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Evaluation of HIV Disclosure Behavior Following a Randomized Controlled Disclosure Intervention for Men who have Sex with Men Living with HIV

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Abstract

Preventing the transmission of HIV, especially among high-risk populations, is a U.S. public health priority. Interventions aimed at easing the burden of HIV disclosure to casual sexual partners among men who have sex with men (MSM) living with HIV are essential in this endeavor. This randomized controlled study evaluated differences in disclosure behavior between a disclosure intervention (DI) and attention control case management (ACCM) group for MSM living with HIV ($N = 315$) and determinants (self-efficacy, outcome expectancy) of disclosure. Mixed-effects models results showed no differences in disclosure behavior between the DI and ACCM group. Further, disclosure behavior changed in a curvilinear manner over 12-months and benefited from a booster session. Both disclosure self-efficacy and outcome expectancy predicted disclosure behavior. Interventions targeting HIV disclosure among MSM living with HIV should focus on improving perceptions of disclosure self-efficacy and outcome expectancy, and include a booster session to facilitate HIV disclosure.

Keywords

intervention; HIV disclosure; MSM; longitudinal

Men who have sex with men (MSM) remain disproportionately represented in the U.S. HIV/AIDS statistics. While the overall numbers of new HIV diagnoses decreased by 20% between 2005 and 2014, the number of new diagnoses among gay, bisexual, and other MSM increased 6% during that same time (Centers for Disease Control and Prevention [CDC], 2016a). Although MSM account for just 4% of the U.S. population, their rates of new HIV

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Compliance with Ethical Standards

Statement of Human Rights: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent: Informed consent was obtained from all individual participants included in the study.

diagnoses are 44 times greater than that of other men (CDC, 2016a). Rates are even higher among racial/ethnic minorities, particularly African Americans (CDC, 2016a).

Preventing the transmission of HIV, especially among key populations, is a U.S. public health priority (CDC, 2016b; Office of National AIDS Policy [ONAP], 2015). One of the ways to reduce HIV transmission risks is through effective sexual communication including HIV serostatus disclosure (Bird & Voisin, 2010; CDC, 2017a; O'Connell, Reed, & Serovich, 2015). Disclosure among casual sexual partners allows those at risk for HIV exposure to make more informed decisions about getting tested and modifying sexual behaviors that are known to increase the risk of HIV infection and transmission such as condomless sex (CDC, 2017a). Seropositive status disclosure is particularly important because of legal mandates in the majority of U.S. states that require individuals to disclose their seropositive status prior to sexual encounters (CDC, 2017b).

However, disclosure is a complex process (Bird & Voisin, 2010; Serovich, Oliver, Smith, & Mason, 2005). Interventions that help MSM living with HIV develop the necessary skills to disclose their status to casual sexual partners while recognizing the benefits and risks of disclosing may facilitate this process. Although a number of studies have examined disclosure of HIV and factors related with disclosure among MSM, research is lacking in two main areas. First, there is a noticeable shortage of experimental studies on disclosure interventions targeting MSM. Second, longitudinal studies are lacking that track changes in disclosure behavior among MSM over time.

In a systematic review of the effectiveness of disclosure interventions to sexual partners between 2005 and 2012, Conserve, Groves, and Maman (2015) found only five studies that (quasi) experimentally examined disclosure interventions and included an HIV disclosure outcome. Four of the five studies examined disclosure among MSM (Chiasson, Shaw, Humberstone, Hirshfield, & Hartel, 2009; Hirshfield et al., 2012; Serovich, Reed, Grafsky, & Andrist, 2009; Wolitski, Gómez, & Parsons, 2005); three of the four studies showed increased disclosure to sexual partners. However, the variations in types and content of the interventions and length of the study did not allow for generalizations (Conserve et al., 2015).

Current Study and Theoretical Framework

The current randomized controlled study aims to add to the body of knowledge and bridge the gaps in research by examining global disclosure behavior over a 12-month period among MSM living with HIV. The main goal of the study was to help MSM interested in learning more about disclosure develop requisite skills to disclose their seropositive status to casual sexual partners. MSM were randomly assigned to either the disclosure intervention (DI) group or the attention control case management (ACCM) group. Only the DI group was exposed to content that concentrated on potential disclosure of seropositive status with casual sexual partners. Thus, the following hypothesis (H) was tested:

- (H1)** Over time, the DI group reports greater seropositive status disclosure behavior than the ACCM group.

