

# Facebook Advertising to Recruit Young, Urban Women into an HIV Prevention Clinical Trial

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Published online: 20 May 2017

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**Abstract** Advertising via Facebook to elicit involvement in clinical trials has demonstrated promise in expanding geographic reach while maintaining confidentiality. The purpose of this study is to evaluate Facebook advertising to reach at-risk, predominately African American or Black women in higher HIV prevalence communities for an HIV prevention clinical trial, and to compare baseline characteristics to those recruited on-the-ground. Maintaining confidentiality and the practical aspects of creating and posting ads on Facebook are described. The advertising strategy targeted multicultural affinities, gender, age, interest terms, and zip codes. We report on results during 205 days. A total of 516,498 Facebook users viewed the ads an average of four times, resulting in 37,133 clicks to the study website. Compared to 495 screened on-the-ground, 940 were screened via Facebook ads, of these, half ( $n = 477$ , 50.74%) were high risk, and of those at risk, 154 were randomized into the 6-month clinical trial. Black women comprised 71.60% ( $n = 673$ ) of the total screened online. Roughly twice as many Black women screened via Facebook compared to on-the-ground, yet, the percentage at high risk was similar. Preliminary data suggest that the extent to which ad headlines and photos tap into authentic social experience, advertising on Facebook can extend

geographic reach and provide a comparative sample to women recruited on-the-ground.

**Keywords** HIV prevention in women · Facebook advertising · Smartphones · Online recruitment

## Introduction

Advertising is the action of calling public attention to something, typically by paid announcements [1]. Facebook, a popular social networking site (SNS) [2], offers advertising opportunities to vendors. Posting ads on Facebook has shown promise in recruiting target populations, particularly younger adults and adolescents to participate in research studies [3, 4] and to extend reach to geographically distant or otherwise harder to reach populations [5], such as, homeless populations, individuals concerned about the stigma of HIV, or those engaging in stigmatized behaviors. Recruitment of women, children, and people of color into clinical trials is a National Institutes of Health priority [6] so Facebook advertising could be a plausible approach to meeting recruitment goals. Posting an ad on Facebook can be analogous to posting an ad for a study in the local paper. One clicks on a Facebook ad and is sent to a secured study website to review the full flyer, having left the Facebook platform [3]. The use of Facebook advertising for research and program delivery is growing [5, 7], but, as identified by Pederson and Kurz [8], remains a relatively new area that requires further research and guidance into sample representativeness, protections of human subjects, and validity of the data.

Few studies to date have reported on the use of Facebook advertising to recruit urban, predominately Black women into a HIV prevention clinical trial [3]. Data

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indicate that one of four new HIV infections is among women, the majority of whom (62%) are African American or Black [9]. Instructive insights on use of Facebook advertising in other populations, particularly, in men who have sex with men (MSM) [10, 11] may not generalize to Black women, further suggesting the need for such work.

The purpose of this study is to evaluate Facebook advertising to successfully reach and recruit the target population of predominately African American or Black women in higher HIV prevalence communities for an HIV prevention clinical trial, and to compare baseline characteristics, HIV risk, and cost estimates to a sample recruited on-the-ground. In addition to concerns of sample representativeness; maintaining participant confidentiality and data validity [8] will be described. This report provides a practical guide to creating and posting ads on Facebook to recruit participants, with a specific exemplar of an ongoing HIV prevention clinical trial of young adult urban, predominately Black women.

## Background

### Sample Representativeness

Social Networking Sites, such as Facebook have increasingly been deployed to recruit, engage in social media promotion campaigns, and deliver HIV prevention interventions to vulnerable populations [5]. However, it remains unclear whether Facebook as an advertising strategy will be an effective mechanism to recruit a sample that is representative of the target population of at-risk, young adult, African American or Black women in urban communities with high HIV prevalence. The first consideration is whether the target population accesses social media. As of late 2016, Facebook continued to be the most popular social networking site in the US [12]. Of all people in the US, 68% are Facebook users, with 28% using Instagram, now an addition to the Facebook platform. Of the 85% of adults in the US who access the Internet [13], 78% use Facebook, and women access Facebook more than men (83 vs. 75%). Among the target age group of 18–29, Facebook use is higher at 88 and 59% are on Instagram. Those with lower incomes show higher use than those at higher incomes [12]. Among African American or Black Internet users, 67% use Facebook [2]. Use of social media among those with a high school diploma or less has grown more than tenfold over the past decade [14].

