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Effect of a clinic-wide social marketing campaign to improve adherence to antiretroviral therapy for HIV infection

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Abstract

This demonstration study tested the impact of a 5-month clinic-wide social marketing campaign at improving adherence to antiretroviral therapy (ART). The intervention included a video, posters, pens, mugs, and lapel buttons with the campaign slogan “Live the Solution: Take Your Pills Every Day.” Participants self-reported adherence over a 4-week interval, the primary outcome, with a visual analogue scale. Pre- and post-intervention surveys were completed by 141 participants. Adherence did not change over time (absolute mean change –2.02%, paired *t*-test *p*=0.39). Among the 39.7% of participants who correctly identified the campaign slogan on the post-intervention survey, adherence increased by 3.3%, while it decreased in the other participants by 5.5% (paired *t*-test *p*=0.07). The well-received campaign did not increase short-term adherence to ART, but adherence tended to increase in participants who were more engaged with the intervention. Future interventions should engage patients more completely and have a more potent effect on adherence.

Keywords

HIV/AIDS; Social Marketing; Adherence; Behavioral Interventions; Clinical Trial

Introduction

Less than a very high degree of adherence to antiretroviral therapy (ART) is associated with less HIV viral suppression, less improvement in CD4 cell counts, and faster disease

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Conflicts of Interest

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progression and death than is seen in persons with optimal adherence (1, 2). Effective ART use also prevents HIV transmission (3). Yet, adherence to ART is difficult and remains sub-optimal for many patients (4).

Many interventions to improve adherence to medications have been directed at patients from a cognitive-behavioral or behavioral modification standpoint. Despite a wealth of logic and theory supporting such approaches, many interventions have not proven successful and those that have been successful are not sustainable (5–8). Social marketing theory suggests that one reason for the limited success of many programs is that a particular program's message, while factually correct, rational, and based on sound theory, is not sufficiently appealing or convincing enough to change behavior (9). Social marketing is consumer-oriented marketing developed by consumer research and applied to public health problems. In contrast to educational efforts or motivational techniques, social marketing strategies do not try to change behavior by appealing to rational sensibilities. Instead, they attempt to change behavior through an appeal to cultural sensibilities, social norms, or group identity, just as the commercial sector often does when selling a product or building brand loyalty (10, 11). Campaign materials are targeted to a specific audience, and can be easily disseminated when a similar audience is identified (12).

Social marketing has been used in public health to improve condom use and reduce high-risk behaviors. For example, a 21-month, multi-component campaign targeting intravenous (IV) drug users resulted in more IV drug users engaging in lower risk injection practices if they had seen campaign materials (13). After a one-year campaign to reduce sexual transmission of HIV among adolescents, the proportion of adolescents who used a condom at last sex increased (14). A 6-month social marketing campaign resulted in Latino men having fewer sexual partners, and the men were more likely to carry condoms (15).

Adherence self-efficacy, which is confidence in one's ability to adhere to a treatment plan (16), is a frequently identified predictor of adherence to ART (16–18), and self-efficacy and intent to adhere are viable targets for a social marketing campaign (9). We hypothesized that social marketing materials salient to various target audiences among an HIV clinic population would improve patients' intent to adhere and their adherence self-efficacy and thereby improve their adherence to ART. We conducted preliminary research to develop a social marketing intervention with messages, messengers, and media specifically designed to decrease stigma, be culturally relevant to the target population, normalize adherence behavior, and promote adherence self-efficacy and intent. Herein we report the results of that preliminary research and a clinic-wide demonstration project of the social marketing intervention to determine its impact on adherence to ART.

Methods

The Setting

Thomas Street Health Center (TSHC) is a publicly funded, free-standing clinic for the care of persons infected with HIV. TSHC provides care for about 4000 patients annually, most of whom are uninsured or on public insurance programs.