Drawing on elements from social cognitive theory (Bandura, 1986; McAlister, Perry, & Parcel, 2008), predictors of disclosure behavior, namely self-efficacy and outcome expectancy, were further examined. Self-efficacy can be defined as a person's belief that they have the ability to carry out a particular behavior to achieve a desired outcome (e.g., the conviction that he can convince his partner to use a condom to prevent the transmission of HIV). In contrast, outcome expectancy is defined as a person's belief about the (negative or positive) consequences of their behavior (e.g., unsupportive reaction from his sexual partner following HIV disclosure; pleasurable expectation of condom use). Both self-efficacy and outcome expectancy are theoretically linked to behavioral outcomes and changes in behavior (Bandura, 1986; McAlister et al., 2008). Subsequently, it was further hypothesized:

- (H2) Self-efficacy for HIV disclosure, condom use, and safer sex negotiation predicts seropositive status disclosure behavior; and
- (H3) Outcome expectancy for HIV disclosure, condom use, and safer sex negotiation predicts seropositive status disclosure behavior.

Method

Procedure

Data were obtained at five time points from MSM living with HIV who participated in a two-arm randomized controlled study. The study was carried out between 2009 and 2014 in two metropolitan areas located in the Midwest and Southeast. Participants were recruited through advertising efforts with local and state AIDS service organizations, local newspapers, AIDS clinical trials units, other HIV-related venues, and forums taking place around the two metropolitan areas. Advertisements specified that seropositive MSM were being recruited for a disclosure study. To be eligible for inclusion in the study, MSM had to be 18 years of age or older, HIV-positive, sexually active in the prior three months with at least one man, English-speaking, planning on living in the area for at least one year, and be interested in learning more about seropositive status disclosure to casual sexual partners.

Randomized Controlled Intervention

At baseline, participants were randomly assigned to either the DI group or the ACCM group. Both groups participated in seven one-on-one sessions with a trained facilitator over 12-months, with each session taking approximately 60 to 90 minutes to complete. The focus of the DI group at each session was on potential disclosure of HIV seropositive status. In contrast, the content for the ACCM group was the CDC's HIV prevention case management program "Comprehensive Risk Counseling and Services" (CRCS) at each condition session (CDC, 2015). Content for both groups also focused on reducing risky sexual behaviors.

Both groups followed the same timeline. Data were collected during five sessions (Sessions 1, 4, 5, 6, 7) and the treatment was administered during three sessions (Sessions 2, 3, and 4). Sessions 2 and 3 occurred in weekly increments post-baseline (Session 1). Session 4 occurred about 1.5 months post-baseline. Additionally, a "booster" session was administered 3-months post-baseline at Session 5. The booster was designed to allow time for participants to take what they had learned so far, and in the case of the DI group experiment more with

disclosure if desired, and then come back with questions or concerns. No new material was presented at this time, but past material was reviewed. Session 6 took place 6 months post-baseline and Session 7 occurred 12-months post-baseline.

DI group content—During Session 1, all MSM participated in a baseline interview that consisted of an introduction to the project and an assessment of previous strategies used to disclose their HIV-positive status and disclosure triggers. Baseline data were also collected on demographic characteristics (e.g., age, race, sexual orientation). During Session 2, MSM explored the costs and benefits of disclosing to casual sexual partners, different strategies that aid disclosure, and different methods that aid management of negative reactions. They also participated in a variety of disclosure exercises. During Session 3, MSM reviewed and practiced disclosure strategies used so far and the associated costs and benefits. During Session 4, MSM were taught additional disclosure strategies and were provided with opportunities to rehearse and refine their disclosure strategies. During Session 5, MSM received a “booster” session to reinforce disclosure strategies and reassessment of strategies to reduce costs and improve benefits associated with disclosure. During Sessions 6 and 7, no additional content was provided.

ACCM group content—The CRCS combines traditional case management and HIV risk-reduction in an individualized, client-centered program, which focuses on the reduction of risk behavior and addresses a client’s psychosocial and medical needs (CDC, 2015). CRCS focuses on seven core elements for participants that include recruitment and engagement; screening, enrolling, and assessing; prevention planning; risk reduction counseling; referrals and service coordination; monitoring; and discharge and maintenance. These core elements represent the framework of the ACCM group, and provide enough flexibility to allow implementation that most appropriately serves the needs of participants. The structure of the ACCM sessions mirrored the DI group. However, unlike the DI group, the content of the sessions did not include seropositive status disclosure in the ACCM group.

Participants

A total of 337 MSM participated in the study at baseline. For the purpose of the current study, data from MSM who had missing data for all of the 13 disclosure behavior items because of N/A responses ($n = 20$ at baseline) or no responses ($n = 2$ at baseline) were omitted. This resulted in a final baseline sample of 315 MSM. Of the 315 MSM, 160 (50.79%) had been randomly assigned to the DI group and 155 (49.21%) to the ACCM group. At 1.5-months post-baseline 225 (71.43%), at 3-months post-baseline 220 (69.84%), at 6-months post-baseline 216 (68.57%), and at 12-months post-baseline 183 (58.09%) of the original 315 participants completed the survey. There were no statistically significant differences in participation rates over time between the DI and ACCM group ($\chi^2 = 0.16$, $df = 4$, $p = 0.997$).