Given the widespread access and popularity of SNS, and Facebook in particular, among young adult African American or Black women, it is plausible that Facebook can be a venue from which to attain a sample of young, adult Black women that would be comparable to women

recruited on-the-ground. Concerning representativeness, it is noteworthy that Parsons, Vial, Starks, and Golub (2013) found higher substance misuse among those recruited online compared to those recruited in the field. However, they viewed this difference to be an advantage [10] in that online recruitment may offer greater access to populations engaging in risk behaviors.

### Human Subjects Concerns

These concerns are associated with the potential risk to participants' confidentiality, mainly exposing one's identity as a research participant. Facebook users may not fully understand the security and privacy features associated with their Facebook account profiles [15]. If clicking an ad directs participants to an HIV prevention website, interest in an HIV prevention study may inadvertently become known to other Facebook friends or to Facebook tracking. Similar to other websites, Facebook tracks cookies, Internet history, and usage beyond the Facebook environment that can present challenges to confidentiality.

By utilizing cookies, ads are directed to Facebook users who have an affinity to the topic based on that users' browsing history [16]. A cookie is a message sent to a web browser (i.e., Google Chrome) by a web server. The web browser stores the cookie (message) in a text file and sends it back to that server each time the web browser requests a page. The server can use this information to present a customized web page [17]. Cookies are used to authenticate users, remember the browser, personalize and tailor content, and secure against unauthorized access based on the information in these cookies [16]. Cookies also allow Facebook to count the times ads are shown, how often ads are clicked, limit the number of times an individual sees an ad to reduce ad fatigue, and calculate the cost of the ads [16]. What is key is that browsing, purchasing, and search terms are contained in a user's web browser cache and accessed by Facebook to build user profiles associated with the user's Facebook identity. Therefore, a series of measures are needed to protect privacy and are increasingly required by Institutional Review Boards (IRB).

Approaches to handling privacy on Facebook occur at different levels. At an individual level, a person negotiates a need to connect with others against a need for privacy by excluding contact information, limiting friendship requests, and removing photos from a Facebook profile [18]. At the level of Facebook, an individual can adjust privacy settings to disable cookies, reducing the risk of Facebook tracking to a study related website [16]. Readers are encouraged to review confidentiality practices on the Facebook website since these evolve [16] but such measures do not eliminate the need to establish individual and study protective measures.

The feasibility of implementing study protocols to secure confidentiality had been previously developed in conjunction with the University IRB and Director of the Office of Information Security and tested in a small pilot study of 40 recruited during a 30-day period [3]. User evaluation indicated 17 of 40 participants had some concerns about privacy when they clicked on the Facebook ad, however, once redirected to the study website, nearly all ( $n = 38$ ) trusted that their responses were confidential [3]. These preliminary findings suggested Facebook to be an acceptable and viable recruitment tool given the measures taken to assure confidentiality.

### Data Validity

Once an ad is clicked, and a potential participant reviews the flyer and consents to the screening survey, there is concern that individuals could attempt to register several times and offer fake identities. To date, efforts to verify the identity of a potential research participant can require a mixed approach of automated methods and phone contact [3, 19–21]. An automated protocol can be applied to the database to search for duplicate email addresses, phone numbers, and usernames, allowing only those with unique names and numbers to join the study. However, it is common for participants to have the same internet protocol (IP) address when sharing a device with friends or family, or when logging on at public places, such as, a library or coffee shop. Therefore, a manual review of the database may also be performed as well as direct contact with participants by phone to verify identity.