Intervention Development

To develop the intervention, we first conducted focus groups with TSHC patients, as described previously (19). Potential focus group participants were invited to complete a survey that assessed their demographics and sexual orientation. Using that information, we stratified the focus groups by race/ethnicity, gender, and, for men, sexual orientation, by inviting eligible persons to the appropriate focus group. Relevant guiding questions for the focus groups were: "If there was one thing you could do to solve the (adherence) problem,

what would that be? If you had to design a campaign, slogan, or ad materials to share your solution with others, what would your campaign be like? Who in the community would make you think about taking your meds?” A total of 31 persons participated in one of nine different focus groups. The focus group data were systematically analyzed by the study team around identifying the recommended message, messenger, and media. We learned that 1) the most salient messenger would be peers who had successfully treated their own HIV infection, rather than healthcare providers, celebrities, or community leaders; 2) any intervention should be positive and hopeful, not negative or scary; and 3) the intervention should be a multi-media campaign, centered in the clinic, where patients could access campaign components without fear of unintentional disclosure, rather than something designed for broader public distribution.

The Intervention

Keying off a focus group participant’s suggestion, we developed the slogan, “Live the Solution: Take Your Pills Every Day,” because it directly targeted adherence self-efficacy and intent. To use messengers who could normalize adherent behavior, we sought a diverse set of real clinic patients, as suggested by the focus group participants. TSHC has a Patient Mentor Program, which trains successful patients to act as peer navigators and supporters for the broader patient population, especially patients new to the clinic (20). Mentors are readily identifiable by a special vest they wear while on duty. We invited the mentors to be videotaped telling their stories about how they overcame struggles with ART adherence. All of the mentors who were willing to be interviewed on camera for the video and able to attend the video shoot were included in the video, constituting about half of the clinic’s mentors. The video footage was edited for consistency with the focus group data and our theoretical underpinnings and condensed into a 10-minute piece featuring eight stories, all told in the mentor’s own words, with the campaign’s logo and slogan interwoven. The video featured five male and three female mentors, of whom five were African American, two were Hispanic, and one was non-Hispanic white (roughly consistent with the demographics of the clinic’s population). A Spanish-language dubbed version of the video was produced and played after the English version. We also produced lapel buttons with the slogan for the physician and nursing staff to wear, small posters to hang in the clinic featuring photos and quotations from the video, and mugs and pens with the campaign’s logo and slogan. Mugs and pens were selected based on affordability and input from the mentors suggesting that these materials would be well received by the patients. The video was played on the clinic’s closed-circuit waiting room televisions in the nursing units, pharmacy, and phlebotomy areas three or four times daily between January 27 and July 2, 2010. Campaign mugs and pens were distributed daily in common areas of the clinic over the same time period to all patients who wanted them (Table I).

Evaluation Participants

We had 6 months to enroll participants, and, as a demonstration project, determined that we could enroll about 10–15 participants per workday, and therefore targeted 250 participants. Eligible participants were at least 18 years old, had been prescribed ART for at least the last 30 days, spoke English or Spanish, and were responsible for taking their own medications. Between June and October 2009, a convenience sample of 250 participants was recruited and given an interviewer-administered survey. Participants were primarily recruited from clinic waiting rooms and from the pharmacy waiting area. Beginning March 1, 2010 (>30 days after the intervention was deployed), we resurveyed as many of the 250 original participants as possible over a 6-month period as they attended scheduled appointments at the clinic.

The Evaluation

The evaluation relied on a pre/post-intervention design. Adherence was assessed by self-report using a validated item based on a visual analogue scale, which asks the participant to report their adherence over the last 4 weeks (21, 22), a recall period supported by recent literature (23). The survey also gathered demographic, socioeconomic, and substance use information. Electronic medical records were used to obtain baseline laboratory characteristics of the study participants.