Data Collection

Survey data were collected using audio-computer-assisted self-interviewing (ACASI). ACASI is associated with more complete data collection of sensitive, potentially stigmatizing data (e.g., sexual risk behaviors, drug use) (Des Jarlais et al., 1999; Kelly et al.,

2014; Perlis, Des Jarlais, Friedman, Arasteh, & Turner, 2004). At baseline, participants provided information on their demographic characteristics. At each data collection time point, participants completed a series of measures including disclosure of seropositive status, sexual behaviors, and traits (e.g., self-efficacy, outcome expectancy).

Measures

Disclosure behavior—The outcome variable – HIV seropositive status disclosure to casual sexual partners – was assessed with an author-derived 13-item measure at each data collection time point. Items asked about global disclosure in different types of sexual situations and with different current and past sexual partners. The 13 items were, “In the last 30 days, I have disclosed my HIV status to (1 = *none*, 2 = *a few*, 3 = *about half*, 4 = *most*, and 5 = *all*) of my sexual partners (1) to whom I gave oral sex with a condom, (2) to whom I gave oral sex without a condom, (3) from whom I received oral sex with a condom, (4) from whom I received oral sex without a condom, (5) with whom I had insertive anal sex with a condom, (6) with whom I had insertive anal sex without a condom, (7) with whom I had receptive anal sex with a condom, (8) with whom I had receptive anal sex without a condom, (9) with whom I engaged in any other sexual behavior, (10) that I just met, (11) who were casual sexual partners, (12) who I believed were HIV-negative, and (13) who I believed were HIV-positive. Participants also had the option of selecting N/A if an item did not apply to them. Because participants who selected N/A to one disclosure behavior item did so consistently with each of the 13 items, N/A responses were treated as missing data. The measure was created by calculating the mean across the 13 disclosure items. Thus, higher scores indicate greater disclosure behavior. Cronbach’s alpha ranged from .96 to .98 across the five time points.

Self-efficacy—The first set of independent variables – HIV disclosure self-efficacy, condom use self-efficacy, and negotiation of safer sex self-efficacy – was examined with a 3-item measure for each type of self-efficacy at each data collection time point (Semple, Patterson, Shaw, Pedlow, & Grant, 1999; Semple et al., 2000, 2004). Sample items for each measure were “I can use a condom in any situation”, “I can disclose my HIV-positive serostatus to all partners before we engage in sex”, and “I can negotiate mutual masturbation with any sexual partner.” Responses were recorded on a Likert-type scale ranging from 1 = *strongly disagree* to 4 = *strongly agree*. Each measure was created by calculating the mean across the three corresponding items, with higher scores indicating greater self-efficacy. Cronbach’s alpha ranged from .73 to .78 across time points for condom use self-efficacy, from .84 to .89 across time points for disclosure self-efficacy, and from .64 to .74 across time points for negotiation of safer sex self-efficacy.

Outcome expectancy—The second set of independent variables – HIV disclosure outcome expectancy (5 items), condom use outcome expectancy (4 items), and negotiation of safer sex outcome expectancy (5 items) – were also examined at each data collection time point (Semple et al., 1999, 2000, 2004). Sample items for each measure were: “I believe that my partner(s) will reject me if I tell him/them that I am HIV positive (reverse scored)”; “I believe that using condoms can be sexy and erotic”; and “I believe that my partner(s) will still trust me if I suggest safer sex practices.” Responses were recorded on a Likert-type

scale ranging from 1 = *strongly disagree* to 4 = *strongly agree*. Each measure was created by calculating the mean across the corresponding number of items, with higher scores indicating greater outcome expectancy. Cronbach's alpha ranged from .71 to .73 across time points for condom use outcome expectancy, from .45 to .55 across time points for disclosure outcome expectancy, and from .83 to .89 across time points for negotiation outcome expectancy.

Control variables—A number of control variables were included in the analyses based on previous research that showed significant relationships with disclosure behavior (e.g., Bird, Fingerhut, & McKirnan, 2011; Emlet, 2006; Simon Rosser et al., 2008; Simoni & Pantalone, 2004; Wei, Lim, Guadamuz, & Koe, 2012; Winter, Sullivan, Khosropour, & Rosenberg, 2012). Control variables that were reported at baseline and treated as fixed effects in the analyses included participants' race (1 = *White*, 0 = *non-White*), employment status (1 = *employed*, 0 = *unemployed*), sexual identification (1 = *gay*, 0 = *bisexual/heterosexual*; *heterosexual was grouped in with bisexual because only 1 participant identified as heterosexual but was behaviorally bisexual*), level of education, monthly income, age in years, and time since HIV diagnosis in years. Location of data collection (1 = *Southeast*, 0 = *Midwest*) was also a control variable.