### Advertising Basics on Facebook

Facebook provides advertisers with options to publish ads on mobile devices, desktop computers and third-site audience networks. Third-site audience networks are websites or mobile applications (apps) where users may login with their Facebook credentials. Examples are: Tango, a messaging, video chat and calling app; Shazam and Pandora, both music apps; and Badoo, an online dating app. To date these are available to Facebook advertisers free-of-charge [22].

Facebook ads are displayed to users whose profiles match the selected inclusion criteria of multicultural affinities, age, gender, zip code, and interests [23]. Ads are viewed repeatedly whenever users log-on to Facebook until a daily ad budget is met. This approach can reach a broad distribution of a target population [24] or reach a population that may be less accessible for onsite data collection. A study of college students' perceptions of online advertising on Facebook indicated that interactivity, advertising avoidance, trust of privacy, but not credibility, influenced

students' attitudes towards Facebook ads [25]. Facebook ads do offer interactivity, with ads that show text, images, video and links [25]. Oversaturating an ad on someone's Facebook page can lead to ad avoidance. Ads may also be avoided if there is an appearance of clutter on the page, if tasks are interrupted, or with prior negative experiences with the ad or organization [25]. Credibility can be addressed by the credentials of the organization promoting the ad, such as, a university.

### Evaluation Plan

Before implementing an ad, a plan is set in place to evaluate the success of the ad campaign. This plan involves decisions of how widespread the potential reach to the target audience should be, and the best approach to reach that audience. These criteria are reviewed at regular time points so that the approach can be adjusted [26].

Reach is related to ad exposure to 18–29 year old urban women in high HIV prevalence zip codes. Representativeness was determined by whether women who were clicking the ads were predominately African American or Black women at higher HIV risk, as determined by results of an online screening survey; residence in zip codes with high HIV prevalence, and finally, of the women screened to be at high risk, the proportion who went on to join the 6-month long study. These were considered important criteria based upon the Centers for Disease Control and Prevention, High Impact HIV Prevention recommendations [27]. Heterosexual transmission of HIV remains the most prevalent transmission mode in women [9], with the fourth largest number of new HIV infections in the U.S. among Black women [9].

Specific questions to be asked in this research are whether targeted Facebook advertising will reach predominately Black women at higher risk for heterosexual HIV transmission? How effective will the online approach be in recruiting higher risk women into the 6-month long study? Would this sample be similar in baseline characteristics to the on-the-ground sample in higher HIV prevalence communities?

### Methods

The purpose of this study is to evaluate Facebook advertising to successfully reach and recruit the target population of predominately African American or Black women in higher HIV prevalence communities for an HIV prevention clinical trial, and to compare baseline characteristics, HIV risk, and cost estimates to a sample recruited on-the-ground. The purpose of the parent study is to recruit young, adult urban women into a clinical trial to determine the

efficacy of an HIV prevention video web series on reducing HIV risk and increasing HIV testing. The advertising component is strictly a recruitment tool because the study activities, including, consent, intervention delivery, and data collection were conducted on a website separate from the Facebook platform. The university IRB approved full implementation of study protocols, including Internet and Facebook privacy protocols.

### Sample

Women, 18–29 years who had been in sexual relationships with men during the past three months were eligible for a screening interview. To compare intervention and control arms on baseline characteristics and study outcomes, the study utilized block randomization within each zip code of participants recruited online in Massachusetts (MA), New Jersey (NJ) and New York City (NYC). Additionally, a strata of the population was recruited from traditional on-the-ground venues in MA to compare baseline characteristics and key outcomes of levels of risk, HIV testing, and retention to those recruited online via Facebook advertising. This approach will help to answer whether there are significant differences in baseline characteristics, attrition, and study outcomes between those recruited online and those recruited on the ground.