To estimate possible exposure to and penetration of the intervention, the post-intervention survey assessed the number of clinic visits made during the intervention period and recall of the campaign's components. Response options to these questions included real components of the campaign as well as sham components. Self-reported impact of the intervention was assessed by items that asked whether the campaign made it "easy to take my pills every day and on time," made it "more likely for me to take all my pills every day and on time," (both items used a 6-point "strongly agree" to "strongly disagree" response scale); and an item that assessed the degree to which each component of the intervention was helpful in taking pills every day and on time (using a response scale of 1 to 7, with 1 being "not helpful" and 7 being "very helpful"). The video was assessed with items on whether the video characters were "like people you know," whether the recommendations shown in the video would work for "audiences like you," and whether watching how the characters "dealt with taking their HIV pills in the video will help me deal with my HIV medication," each assessed using a 5-point response scale. We assessed adherence self-efficacy using seven items that we previously developed. The items assess levels of certainty that adherence to medications and appointments will have a positive impact on HIV-related health (e.g., "How sure are you that the HIV medications will have a positive impact on your health?"), and that the participant can adhere to medications and appointments (e.g., "How sure are you that you will be able to take all or most of your HIV medications as directed?"). Higher scores indicate higher self-efficacy. We measured intent to adhere with a single item, "How strongly do you intend to take all of your medicines on time?" There were four response options, "not very strongly," "somewhat strongly," "quite strongly," and "very strongly." These items were scored 1 to 4, respectively (23). Recall of the intervention was measured by whether or not the participant correctly identified the slogan of the intervention from a list of four slogans.

Data Analysis

Participants with both a pre- and post-intervention survey were included in the analysis. Absolute change in adherence was calculated as post-intervention minus pre-intervention percent adherence. In order to maximize cell sizes, we dichotomized the self-report items on impact and acceptability of the intervention at the median response to test whether the adherence change was different for the low and high groups. To compare patient characteristics between groups, we performed the *t*-test for continuous variables or the Kruskal-Wallis test if the data were not normally distributed. To compare categorical data, we used the Chi-square test or Fisher's exact test, as appropriate. To create a multivariable model of change in adherence, the association of each covariate with change in adherence was first assessed in univariate analysis. All covariates with a *P*-value ≤ 0.20 in the univariate analysis were entered into a multivariable regression model. The final multivariable model was selected using a stepwise method (SAS version 9.1; SAS Institute, Cary, NC). All statistical tests were two-sided.

The study was approved by the Institutional Review Boards of the University of Texas MD Anderson Cancer Center and Baylor College of Medicine. All participants provided written informed consent.

Results

Evaluation Participants

We approached 302 persons to enroll the target population of 250 participants. Reasons for non-enrollment were: not on ART ($n=18$), screened eligible but did not complete the survey ($n=16$), refused ($n=11$), not TSC patients ($n=5$), and already enrolled ($n=2$). Of the 250 participants, 141 completed a post-intervention survey. One-hundred nine participants did not complete a post-intervention survey: one was confirmed deceased, four were no longer on ART for the last 30 days, two declined, and the remainder either did not attend clinic visits during our post-intervention survey period (about two-thirds of the remainder) or were missed by the research team when they attended a visit. Characteristics of participants who completed both pre- and post-intervention surveys compared to participants who completed only pre-intervention surveys are shown in Table II. The groups were similar in all baseline characteristics except age, with persons lost to follow-up being younger than the other participants.

The 141 participants with both a pre- and post-intervention survey are included in the present analysis. Forty percent were women, nearly all were Black or Hispanic, two-thirds identified themselves as being heterosexual, and a third had less than a high school degree. On average, participants were diagnosed with HIV for 11 years, had been on ART for 8 years, and had been attending the clinic for 7 years. Post-hoc power calculations indicate that the study had 80% power to detect a change in adherence as small as 6.6% as statistically significant.

Impact of the Intervention

At least one component of the intervention (posters, video, staff buttons, mug, or pen) was seen or received by 96% of the respondents. In general, respondents had positive impressions of the intervention. When asked how helpful the components of the intervention were with taking pills every day and on time, on a scale of 1 (“not helpful”) to 7 (“very helpful”), participants’ mean rating of the video was 5.6 (SD 2.1), with a median value of 7. They rated the campaign posters at 5.2 (SD 2.1 and median of 6), the pen at 4.6 (SD 2.4 and median of 5), and the mug at 4.9 (SD 2.4 and median of 6). Eighty-six percent of respondents agreed that the campaign made it “easy” to take pills every day and on time and the same proportion agreed that the campaign made them “more likely” to take their pills every day and on time.