Control variables that were reported at each data collection time point and considered as potential random effects in the analyses included number of sexual partners in the past 30 days and most recent viral load. Viral load was recoded into a viral suppression dichotomy (1 = *< 200 copies per milliliter of blood*, 0 = *≥ 200 copies per milliliter of blood*). Comparisons of multilevel models using deviance tests indicated that these variables should be treated as fixed rather than random effects.

Data Analysis

All data were analyzed using SAS version 9.4 (SAS Institute, Cary, NC). Descriptive statistics were conducted to describe the sample and examine the data for normality and outliers. Mixed-effects models were selected to test all hypotheses. Mixed-effects models are ideal for use with multilevel data (i.e., time nested within participants) that contain at least three time-points because they do not require participants to have data at all time-points. Repeated measures analysis of covariance (ANCOVA) using proc mixed was selected to investigate mean differences in disclosure behavior between the DI and ACCM group over time (H1). Post-hoc tests using the pdiff statement were used to determine at which time points differences in disclosure behavior were observed.

Mixed-effects models (growth curve models) using proc mixed were conducted to test whether self-efficacy for HIV disclosure, condom use, and safer sex negotiation (H2) and outcome expectancy for HIV disclosure, condom use, and safer sex negotiation (H3) predict disclosure behavior over time. Kenward-Roger's approximation of the degrees of freedom were specified along with an unstructured matrix. Models were run in multiple steps. First, an unconditional means model was run to obtain the intraclass correlation coefficient (ICC), which showed that 59% of the variance of disclosure behavior was explained by within participant nesting. The generally accepted rule is that ICCs around 10% or greater indicate

the need to account for the nested data structure (Kreft & de Leeuw, 1998). Thus, mixed-effects models rather than ordinary least squares regression models need to be selected.

Second, a series of mixed-effects models were run separately and examined for fit. Random slopes for the intercept, time, and the time-varying sets of independent variables of self-efficacy and outcome expectancy were considered separately. Because the ANCOVA results suggested non-linear disclosure behavior, time-squared and time-cubed were also considered in the models. Additionally, although ANCOVA results showed no significant differences between the DI and ACCM group, this variable was retested in the mixed-effects models but also found to not significantly contribute to the fit of the models. Thus, treatment group was omitted from the final model. For H2, the final best fitting model included random slopes for the intercept, time, and self-efficacy for HIV disclosure; fixed effects for the set of self-efficacy predictors; and all control variables. For H3, the final best fitting model included random slopes for the intercept and time; fixed effects for the set of outcome expectancy predictors; and all control variables.

Results

Participant Characteristics

Characteristics of participants are shown in Table 1. Briefly, of the 315 participants at baseline, 90.48% identified as non-Hispanic. Half considered themselves as White (49.21%), more than one-third as African American (36.51%), and 14.29% as other/mixed race. Most participants identified as gay (79.62%) and 20.06% as bisexual. Viral suppression was reported by 66.24% of participants. Approximately one-quarter (22.93%) had earned a high school degree or GED, 43.31% had some college experience, and 18.47% held a bachelor's degree. Almost 30% of participants reported monthly incomes of either up to \$500 (28.98%) or between \$501 and \$1,000 (28.34%), and 21.97% between \$1,001 and \$1,500. Only 31.53% of participants were employed. About half were located in the Southeast (48.25%) and half in the Midwest (51.75%). Mean age was 42.06 years ($SD = 11.14$) and mean time since HIV diagnosis was 10.93 years ($SD = 8.40$). Participants also reported a mean of 3.15 ($SD = 3.52$) sexual partners in the past 30 days. Additional analyses indicated no statistically significant differences in characteristics between the DI and ACCM group ($p > .05$), with one exception: More participants in the DI group (59.60%) were employed than in the ACCM group (40.40%) ($\chi^2 = 4.32$, $df = 1$, $p = 0.038$).

Mean Differences in Disclosure Behavior Over Time by Treatment Group

Table 2 provides a description of the means and standard deviations of seropositive status disclosure behavior over time overall (left column) and by treatment group (right columns). Results indicate that there was no significant main treatment or time by treatment interaction effect on disclosure behavior over time. That is, the DI and ACCM group did not differ in their disclosure behavior over time. Thus, Hypothesis 1 was not supported. However, regardless of type of treatment, both groups improved their disclosure behavior over time.