### Data Collection on-the-Ground Compared to Online

Using an adaptive web design, consents, surveys and video episodes were accessed on women's own diverse mobile devices and operating systems. Therefore, on-the-ground recruitment still required that the informed consent and the screener be completed on women's own smartphones or on the tablets carried by research assistants (RAs). A private room or space was provided at each site with an average of 10 min to complete. On-the-ground venues were those situated in high HIV prevalence zip codes in predominately African American and Black neighborhoods in MA, but, primarily neighborhoods in Boston and surrounding cities. Data were collected at local bus stops and shopping venues in collaboration with community organizations that serve lower income women, women at risk for substance use, a mobile health van attached to the university nursing school, and a Women, Infant, Children (WIC) site. Recruitment was coordinated at times convenient for staff and in conjunction with the RAs and recruiter's weekly schedules. Compensation for completing the screener onsite was \$5.00. When recruited via Facebook, the screening survey was not compensated. Compensation for participation in the full study was \$100.

The project director (PD) phoned all online participants who had screened-in as high risk and consented to the 6-month long study in order to review the study and

respond to questions. The PD also phoned those recruited on-the-ground to ascertain if there were any questions, in the event that a participant onsite had run out of time, such as, for child care or transportation pressures. Another purpose for the PD to phone all online eligible and consented participants was to verify identity. She did so by asking questions, such as, *Can you verify your age, please? What city do you live in?* An automated protocol was also applied to the database to search for duplicate email addresses, phone numbers, and usernames. All participants' provide a phone number upon consenting to the 6-month long study. The phone number is used as a form of communication secondary to email and permission is provided to text or call. To date, the requirement of a phone has not served to be a deterrent to on-the-ground participation because of the pervasive use of mobile devices in this population.

### The Intervention

Love, Sex, and Choices (LSC) is a 12-episode soap opera video series created to reduce HIV risk and increase HIV testing among at-risk Black urban women [28]. A video guide commentator was added to the end of episodes to offer insights concerning critical dramatic moments. The findings of earlier descriptive studies and focus groups [29–31] led to the development of sexual health promotion messages related to relationship communication, HIV testing, and consistent condom use skills, that were woven into familiar high-risk sex scripts to model new behaviors in situational and emotional contexts. The LSC heroines transform self-behavior through awareness of their values, choices, and potentials. With permission by the producers, the control group received a popular 11-episode romantic comedy video web series, with one episode of CDC-based HIV prevention video.

### Securing Confidentiality

When potential participants clicked on the Facebook ad, they were redirected to the secured study website with an innocuous Uniform Resource Locator (URL) address (Women2 Women) on the World Wide Web, so the address did not identify the nature of the study as HIV prevention. Participants were not asked to "like" the study Facebook page, although many did. No personal data were collected from those who 'like' the study Facebook page.

### Ads Created by Team to Attract the Target Population

The team, which included three of the authors (principal investigator, project director, and undergraduate

communications intern), collaborated on the core messages communicated in individual and carousel ads (advertisements that feature multiple photos and/or videos) by method of consensus. The ads were approved by the IRB and posted on Facebook and Instagram. The team produced its own ads to target predominantly African American or Black women, aged 18–29-years old, in urban neighborhoods of MA, NJ, and NYC with high HIV prevalence. The ads were created to appeal to women in committed, casual or multiple partnered relationships. Drawing upon previous research into sex scripts [30, 32] the ads were constructed to resonate with the lived experiences of women engaging in condomless sex with men whom they believed were having sex with other women and/or men, or injected drugs. Ads communicated this narrative to encourage women to consider learning more about the study.

Each ad featured an attention-grabbing headline 25 characters or less in length, and a high-resolution image, rendered 1200 × 680 pixels in size for Facebook and 600 × 600 pixels for Instagram. Images for the ads were selected from original photographs created by the study team or from publicly available stock images. In addition, each advertisement included a brief description of the study, details about the benefits of participating (35–90 characters in length) and a “Learn More” button. By clicking on the “Learn More” button, users were redirected from the Facebook platform to a W2W flyer located on the secured study team website that described the study and how to participate. Together, these components communicated the narrative of women facing a trust dilemma in a relationship and how they could get involved with the W2W study (See Fig. 2).