Self-reported adherence did not improve (pre-intervention 90.3% [SD 21.0], post-intervention 88.3% [SD 18.6]; absolute mean change -2.0% [SD 27.8] paired t -statistic = -0.86 , $P = 0.39$). Adherence also did not improve as a function of the number of self-reported visits to the clinic during the intervention, a marker for possible exposure to the intervention. In fact, adherence declined more for persons with > 3 visits (absolute mean change -9.0% [SD 18.2]) compared to persons with ≤ 3 visits (absolute mean change $+1.5\%$ [SD 31.0], t -statistic = 2.50, $P = 0.01$). There were no significant differences in change in adherence as a function of exposure to the intervention (i.e., by self-report of receipt of a campaign mug or pen, or whether the video, buttons, and posters were reported seen; data available on request). There were also no significant differences as a function of the participants’ rating of how much the campaign helped them or how closely they identified with the persons in the video (data available on request). Finally, in sub-population analyses, years on ART (dichotomized at the median) predicted change in adherence (≤ 7.4 years, absolute mean change $+3.9\%$ [SD 23.3]; > 7.4 years, absolute mean change -8.0% [SD 27.4]; t -statistic = 2.58, $P = 0.01$). None of the other baseline characteristics predicted a significant change in adherence (data available on request).

Adherence Self-Efficacy and Intent to Adhere

The adherence self-efficacy scale had good internal reliability in this population (Cronbach's alpha 0.74). Adherence self-efficacy decreased from baseline to follow-up (pre-intervention 3.8 [*SD* 0.3], post-intervention 3.7 [*SD* 0.4]; mean change -0.15 [*SD* 0.44], paired *t*-statistic = -4.13 , $P < 0.001$); however, this change of, on average, less than a quarter point on scale scores that could range from 1.0 to 4.0 was not likely clinically meaningful. Participants who reported seeing the slogan's picture had a smaller decrease in adherence self-efficacy score by 0.16 points (*t*-statistic = 2.08, $P = 0.04$), also likely not a clinically meaningful change. Other measures of exposure to and acceptance of the intervention did not significantly predict change in adherence self-efficacy (data available on request). There was no significant correlation between change in adherence and change in adherence self-efficacy (Pearson correlation coefficient $r = 0.10$, $P = 0.24$). There were no differences in changes in adherence self-efficacy by baseline characteristics, with the exception of race: Black participants had a mean (*SD*) decrease of 0.10 (0.44) points, while non-black participants had a decrease of 0.27 (0.45) points, *t*-statistic = -2.1 , $P = 0.03$; additional data available on request). Finally, intent to adhere did not change over the course of the study (mean change -0.05 [*SD* 0.71], *t*-statistic = -0.83 , $P = 0.41$). There were no differences in changes in intent to adhere by baseline characteristics (data available on request).

Intervention Recall

Fifty-six participants (39.7%) correctly identified the campaign's slogan from the list of four options. Participants who correctly identified the intervention's slogan reported more exposure to the intervention and showed a non-significant trend toward improvement in adherence (absolute mean change $+3.3\%$ [*SD* 28.6]), compared to participants who did not correctly identify the slogan (absolute mean change -5.5% [*SD* 26.9], *t*-statistic = -1.85 , $P = 0.07$; Table III). Identifying the slogan correctly did not predict change in adherence self-efficacy though there was a trend towards improvement in intent to adhere (Table III).

Multivariable Analyses

In a multivariate analysis of change in adherence, we considered age, sex, race, education, health literacy, alcohol use, drug use, years at TSHC, years on ART, and whether the participant correctly identified the campaign's slogan. The final model included age, education, years on ART, and whether the participant correctly identified the slogan (Table IV). Participants who correctly identified the slogan had an adjusted increase in adherence of 8.6% compared to participants who did not (*t*-value = 1.71, $P = 0.09$).

Discussion

This study is to our knowledge the first to test a clinic-wide social marketing campaign to improve adherence to ART. Overall, the pilot intervention did not improve adherence, but many important lessons were learned. Our results were likely driven by two major factors: only about 40% of the participants could correctly identify the message, suggesting inadequate internalization of the campaign; and the campaign, once internalized, had only a modest effect.