In particular, there was a significant increase in mean disclosure behavior from baseline to 1.5 months post-baseline (post-treatment), 3-months post-baseline (booster), 6-months post-

baseline, and 12-months post-baseline. Additionally, there was a significant increase in mean disclosure behavior from 3-months post-baseline (booster) to 6- and 12-months post-baseline; and from 6- to 12-months post-baseline. Thus, there was also a significant booster effect following the booster session at 3-months post-baseline. Figure 1 visually represents the data, which also suggest a curvilinear pattern of disclosure behavior. Regarding the control variables, only race and number of sexual partners was significantly related to disclosure behavior. White compared to racial minority MSM and those with fewer sexual partners in the past 30 days reported greater disclosure behavior.

Mixed-Effects Models of Disclosure Behavior

As shown in Table 3 and Table 4, results confirm the ANCOVA findings of a significant cubic relationship between time and disclosure behavior. There is also support for a booster effect. That is, the initial increase in disclosure behavior between baseline and 1.5 months post-baseline (post-treatment) was followed by a decrease in disclosure 3-months post-baseline (booster); following the booster session, there was an increase again at 6-months post-baseline, which was sustained at 12-months post-baseline.

Self-efficacy as predictors of disclosure behavior—Results in Table 3 indicate that greater HIV disclosure self-efficacy, but not condom use or negotiation self-efficacy, significantly predicted the increase in disclosure behavior. Thus, H2 was partially confirmed. Regarding the control variables (not shown), both race and time since seropositive diagnosis showed a significant relationship with disclosure behavior. White compared to racial minority participants and those with less time since diagnosis reported greater disclosure behavior.

Outcome expectancy as predictors of disclosure behavior—Results in Table 4 show that greater HIV disclosure outcome expectancy, but not condom use or negotiation outcome expectancy, significantly predicted the increase in disclosure behavior. Thus, H3 was partially confirmed. Pertaining to the control variables (not shown), race, time since seropositive diagnosis, and number of sexual partners showed a significant relationship with disclosure behavior. White compared to racial minority participants, those with less time since HIV diagnosis, and those with fewer sexual partners reported greater disclosure behavior.

Discussion

This randomized controlled study evaluated differences in HIV seropositive status disclosure behavior over time between a DI and ACCM group and determinants of disclosure behavior among MSM living with HIV. Contrary to expectations, there was no statistically significant difference in disclosure behavior between the DI and ACCM group over time. However, regardless of treatment, disclosure behavior increased over the 12-month period, with a marked booster effect following the booster session about 3 months post-baseline. Further, greater HIV disclosure self-efficacy and HIV disclosure outcome expectancy predicted the increase in disclosure behavior.

The increase in HIV seropositive status disclosure in the absence of significant differences between the DI and ACCM group is an unexpected albeit interesting finding. The intervention in the DI group focused heavily on disclosure of seropositive status. MSM in this group received extensive coaching in seropositive status disclosure to casual sexual partners that included risks and benefits assessment of disclosing, disclosure exercises, and strategies and techniques for disclosing to different sexual partners and in different situations. In contrast, the ACCM group only received sexual risk assessments and risk reduction planning instead of training in disclosure. The only component that was similar between the DI and ACCM group was the focus on reducing risky sexual behaviors. It may be that similarities in disclosure behavior are attributable to one or more aspects of the shared risky sexual behavior component experience. More research is warranted in this area.

There is some support for the speculation that a shared component between the DI and ACCM group may explain the lack of group differences in disclosure behavior over time. A systematic review and meta-analysis of the literature on the effects of behavioral HIV prevention interventions on condomless sex among MSM found greatest effects for studies in which the control group received minimal to no prevention intervention (Johnson et al., 2005). However, the authors warn against drawing the conclusion that any intervention is better than no intervention. It may be that the extent of the sessions and content in the ACCM group in the current study explains the lack of significant findings in comparison to the DI group. As a result, an increase in disclosure behavior over time independent of the treatment occurred. Further studies are needed that continue to identify the most effective and parsimonious disclosure interventions benefitting MSM living with HIV.

Moreover, there was a clear booster effect on disclosure behavior following the booster session approximately 3-months post-baseline in both the DI and ACCM group despite the fact that only the DI group received the disclosure content. This finding suggests that there are benefits to receiving a reminder and reinforcement of various behavioral techniques for MSM who live with HIV regarding disclosure behavior. Similar findings regarding the positive effects of a booster session on behavior change have been found in previous social and behavioral research (e.g., Gearing, Schwalbe, Lee, & Hoagwood, 2013; Whisman, 1990).

As hypothesized and proposed by social cognitive theory (Bandura, 1986; McAlister et al., 2008), greater self-efficacy for HIV disclosure and greater outcome expectancy for HIV disclosure predicted the increase in disclosure behavior. These findings are similar to other studies that have found a positive relationship between behavior outcomes and both self-efficacy and outcome expectancy (Semple et al., 1999; 2000). Practitioners working with MSM living with HIV on HIV intervention strategies may consider improving perceptions of self-efficacy and outcome expectancy, in particular for HIV disclosure, to improve disclosure behavior.

