behavior interventions to individuals' stages of change and other TTM variables has been demonstrated to be a promising behavior change strategy across risk behaviors (Noar, Benac & Harris, 2007). Across health behaviors (smoking cessation, dietary fat reduction, physical activity, sun protection, mammography screening, condom use) and in different settings and populations, print interventions that were TTM-tailored were more effective than comparison interventions (Noar et al., 2007).

This paper will describe the effect on condom use and stages of condom use of one brief (20–25 minutes) intervention session in a pilot sample of women using an interactive computer-delivered TTM-tailored condom use intervention. Previous work demonstrated that urban adolescents were comfortable and enjoyed using this computer-delivered system (Prochaska, Redding and Evers, 1997; Redding et al., 1999). We also previously reported good baseline acceptability of this system for this sample of at-risk women, in spite of the fact that many had little to no previous computer experience (Brown-Peterside et al., 2000). The longitudinal results from this pilot study to increase stages of condom use among at-risk adult women in New York City are presented here. The study site was a clinic conducting HIV prevention research located in a Department of Health building in the South Bronx, one of the highest prevalence areas for HIV infection in New York City (NYCDOH, 2008).

METHODS

Study population

Women (N=62) were recruited into the study between June and September, 1998 using a variety of recruitment strategies including flyers, word of mouth, street outreach and the snowball method. The eligibility criteria, based on self report, included being English-speaking, HIV negative and engaging in one or more of the following risk behaviors: vaginal sex with two or more male sexual partners in the past year, a sexually transmitted disease (STD) in the past year, exchanging sex for money or drugs in the last two years, or using crack in the last two years. The criteria were selected to include women who were engaging in high risk sexual activity with men, because the intervention focused on increasing condom use. Crack use was included as a criteria because it has been found to be an independent risk factor for sexual transmission of HIV (Fullilove et al., 1990).

Procedures

At the enrollment visit, participants' eligibility was confirmed, informed consent and locator information were obtained, and participants were invited to go through the interactive computer-based intervention. Following this, participants completed a brief interview to obtain feedback about the intervention. Acceptability and feasibility data from the baseline visit have been presented (Brown-Peterside et al., 2000). All procedures and surveys were

reviewed and approved by the University of Rhode Island, the New York Blood Center, and New York City Department of Health and Mental Hygiene Institutional Review Boards for human subjects protection.

Clinic staff introduced participants to the privately situated computer that delivered the expert system intervention and showed participants how to use the mouse to respond to questions. Once participants were comfortable using the computer, they were allowed to complete the session alone. Though the computer was located in a cubicle to enhance privacy, staff were accessible if questions arose. At the end of the visit, participants were given $10 and a $3 metrocard to cover public transportation costs. A follow-up visit was scheduled two to three months later.

TTM-Tailored Expert System Intervention

The multimedia expert system used in this study was originally developed for diverse urban teenagers (Prochaska et al., 1997; Redding et al., 1999), using both quantitative and qualitative data. Many of the pictures and voices included African-American teenagers. Each portion of the feedback from this expert system was tailored to the participant's stage of condom use and was designed to encourage progress toward consistent condom use.

The intervention was delivered to participants by an on-site computer after they directly input their responses to an on-screen survey. The survey and feedback, written at a sixth-grade reading level, took participants a total of 20–25 minutes to complete. As they read each screen, participants used headphones to simultaneously hear its contents to ensure privacy and maximize comprehension. Participants were not required to have any prior experience with computers, since only a mouse was needed to answer questions or to move from section to section.

Using these data, the program, which integrates statistical and word processing software, calculated scale scores associated with key TTM variables. These scores were used to generate immediate positive or negative feedback on screen (Redding et al., 1999; Velicer et al., 1993), as well as to reward progress over time in subsequent sessions. The tailored intervention content was presented in five sequential sections taking between 3–5 minutes each: current stage of condom use; current positive and negative attitudes towards condom use; potential high-risk situations and coping responses to increase condom use efficacy; individual’s use of the key processes of change appropriate for that person's stage of condom use; and feedback about general strategies to facilitate condom use (Redding et al., 1999). Feedback was presented twice in this intervention: 1) on-screen in response to scales in each section, and 2) upon completion, a copy of their feedback report was printed for each participant. All feedback was tailored and encouraged progress to the next stage of condom use, or for those already in maintenance, emphasized continued condom use and strategies to avoid relapse.

Measures

The data collected via the computer included: brief demographic information (baseline only), questions regarding sexual and substance use risks, and questions assessing stages of condom use, pros and cons of condom use, confidence in condom use, and processes of condom use.