There are a number of other possible reasons for the lack of success of the campaign. Some reasons are related to the evaluation itself. As a demonstration project, we did not have the resources to actively track patients for follow-up and as a result were not able to complete the post-intervention survey on a substantial portion of study participants. This limitation reduced statistical power and perhaps introduced some bias. Participant adherence was quite high at baseline, perhaps because we relied on self-reported adherence or because adherence truly was high, as has been found in other studies that do not select for participants with

problematic adherence (24). Either way, this ceiling effect limited our ability to show an effect of the intervention. Unfortunately, we could not rely on pharmacy refill data since about half of the clinic's patients do not use the on-site pharmacy, and a requirement that potential participants have or bring their medication bottles to the clinic would significantly limit enrollment and potentially bias it to a more adherent population. Adherence in the study declined between the pre-intervention evaluation and the post-intervention evaluation, which is not unexpected (25). It is possible that the decline in adherence we observed would have been larger in the absence of the intervention. Without a separate control group, this possibility cannot be evaluated. We only had a single post-intervention measurement of adherence so longer term effects of the intervention are unknown. Finally, it is impossible to definitively state that the intervention was or was not effective based on a pre/post study design, and our results should be interpreted as preliminary evidence.

Evaluation issues aside, the intervention does not appear to have been sufficient to meaningfully change short-term adherence. Various characteristics of the intervention may have limited its potency. Our intervention needed to strike a balance between saturating the clinic with its message and annoying the campaign's audience, and we may have erred on one side or the other of this balance, although the data suggest that the campaign was well received. We designed some of the intervention materials to be taken home by the patients, like the mug and pen. Stigma may have prevented some participants from doing so, thus limiting their exposure to the intervention. These participants may have needed the intervention most. Indeed, we found several mugs and pens in the clinic, possibly intentionally left behind because the material had HIV-specific references (a red ribbon and the name of the clinic). Without the take-home components of the intervention, the clinic-based components may not have been potent enough to change adherence. Future interventions could use a more subtle logo, perhaps interpretable only to those who had seen the video or posters. The logo then might not discourage patients from taking components of the intervention out of the clinic.

We did not observe a clear relationship between exposure to the intervention and improved adherence. In fact, the persons with more visits to the clinic during the intervention had greater declines in adherence. This observation may reflect the need for patients with adherence problems to more frequently visit the clinic for medical or nursing visits, or for treatment of comorbidities, such as psychiatric disease and substance use. On the other hand, adherence increased in persons on ART for about 7 years or less years and declined for persons on ART for longer periods. It is possible that the mentors' messages were more salient to the population more recently initiating ART, for at least 2 reasons. First, some of the stories in the video focused on the mentors' early experiences with ART, which may have had limited relevance to more ART-experienced patients. Second, the mentor program at TSHC was about 5 years old at the time of this intervention, and perhaps the participants on ART for longer periods had less personal experience with the mentors than the newer patients, making the intervention less potent for them.

Adherence to ART is a complex phenomenon. Stigma, social instability or homelessness, mental health issues, and substance abuse can significantly impact patients' ability to take ART (26). Future social marketing interventions may need to address the many factors impacting adherence, as opposed to delivering messages only based on the benefits of adherence, as we did here. Finally, we may have been underpowered to detect as statistically significant a clinically meaningful change in adherence during our study's limited follow-up period.

Other social marketing campaigns have had mixed results. Successes related to HIV infection have included interventions to increase condom use (15), decrease needle sharing

behavior (27), increase HIV testing (28), and increase linkage and retention in care (29). A number of HIV-focused studies had results similar to ours, where there was some evidence that the campaign increased intent or knowledge or improved attitudes and beliefs but had little or no impact on behavior, if indeed it was measured (30–33). The more successful campaigns included other intervention components, like outreach and system changes (29, 34, 35). Our intervention may not have had enough modalities to produce meaningful change in behavior.