Limitations and Conclusions

Limitations of the current study need to be taken into consideration when interpreting and attempting to generalize the findings. Although MSM were randomly assigned to either the DI or ACCM group, participants were not drawn from a random sample. Additionally, MSM

in the current study had to indicate an interest in learning more about seropositive status disclosure. It is possible that individuals who show an interest in disclosure and decide to participate in an HIV disclosure intervention study have different demographic characteristics and are more ready, motivated, and eager to disclose their status to casual sexual partners than individuals who do not inquire about eligibility or decide against participating in an intervention study. Thus, findings may not generalize to all MSM living with HIV.

Additionally, despite the use of ACASI to collect sensitive information, self-reported measures of disclosure behavior pose a validity threat. ACASI is recommended for and extensively used in studies that assess sensitive and potentially stigmatizing information (e.g., Des Jarlais et al., 1999; Kelly et al., 2014; Perlis et al., 2004). Participants may still have reported disclosure behavior in ways that are perceived to be more socially desirable and legally acceptable (i.e., over-reported disclosure). Subsequently, actual disclosure of HIV status to casual sexual partners may differ from reported behavior.

Despite limitations, the current study adds to the small body of literature on the effects of disclosure interventions among MSM who live with HIV. Disclosure behavior increases over time independent of group type (DI versus ACCM). Booster sessions play an important role in sustaining positive effects over time. Self-efficacy and outcome expectancy for HIV disclosure are important factors that explain the increase in disclosure behavior among MSM living with HIV.

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References

- Bandura A. Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall; 1986.
- Bird JDP, Fingerhut DD, McKirnan DJ. Ethnic differences in HIV-disclosure and sexual risk. *AIDS Care*. 2011; 23:444–448. [PubMed: 21271405]
- Bird JDP, Voisin DR. A conceptual model of HIV disclosure in casual sexual encounters among men who have sex with men. *Journal of Health Psychology*. 2010; 16:365–373. [PubMed: 20929939]
- Centers for Disease Control and Prevention (CDC). Comprehensive Risk Counseling and Services (CRCS). 2015. Available at, <https://effectiveinterventions.cdc.gov/en/highimpactprevention/publichealthstrategies/CRCS.asp>
- Centers for Disease Control and Prevention (CDC). HIV among gay and bisexual men. 2016a. Available at, <https://www.cdc.gov/nchhstp/newsroom/docs/factsheets/cdc-msm-508.pdf>
- Centers for Disease Control and Prevention (CDC). The nation's approach to HIV prevention for gay and bisexual men. 2016b. Available at, <https://www.cdc.gov/nchhstp/newsroom/docs/factsheets/approach-to-hiv-prevention-508.pdf>
- Centers for Disease Control and Prevention (CDC). Start talking Stop HIV. 2017a. Available at, <https://www.cdc.gov/actagainstaids/campaigns/starttalking/>
- Centers for Disease Control and Prevention (CDC). HIV-specific criminal laws. 2017b. Available at, <https://www.cdc.gov/hiv/policies/law/states/exposure.html>