Using Power Editor, the team specified “affinities” or demographics to ensure the ads reached the Facebook pages of their target population. These included multicultural affinities where race affinity may be requested (i.e., African American, Latina), gender, age (18–29 year olds) and specific geographic zones (67 zip codes in MA, 18 zip codes in NJ, and 4 in NYC).

Ads were organized in folders called Ad Sets in order to group ads according to certain criteria. Ad sets were primarily organized according to location and ad narrative but could include a daily budget, location, target criteria, interest terms, and the platforms where the advertisements were to be shown [23]. For example, ads targeting women in main partner relationships would be published in two separate ad sets: one targeting NJ, the other, MA.

### Ad Workflow

The team created ad content using the Facebook Power Editor [33] to create and edit multiple ads at once [33]. Ads were uploaded to the Facebook Ads Manager program,

where they were reviewed for approval by Facebook administrators, as outlined in the Facebook Advertising Policies [34]. Facebook Ad Manager is used to manage, publish, and track ad performance. Facebook Audience Insight is an application that collects data on population trends of the target demographic [35].

Initially, W2W ran ads on Facebook users’ mobile device News Feed, and on the right-hand column of desktop users’ News Feed. News Feeds on the Facebook home page provide status updates, photos, videos, links, app activity and “likes” from people that users select to follow [36]. Ads placed on the computer desktops were discontinued because they generated few clicks to the W2W website (<1% of all ad clicks) compared to ads on mobile platforms. The team also published ads on Instagram, a social media app accessed primarily on mobile platforms, and where users share photos and videos. Instagram, which is popular with the target audience [2], is owned by Facebook and was recently added to the advertising platform options.

### Interest Terms

To increase exposure to the target population with greater precision, the team utilized interest terms. Decisions about which interest terms to select were informed by three sources: the formative research, discussions among team members whom were representative of the target population, and data from Facebook Audience Insights. Facebook Audience Insights reports trends within specific populations based on users’ interactions on Facebook [35]. It provides advertisers with aggregate and anonymous data about the demographics, geographic location, relationship status, device used to access Facebook, and pages “likes” in various categories, such as, entertainment. Using data from Audience Insights, the team focused on monthly active Facebook users who were 18–29 years old African-American or Black women, and interest terms from the top-ten Facebook page “likes” [35].

Interest terms gleaned from the top-ten “likes” of the target audience often included popular television shows, current events, and civic and social organizations that were trending. For instance, the Audience Insights program would suggest that African American/Black women ages 18–29 living in NJ in Spring 2016 were most likely to be commenting and seeking information on topics such as: “Hot 97” (a popular urban radio station), “Alpha Kappa Alpha sorority”, “The Walt Disney Company”, “Six Flags Great Adventure,” “Brooklyn Nets,” and “The Weekend.” Targeting the audience by their interests, as well as demographics and zip codes, increased the precision of the ad reach and better utilized the daily ad budget.



## How Ads are Published

Once the content and image were finalized, the ads were exported from Power Editor to Ad Manager for review (see Fig. 1). During the ad review process, an algorithm is run to scan the ad for content to determine whether the images comply with Facebook ad guidelines. Reasons for disapproval are usually related to nudity or offensive language [37]. If disapproved, an email is sent with the reason and recommendations to modify the ad for compliance to Facebook guidelines. Although this process could take up to 24 h, most of the ads for this study were approved within an hour. Of 10 ads, one ad was not approved initially because of the “sexual content”. With a minor revision, the ad was accepted and published.