There was some evidence (albeit not statistically significant) that the degree to which participants engaged with the social marketing campaign, reflected in their being able to properly identify the campaign's slogan, did predict improvement in adherence. McGuire's communication theory proposes that after exposure there must be attention, comprehension, yielding to the information, remembering, and action (36). The trend in our data was not statistically significant in univariate or multivariate analyses and may have been due to chance, and the findings from the stepwise multivariate procedure should be viewed as exploratory. Nonetheless, the trend observed between knowing the campaign slogan and improved adherence suggests that, among persons who internalized the campaign message enough to recognize it, the intervention may have had a positive effect on short-term adherence.

Social marketing campaigns are widely used in public health, but relatively few are formally evaluated for their impact on outcomes. In this study of a social marketing campaign to improve adherence to ART, we did not see an overall increase in adherence. However, the campaign was well accepted, and short-term adherence tended to increase in the sub-set of patients who were more engaged with the intervention and who were more recently started on ART. Social marketing campaigns to improve adherence may have potential, and should employ broader interventions, take-home components devoid of potentially stigmatizing graphics or slogans, and evaluation instruments less prone to ceiling effects.

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Table I

Intervention components delivered at Thomas Street Health Center during the social marketing campaign to improve adherence to antiretroviral therapy.

Item	Content	Distribution
Video	20 minutes long video (10 minutes in English and 10 in Spanish); 8 mentor stories normalizing adherence to ART, demonstrating that barriers to adherence can be overcome, and discussing benefits of ART on health and well-being. Campaign slogan and logo flashed between stories.	Played 438 times, an average of 3 times per day on 5 of 6 televisions in the clinic.
Posters	Photo of mentor with quote from the video and campaign slogan.	Displayed for 130 days.
Mugs	Campaign slogan and logo	1990 distributed.
Pens	Campaign slogan and logo	1990 distributed.
Staff lapel button	Campaign slogan and logo	200 distributed.

Table II

A comparison of baseline characteristics, by whether the participant completed both pre- and post-intervention surveys or only the pre-intervention survey, in an evaluation of a social marketing campaign at Thomas Street Health Center to improve adherence to antiretroviral therapy.

Characteristic	Pre- and Post-Intervention Participants <i>n</i> = 141	Pre-Intervention Participants Only <i>n</i> = 109	Test statistic (<i>P</i> value)
Females – <i>n</i> (%)	56 (39.7%)	40 (36.7%)	0.28 (0.60) ^a
Age – years, mean (<i>SD</i>)	46.1 (9.0)	43.5 (8.7)	–2.19 (0.03) ^b
Race/ethnicity – <i>n</i> (%)			
Hispanic	43 (30.5%)	35 (32.1%)	2.77 (0.43) ^a
Black	92 (65.2%)	68 (62.3%)	
Sexual orientation – <i>n</i> (%)			
Gay/Lesbian	28 (19.8%)	19 (17.4%)	0.55 (0.76) ^a
Heterosexual	91 (64.5%)	76 (69.7%)	
Bisexual	19 (13.5%)	13 (11.9%)	
Education ^d – <i>n</i> (%)			
Less than high school	46 (33.8%)	30 (27.5%)	1.00 (0.61) ^a
GED	21 (15.4%)	20 (18.3%)	
High school graduate	69 (50.7%)	55 (50.4%)	
Alcohol use ^e – <i>n</i> (%)	22 (15.6%)	13 (11.9%)	0.69 (0.41) ^a
Drug use – <i>n</i> (%)	26 (18.4%)	16 (14.7%)	0.62 (0.43) ^a
CD4 cell count – <i>n</i> (%)			
0–200 c/mm ³	19 (15.8%)	21 (19.3%)	2.65 (0.45) ^a
200–350 c/mm ³	31 (25.8%)	19 (17.4%)	
350–500 c/mm ³	26 (21.7%)	15 (13.8%)	
>500 c/mm ³	44 (36.7%)	31 (28.4%)	
HIV viral load <400 c/mL – <i>n</i> (%)	87 (73.7%)	54 (50.0%)	2.08 (0.16) ^a
Years HIV positive – median (25 th , 75 th percentile)	10.2 (5.1, 15.9)	9.3 (5.2, 14.2)	0.34 (0.56) ^c
Years as clinic patient – median (25 th , 75 th percentile)	5.0 (2.0, 10.0)	4.0 (1.0, 9.0)	2.58 (0.11) ^c
Years on ART – median (25 th , 75 th percentile)	7.4 (3.3, 13.0)	8.2 (4.2, 12.2)	0.29 (0.59) ^c

GED is General Education Development. ART is antiretroviral therapy.