- Chiaasson MA, Shaw FS, Humberstone M, Hirshfield S, Hartel D. Increased HIV disclosure three months after an online video intervention for men who have sex with men (MSM). *AIDS Care*. 2009; 21:1081–1089. [PubMed: 20024766]
- Conserve DF, Groves AK, Maman S. Effectiveness of interventions promoting HIV serostatus disclosure to sexual partners: A systematic review. *AIDS and Behavior*. 2015; 19:1763–1772. [PubMed: 25645328]
- Des Jarlais DC, Paone D, Milliken J, Turner CF, Miller H, Gribble J, Shi Q, Hagan H, Friedman SR. Audio-computer interviewing to measure risk behaviour for HIV among injecting drug users: A quasi-randomized trial. *Lancet*. 1999; 355(9165):1657–1662.
- Emllet CA. A comparison of HIV stigma and disclosure patterns between older and younger adults living with HIV/AIDS. *AIDS Patient Care and STDs*. 2006; 20:350–358. [PubMed: 16706709]
- Gearing RE, Schwalbe CS, Lee RH, Hoagwood KE. The effectiveness of booster sessions in CBT treatment for child and adolescent mood and anxiety disorders. *Depression and Anxiety*. 2013; 30:800–808. [PubMed: 23596102]
- Hirshfield S, Chiaasson MA, Joseph H, Scheinmann R, Johnson WD, Remien RH, et al. An online randomized controlled trial evaluating HIV prevention digital media interventions for men who have sex with men. *PLoS ONE*. 2012; 7:e46252. Available at, <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0046252>. [PubMed: 23071551]
- Johnson WD, Holtgrave DR, McClellan WM, Flanders WD, Hill AN, Goodman M. HIV intervention research for men who have sex with men: A 7-year update. *AIDS Education and Prevention*. 2005; 17:568–589. [PubMed: 16398578]
- Kelly CA, Hewett PC, Mensch BS, Rankin JC, Nsoby SL, Kalibala S, et al. Using biomarkers to assess the validity of sexual behavior reporting across interview modes among young women in Kampala, Uganda. *Studies in Family Planning*. 2014; 45:43–58. [PubMed: 24615574]
- Kreft I, de Leeuw J. *Introducing multilevel modeling*. Thousand Oaks, CA: Sage; 1998.
- McAlister AL, Perry CL, Parcel GS. How individuals, environments, and health behaviors interact. Social cognitive theory. In: Glanz K, Rimer BK, Viswanath K, editors *Health behavior and health education*. Theory, research, and practice. 4th. San Francisco, CA: Jossey-Bass; 2008. 169–188.
- O’Connell AA, Reed SJ, Serovich JM. The efficacy of serostatus disclosure for HIV transmission risk reduction. *AIDS and Behavior*. 2015; 19:283–290. [PubMed: 25164375]
- Office of National AIDS Policy [ONAP]. *National HIV/AIDS Strategy for the United States: Updated to 2020*. 2015. Available at, <https://www.aids.gov/federal-resources/national-hiv-aids-strategy/nhas-update.pdf>
- Perlis TE, Des Jarlais DC, Friedman SR, Arasteh K, Turner CF. Audio-computerized self-interviewing versus face-to-face interviewing for research data collection at drug abuse treatment programs. *Addiction*. 2004; 99:885–896. [PubMed: 15200584]
- Semple SJ, Patterson TL, Grant I. The sexual negotiation behavior of HIV-positive gay and bisexual men. *Journal of Consulting and Clinical Psychology*. 2000; 68:934–937. [PubMed: 11068981]
- Semple SJ, Patterson TL, Grant I. Partner type and sexual risk behavior among HIV positive gay and bisexual men: social cognitive correlates. *AIDS Education and Prevention*. 2004; 12:340–356.
- Semple SJ, Patterson TL, Shaw WS, Pedlow CT, Grant I. Disclosure of HIV seropositivity to sexual partners: An application of social cognitive theory. *Behavior Therapy*. 1999; 30:223–237.
- Serovich JM, Oliver DG, Smith SA, Mason TL. Methods of HIV disclosure by men who have sex with men to casual sexual partners. *AIDS Patient Care and STDs*. 2005; 19:823–832. [PubMed: 16375614]
- Serovich JM, Reed S, Gafsky EL, Andrist D. An intervention to assist men who have sex with men disclose their serostatus to casual sex partners: Results from a pilot study. *AIDS Education and Prevention*. 2009; 21:207–219. [PubMed: 19519236]
- Simon Rosser BR, Horvath KJ, Hatfield LA, Peterson JL, Jacoby S, Stately A, et al. Predictors of HIV disclosure to secondary partners and sexual risk behavior among a high-risk sample of HIV-positive MSM: Results from six epicenters in the US. *Aids Care*. 2008; 20:925–930. [PubMed: 18777221]

- Simoni JM, Pantalone DW. Secrets and safety in the age of AIDS: Does HIV disclosure lead to safer sex? International AIDS Society-USA. Topics in HIV Medicine. 2004; 12:109–118. [PubMed: 15516708]
- Wei C, Lim SH, Guadamuz TE, Koe S. HIV disclosure and sexual transmission behaviors among an internet sample of HIV-positive men who have sex with men in Asia: Implications for prevention with positives. AIDS and Behavior. 2012; 16:1970–1978. [PubMed: 22198313]
- Whisman MA. The efficacy of booster maintenance sessions in behavior therapy: Review and methodological critique. Clinical Psychology Review. 1990; 10:155–170.
- Winter AK, Sullivan PS, Khosropour CM, Rosenberg ES. Discussion of HIV status by serostatus and partnership sexual risk among internet-using MSM in the United States. Journal of Acquired Immune Deficiency Syndrome. 2012; 60:525–529.
- Wolitski RJ, Gómez CA, Parsons JT. Effects of a peer-led behavioral intervention to reduce HIV transmission and promote serostatus disclosure among HIV-seropositive gay and bisexual men. AIDS. 2005; 19:S99–109.