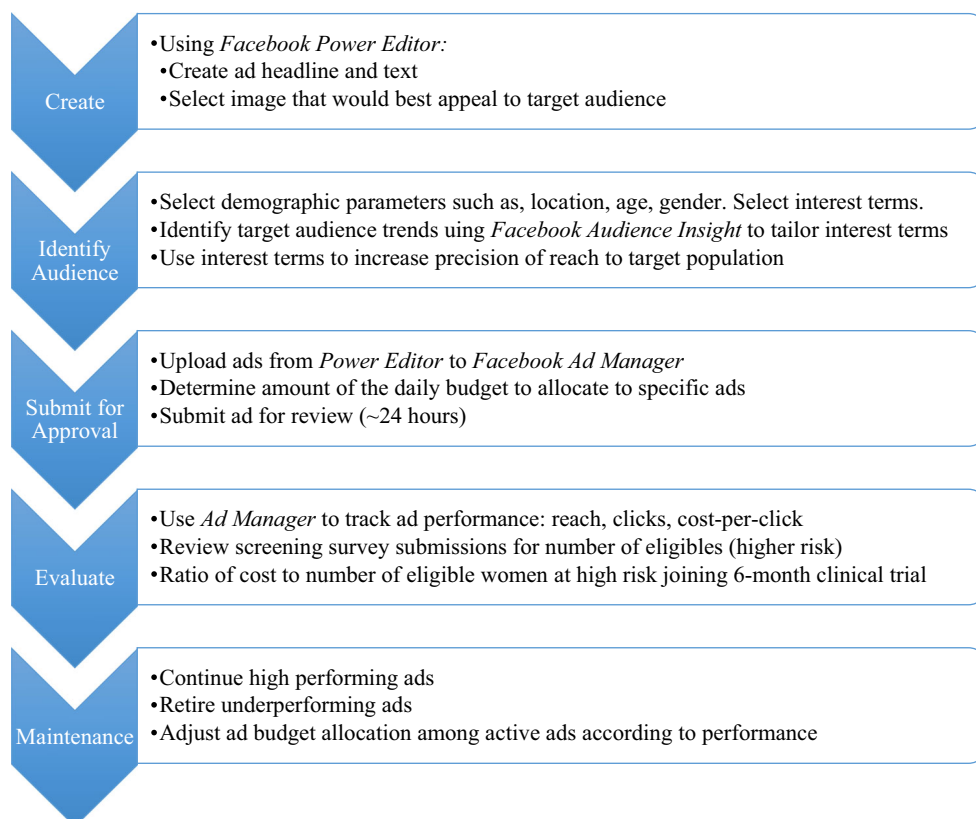
## Evaluation: Determining Performance

The primary goal of a clinical trial is to test the efficacy of an intervention on relevant outcomes. A hybrid design will also include evaluation criteria that can inform subsequent implementation [38]. In this study, criteria were needed to determine whether online recruitment would reach the target population. Therefore, to evaluate reach in a successful ad campaign, the approach that was adopted in this

study was the Reach dimension of the Reach, Effectiveness, Adoption, Implementation, and Maintenance (REAIM) [39–41] model checklist.

The principles guiding evaluation of ad effectiveness were: reach and representativeness, meaning that ads should be seen on the Facebook pages of 18 to 29 year old, predominately African American or Black women, in higher HIV prevalence zip codes in select states in the urban northeast. Therefore, ad performance was operationalized as: (1) the potential number of women who see the ad in high HIV prevalence zip codes, (2) the number of ad clicks to the study website, (3) the numbers categorized as high risk upon completion of the anonymous online screening self-interview, and (4) the numbers who consent and go on to complete the 6-month clinical trial; and finally (5) a framework to estimate the ratio of cost to the numbers of screened-in high risk women who were recruited and then who completed the 6-month long study. Due to budget constraints, the daily Facebook ad budget for this study was set at \$50.