Stages of Condom Use—Precontemplation (PC) stage included those who were using condoms inconsistently and were not considering starting to use condoms every time within the next six months. Contemplation (C) stage included those who were also using condoms inconsistently, however were considering starting to use them every time within the next six

months. Preparation (PR) stage included those who reported using condoms almost every time and plans to start using them every time within the next 30 days. Action (A) stage individuals reported that they used condoms every time, and had been doing so for less than six months. Maintenance (M) stage included those who reported using condoms every time for six months or more. These stage definitions are consistent with those reported elsewhere (Brown-Peterside et al., 2000; Evers et al., 1998; Harlow et al., 1999). Consistency checks for the A and M stages of condom use were included in the computerized assessment to minimize inconsistent responding.

STATISTICAL ANALYSIS

Data analysis included frequency distributions for the baseline demographic, risk profile, and stages of change data at baseline and change over time data at follow-up. Limited cross tabulations of stages of change by follow up status were conducted with chi-squared analyses using SPSS software.

RESULTS

Baseline descriptive and risk information

Table 1 describes the N=62 women in the study at baseline. These women averaged 38 years old (range = 18–57), were mostly African American (82%), two thirds (66%) had at least an 11^{th} grade education, and 95% spoke English as their first language. Most of the women had experienced a pregnancy (90%), and between 18–32% women had experienced various STI's. Nearly three quarters (72%) had been tested for HIV (Brown-Peterside et al., 2000).

Examination of risk related variables confirmed that a population at high HIV risk was recruited. Some women (42%) reported smoking crack and more than a quarter (28%) reported exchanging sex for money or drugs in the previous year. Almost one fifth (18%) reported injecting drugs in the previous three years, 16% reported that they had had a male injection drug user as a sex partner in the previous five years, and 5% indicated that a current partner was HIV positive (Brown-Peterside et al, 2000). The mean number of male sex partners in past 30 days was 2.5 (SD=5.5). Baseline risk profile and demographic variables, including age, were unrelated to stages of condom use (Brown-Peterside et al., 2000).

Follow-up results

Of baseline participants, 88.7% (n=55) returned for their scheduled follow-up visit 2–3 months later. Baseline stage of change was not related to missing status at time 2 (p =.058).

Changes over time—Table 2 shows the changes over time (Regressing, Stable, Progressing, Using Condoms Consistently) for all participants (N=55) and by baseline stage of condom use. For the full sample, 22% regressed to an earlier stage of condom use, 36% remained stable (same stage), 42% progressed to a later stage of condom use, and 27% reported using condoms consistently. The percentage Using Condoms Consistently reflects the subset of those in early stages (PC, C, PR stages at baseline) who both Progressed and reported consistent condom use at follow-up. For those who were in later baseline stages (A or M) and were already using condoms, the Using Condoms Consistently category reflects Stable stage and maintenance of consistent condom use at follow-up. Of those who reported consistent condom use at baseline (n=12 in A or M), 50% (n=6) reported later that they regressed to an earlier stage of condom use and were no longer using condoms consistently (relapsed), while 50% reported continuing to use condoms consistently. Examination of those who did not use condoms consistently at baseline (n=43 in PC, C and PR) showed that

53% (n=23) progressed to a later stage of condom use and 21% (n=9) reported using condoms consistently at follow-up. Table 2 also shows a linear pattern between baseline stage and later condom use, such that 8% of PC's, 24% of C's and 33% of PR stage women reported using condoms consistently at follow-up. Based on previous research showing a linear relationship between baseline stage and consistent condom use one year later (Evers et al., 1998), we assumed a monotonically increasing linear pattern of outcomes across stages. A linear test of trend on the arcsine corrected proportions (Rossi, 1985), corrected for unequal sample sizes, provided some support for this assumption (p =.074).

DISCUSSION

This small uncontrolled pilot study demonstrated that using multimedia computer-based intervention technology to increase condom use and readiness to use condoms was not only feasible and acceptable in this population of high risk women in the Bronx (Brown-Peterside et al., 2000), but nearly 89% of these women returned for a second computer session. Furthermore, after only one session using the TTM-tailored individualized feedback system that was originally tailored for diverse urban teenagers, we observed some limited positive and some negative changes in condom use and stages of condom use. Without a control group, we cannot separate the influence of this intervention from naturally occurring changes. Unfortunately, among the women reporting consistent condom use at baseline (n=12), half (n=6) were no longer doing so 2–3 months later, underscoring the importance of relapse prevention efforts. More hopefully, among those women who did not use condoms consistently at baseline and returned (n=43), (n=9) 21% reported starting to use condoms consistently 2–3 months later. Furthermore, in spite of small sample sizes, there was a trend such that the proportion of those using condoms consistently at time 2 was linearly related to baseline stage of condom use, as was reported by Evers and colleagues in a larger sample over one year (1998). This study in combination with prior reports (Brown-Peterside et al., 2000) supports the feasibility, acceptability, and potential impact of this individually TTM-tailored condom use intervention in at risk women. However, these suggestive findings clearly require additional randomized controlled research with larger samples.