Figure 1.
Least-squares Mean Seropositive Status Disclosure Behavior Over Time and by Treatment Group

Table 1

Baseline Demographic Characteristics Overall and by Treatment Group

	Overall (N = 315)	DI ^a (N = 160)	ACCM ^b (N = 155)	χ ² or F			
Race (f, %)				1.77			
White	155	49.20	79	49.37	76	49.03	
African American	115	36.51	62	38.75	53	34.19	
Multiracial/Other	45	14.29	19	11.88	26	16.78	
Non-Hispanic Ethnicity (f, %)	285	90.48	148	92.50	137	88.39	1.54
Sexual Identity (f, %)							0.01
Gay	250	79.62	127	79.38	123	79.87	
Bisexual	64	20.38	33	20.62	31	20.13	
Education Level (f, %)							2.73
No high school degree	33	10.51	17	10.63	16	10.39	
High school degree	72	22.93	37	23.12	35	22.73	
Some college	136	43.31	64	40.00	72	46.75	
Bachelor's degree	58	18.47	32	20.00	26	16.88	
Post-graduate degree	15	4.78	10	6.25	5	3.25	
Income (f, %)							4.48
\$0 – \$500	91	28.98	42	26.25	49	31.82	
\$501 – \$1,000	89	28.34	45	28.13	44	28.57	
\$1,001 – \$1,500	69	21.97	35	21.88	34	22.08	
\$1,501 – \$2,000	36	11.46	24	15.00	12	7.79	
\$2,000+	29	9.25	14	8.75	15	9.74	
Currently employed (f, %)	99	31.53	59	36.88	40	25.97	4.32*
Location (f, %)							0.00
Midwest	163	51.75	83	51.87	80	51.61	
Southeast	152	48.25	77	48.13	75	48.39	
Viral suppression (f, %)	208	66.24	106	66.67	102	65.81	0.03
Age in years (M, SD)	42.06	11.14	41.94	11.05	42.18	11.27	0.04
Time since diagnosis in years (M, SD)	10.93	8.40	11.10	7.95	10.75	8.87	0.14
Number of sexual partners (M, SD)	3.15	3.52	3.14	3.91	3.17	3.07	0.01

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DI = Disclosure intervention group.
ACCM = Attention control case management group.
 $p < .05$.

Table 2

Repeated Measures ANCOVA Results: Mean Differences in Disclosure Behavior Over Time Overall and by Treatment Group

	Overall		Time		DI ^a		ACCM ^b		Group		Time × Group	
	LS-M ^c	SE	F	F	LS-M	SE	LS-M	SE	F	F	F	F
Time				13.81						0.69		0.64

Baseline	3.49 ⁰	0.08			3.58	0.11	3.40	0.11				
1.5 months post-base (Post-treatment)	3.89 ^{0.1}	0.09			3.86	0.12	3.93	0.12				
3-months post-base (Booster)	3.77 ^{0.2}	0.09			3.83	0.12	3.71	0.12				
6-months post-base	3.93 ^{0.2,3}	0.08			4.01	0.12	3.85	0.12				
12-months post-base	4.11 ^{0.1,2,3}	0.08			4.19	0.11	4.04	0.11				

^a Dl = disclosure intervention group.^b ACCM = attention control case management group.^c Controlling for participant age, sexual orientation, employment status, location, race, income, education, time since diagnosis, number of sexual partners, and viral suppression. LS-M = Least squares means. SE = standard error.⁰ Significant differences between baseline and the other time points.¹ Significant difference between baseline and 12-months post-baseline.² Significant differences between booster and 6- and 12-months post-baseline;³ Significant difference between 6- and 12-months post-baseline.***
 $p < .001$.

Table 3Final Mixed-Effects Model Results: Self-Efficacy Predictors of Disclosure Behavior Over Time ^a

	Estimate	SE	t
Intercept	3.86	0.24	16.02 ***
Time	0.29	0.13	2.20 *
Time-squared	-0.17	0.09	-1.98 *
Time-cubed	0.03	0.01	2.01 *
Self-efficacy disclosure ^b	0.82	0.06	13.40 ***
Self-efficacy condom use ^b	-0.01	0.06	-0.14
Self-efficacy negotiation ^b	0.02	0.06	0.30

^a Controlling for participant age, sexual orientation, employment status, location, race, income, education, time since diagnosis, number of sexual partners, and viral suppression.

^b Grand mean centered.

 $p < .001$;

*
 $p < .01$.

Table 4Final Mixed Effects Model Results: Outcome Expectancy Predictors of Disclosure Behavior Over Time^a

	Estimate	SE	t
Intercept	3.68	0.30	12.20 ***
Time	0.42	0.14	2.98 **
Time-squared	-0.22	0.09	-2.41 *
Time-cubed	0.03	0.01	2.36 *
Outcome expectancy disclosure ^b	0.61	0.07	8.37 ***
Outcome expectancy condom use ^b	0.13	0.07	1.91
Outcome expectancy negotiation ^b	0.04	0.07	0.58

^a Controlling for participant age, sexual orientation, employment status, location, race, income, education, time since diagnosis, number of sexual partners, and viral suppression.

^b Grand mean centered.

 $p < .001$;

**
 $p < .01$;

*
 $p < .01$.