Ad performance was tracked on Facebook using metrics, such as, total clicks, audience clicks (clicks from Facebook, Instagram, and third party audience), and user demographics (such as, gender and age). (See Fig. 1). The click rate is the number of ad clicks to the W2 W website per day. Based on the recruitment goals of the study and prior



**Fig. 1** Ad Workflow

experience tracking ads, a website click rate of 30–50 clicks per day per week was considered to be average performance. Ads with clicks to website higher than 50 clicks per day were considered high performing. Further, an ad or ad set was considered high performing when over the course of a week, 7–10 women who screened-in as high risk, went on to join the study. Typically, multiple ads were run within an ad set to distribute the daily budget among competing advertisements, allowing for ads that perform well to be seen more frequently. (Fig. 2)

Facebook assigns each ad a relevance score on a one to ten ranking based on audience feedback, with ten indicating the ad is highly relevant to the target audience and one that it is not relevant [42]. Positive feedback relates to sharing, liking, commenting, or clicking the ad. Negative feedback relates to users choosing to hide the ad, or choosing to hide all ads from the advertiser. The ad relevance score is useful in forecasting the effect that interest terms may have in increasing exposure to the target population. However, high ad relevance scores did not consistently yield higher numbers or lower cost per click. Therefore, daily monitoring of ad performance by the team was required. Thus far, the most successful advertisements, receiving the highest number of clicks-to-website are: “Do you trust him?” (NJ/MA), “Sex with the wrong guy?” (NJ/MA), “Having Fun Dating” (NJ).

An example of data used to evaluate an ad is one that featured the tagline “Tired of his lies?” This ad ran for a week in July 2016 in MA, NJ and NYC, reaching 13,400 Facebook users, generating 880 clicks, averaging 126 clicks a day, at \$0.16 per click. The “Do you trust him?” ad (NJ) reached 5412 Facebook users, generated 255 website clicks, averaging 36 clicks per day at a cost of \$0.18 per click.

## Data Analysis

Data analysis was performed to evaluate the Facebook ads on reaching the target population and to compare recruitment online to on-the-ground with data from Facebook ad performance metrics, and study demographics, including: the number of women reached in high HIV prevalence zip codes, the number of ad clicks to the study website, the numbers screened, categorized as high risk, and consented to join the 6-month long study, and estimated cost. Chi Square statistical tests were performed on frequencies and percentages between groups.

## Results

As shown in Table 1, during a discrete period of 205 days of recruiting, there were a total of 1435 screened. Of those screened, nearly twice as many were screened by Facebook

or Instagram Ads ( $n = 940$ , 65.50%) compared to on-the-ground recruitment ( $n = 495$ , 34.50%). On-the-ground recruitment was conducted at an average of three, 4-hour sessions per week, at times that sites, including the mobile van and WIC, could accommodate, when RAs and recruiters were available and weather permitting. Facebook ads ran daily until the daily budget was met.

Data from Table 1 show that the age and number of partners were similar across recruitment platforms. Comparing those screened via Facebook ads to those recruited on-the-ground, the percent of women who screened in as high risk online, ( $n = 477$ , 50.74%) was statistically significantly higher than those who screened in as high risk on-the-ground ( $n = 207$ , 41.81%,  $\chi^2(1, N = 1,435) = 10.36$ ,  $p < 0.01$ ). The numbers who decided to join the study, consent, and go on to be randomized were higher in the Facebook group, but, the percent randomized within the mode of recruitment was statistically significantly lower ( $n = 153$ , 32.08%) compared to the on-the-ground ( $n = 94$ , 45.41%),  $\chi^2(1, N = 684) = 11.13$ ,  $p < .001$ .

Of all women who screened online via Facebook, 673 (71.60%) were African American or Black, a number that was nearly twice as high as African American or Black women screened on-the-ground ( $n = 345$ , 69.70%). The percentage of Black women within each recruitment method did not differ,  $\chi^2(1, N = 1,435) = 0.57$ , ns. The percentage of African American and Black women whom screened in as high risk was also similar across recruitment platforms. Of African American or Black women who screened online, 352 (52.30%) were high risk, compared to on the ground, 160 (46.38%) were high risk,  $\chi^2(1, N = 1,018) = 3.20$ , ns. Among all women randomized, the percentage of African American or Black women did not differ by recruitment method,  $\chi^2(1, N = 247) = 1.13$ , ns. Latinas comprised 22% of those screened online ( $n = 206$ ). More Latinas screened-in as high risk online ( $n = 96$ , 20.13%) than on-the-ground ( $n = 31$ , 14.98%).