^aChi square statistic and *P* value;

^bt-test statistic and *P* value;

^cKruskal-Wallis chi square statistic and *P* value.

^d“Less than high school” excludes participants who completed a General Education Development (GED).

^eSelf-reported consumption of 5 or more alcoholic drinks within a two-to-four-hour period at least once or twice per week.

Table III

A comparison of change in adherence to antiretroviral therapy, change in adherence self-efficacy, and exposure to the intervention, by whether the participant correctly identified the campaign's slogan or not, in an evaluation of a social marketing campaign at Thomas Street Health Center to improve adherence to antiretroviral therapy.

	Slogan Correct <i>n</i> = 56	Slogan Incorrect <i>n</i> = 85	Test statistic (<i>P</i> value)
Change in adherence – mean (<i>SD</i>)	+3.3 (28.6)	–5.5 (26.9)	–1.85 (0.07) ^{<i>b</i>}
Change in adherence self-efficacy – mean (<i>SD</i>)	–0.14 (0.56)	–0.16 (0.35)	–0.29 (0.77) ^{<i>b</i>}
Change in intent to adhere – mean (<i>SD</i>)	0.07 (0.74)	–0.13 (0.69)	–1.65 (0.10) ^{<i>b</i>}
Exposure to the intervention			
Saw posters ^{<i>d</i>} – median (25 th , 75 th percentile)	3.0 (2.0, 4.0)	2.0 (0, 4.0)	2.89 (0.09) ^{<i>c</i>}
Saw video ^{<i>d</i>} – median (25 th , 75 th percentile)	4.0 (1.5, 4.0)	3.0 (1.0, 4.0)	2.73 (0.10) ^{<i>c</i>}
Saw staff button ^{<i>d</i>} – median (25 th , 75 th percentile)	4.0 (2.0, 4.0)	3.0 (0, 4.0)	4.23 (0.04) ^{<i>c</i>}
Saw logo ^{<i>d</i>} – median (25 th , 75 th percentile)	4.0 (3.0, 4.0)	3.0 (2.0, 4.0)	14.9 (0.0001) ^{<i>c</i>}
Received mug or pen – <i>n</i> (%)	32 (57.1%)	34 (40.0%)	3.98 (0.05) ^{<i>a</i>}
Times in clinic in last 30 days – median (25 th , 75 th percentile)	3.0 (2.0, 7.0)	3.0 (2.0, 4.0)	3.87 (0.05) ^{<i>c</i>}

^{*a*}Chi square statistic and *P* value;

^{*b*}t-test statistic and *P* value;

^{*c*}Kruskal-Wallis chi square statistic and *P* value.

^{*d*}Response to question asking how often the item was seen in the last 30 days, ranging from 0 (0 points) to 4 or more (4 points).

Table IV

Results of a multivariable linear regression analysis of change in adherence to antiretroviral therapy, in an evaluation of a social marketing campaign at Thomas Street Health Center to improve adherence to antiretroviral therapy.

Characteristic	β Estimate (SE)	t value (P value)
Age (years)		
35	-0.81 (7.87)	-0.10 (0.92)
>35 and 50	-18.4 (5.53)	-3.32 (0.001)
>50	referent	
Education		
GED	17.8 (7.54)	2.36 (0.02)
High school graduate	-1.96 (5.23)	-0.37 (0.71)
Less than high school	referent	
Years on ART	-1.10 (0.38)	-2.85 (0.005)
Slogan correct	8.56 (5.02)	1.71 (0.09)
R ²		0.19
Adjusted R ²		0.15

GED is General Education Development. ART is antiretroviral therapy.