Computer-delivered interventions such as this have many advantages, especially compared to risk reduction counseling which may be expensive and difficult to disseminate in some settings (Rietmeijer, 2007). Once programmed, computer-delivered interventions can be cost-effective; tailored for participants at all stages of condom use and all levels of risk; accommodate lower reading levels; address cultural issues; be translated into other languages; maintain privacy, increasing participants' honesty in reporting sexual information (Turner et al., 1998); and address additional health promotion behaviors. Also, this intervention could be disseminated widely to public health clinics, schools, prisons, community centers, and/or via the internet (Redding et al., 1999).

These women reported that 72% had been tested for HIV which is higher than the 32% rate reported for NYC women (Kerker et al., 2005). Table 1 shows that these women demonstrated a high degree of risk taking behaviors, comparable to other urban samples (Brown-Peterside et al., 1997). In spite of these risks, 22% of these women reported always using condoms at baseline, and 27% at follow-up. These rates are comparable to rates reported elsewhere (Catania et al., 1992; Evers et al., 1998). Most of these women were only considering using condoms consistently, supporting the relevance of TTM-tailored intervention strategies. Traditional action-oriented intervention strategies which assume individuals are ready to use condoms consistently would be well-matched for only about one third of these women (PR, A, and M stages). Furthermore, in this sample stages of condom use were not systematically related to risk profile, demographic variables, or missingness, although these analyses had limited power.

This small, uncontrolled pilot study has important limitations. The timeframe between baseline and time 2 was relatively short, only 2–3 months. Condom use measures were based on self report, did not differentiate between main and other sex partners, and may have been vulnerable to response biases. Future research would benefit from randomized controlled trials with high risk urban women such as these to better evaluate the efficacy of this TTM-tailored intervention system.

These suggestive positive results of only one session are corroborated by at least three other randomized studies with more intervention sessions. A randomized trial of up to 4 sessions using this expert system with urban teenage female family planning clients demonstrated increases in condom use in the TTM-tailored group compared to a usual care group (Redding et al., 2002). Another randomized trial with up to 3 sessions with at-risk adult men and women also showed comparable results (Redding et al., 2004). A third trial with women only and up to 3 sessions found that a similar TTM-tailored intervention increased reported dual method use (condom and contraceptive use), however found no effect for incident STI outcomes (Peipert et al., 2008). In fact, a recent meta-analysis found computer technology-based HIV prevention interventions to be efficacious and to achieve impacts on condom use that were comparable to previously tested human-delivered interventions (Noar, Black, & Pierce, 2009). Results of that meta-analysis also suggested that computerized interventions were most efficacious when they were tailored at the individual level, as this one was. Clearly more research is needed to better understand the process or moderating variables that are related to higher success rates across studies. These results are promising and support future studies of the efficacy, potential reach, and disseminability of computer-delivered TTM-tailored and individualized sexual health interventions such as this one.

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Table 1

Demographic and Risk Characteristics of Baseline Participants (N=62)

Characteristic	n	%
African American	51	82
Hispanic	7	11
English was first language	59	95
> 11th grade	41	66
Lives alone	14	23
Recent boyfriend was steady	51	82
Ever exchanged sex for money or drugs	27	44
Ever been pregnant	56	90
Ever had syphilis	14	23
Ever had gonorrhea	20	32
Ever had chlamydia	11	18
Ever tested for HIV	45	72

Table 2

Changes Over Time by Baseline Stage of Condom Use and in Full Sample

		Follow-up Status			
Baseline Stage of Condom Use	**n**	**Regressed Stage n (%)**	**Stable Stage n (%)**	**Progressed Stage n (%)**	**Using Condoms Consistently n (%)**
PC	12	-	3 (25)	9 (75)	1 (8)
C	25	4 (16)	9 (36)	12 (48)	6 (24)
PR	6	2 (33)	2 (33)	2 (33)	2 (33)
A	2	2 (100)	0 (0)	0 (0)	0 (0)
M	10	4 (40)	6 (60)	-	6 (60)
Full Sample	55	12 (22)	20 (36)	23 (42)	15 (27)

Note: PC = Precontemplation, C= Contemplation, PR = Preparation, A = Action, and M = Maintenance. % are Row Percentages. Dashes indicate that regression is not possible from PC and progress is not possible from M. The Regressed, Stable, and Progressed Stage columns sum to 100%. The Using Condoms Consistently column includes a subset of Progressed (for PC, C, PR) or Stable (for A, M) as explained in text.