Reaching zip codes in three states with Facebook ads on mobile devices; 516,498 were reached, generating a total of 37,133 clicks, during the 205 day period (see Table 2). Desktop ads had been discontinued because these ads reached only 1,888 users that generated 30 clicks. In contrast, Table 2 shows results by mobile platform. Third party Audience Networks (websites or mobile applications (apps) where users may login with their Facebook credentials) received the highest number of clicks ( $n = 27,360$ ), followed by clicks to ads on Mobile News Feeds ( $n = 9135$ ) (i.e. smartphones) and Instagram ads ( $n = 638$ ) which are also viewed on mobile devices. The average cost per click was obtained by dividing total cost by clicks. Because Audience Networks received the most clicks, it was the most cost efficient compared to Mobile News Feed and Instagram. During

**Fig. 2** Sample Instagram carousel ad and sample Facebook Mobile News Feed ad

this time period, the Facebook Ad budget constrained to \$50/day, was divided up between Facebook platforms and zip codes.

Table 3 shows the extent to which the ads reached the target population. Total impressions represent the number of times the ads were shown on Facebook during this time period ( $N = 2,135,058$ ). There were 516,498 individual Facebook users that viewed the ad an average of 4 times, resulting in 37,133 clicks to the W2W study website. Of these, 940 went on to complete the screening survey. Of these, half ( $n = 477$ , 50.74%) were high risk, and of these, just over half ( $n = 256$ , 53.67%) consented to join the 6-month long study. There were 154 who continued on to

be randomized. Various methods of on-the-ground recruitment are shown on Table 4, with most receiving a flyer from study personnel.

The advertising cost per those online that were randomized into the study during this time period was \$66.46. The estimated on-the-ground cost per randomized was \$149.62, based on 293 hours spent recruiting on-the-ground, and as recommended [10] calculating the cost of personnel hours for this time period per person recruited. A preliminary comparison of retention of those recruited during the 205 day period, indicated that, those who did not go on to complete are trending to be similar across recruitment methods to date.



**Table 1** Comparing on-the-ground to Facebook Ads: Demographics of women screened, met high risk eligibility, and went on to be randomized into the 6-Month clinical trial from 10/22/15–7/13/16 (205 days)

	All Screened <sup>a</sup> N = 1435	Recruited on-the-ground, heard about it, saw flyer			Recruited online: Facebook and Instagram ads		
		Screened (n = 495) (34.50%)	High risk (n = 207) (41.81%)	Randomize (n = 94) (45.41%)	Screened (n = 940) (65.5%)	High risk (n = 477) (50.74%) <sup>b</sup>	Randomize (n = 153) (32.08%) <sup>c</sup>
Average age	23.5	23.8	23.6	24.2	23.4	23.6	23.9
Average # of partners	1.4	1.3	1.6	1.7	1.4	1.6	1.7
<b>Background</b>							
African American/ Black	1018 (70.94%)	345 (69.70%)	160 (77.29%)	75 (79.79%)	673 (71.60%)	352 (73.79%)	113 (73.86%)
Latina	295 (20.56%)	89 (17.98%)	31 (14.98%)	12 (12.77%)	206 (21.91%)	96 (20.13%)	28 (18.30%)
White	82 (5.71%)	42 (8.48%)	12 (5.80%)	5 (5.32%)	40 (4.26%)	18 (3.77%)	7 (4.58%)
Asian	9 (0.63%)	6 (1.21%)	1 (0.48%)	0 (0%)	3 (0.32%)	2 (0.42%)	0 (0%)
Middle Eastern	2 (0.14%)	1 (0.20%)	0 (0%)	0 (0%)	1 (0.11%)	1 (0.21%)	1 (0.65%)
Other	13 (0.91%)	4 (0.81%)	0 (0%)	0 (0%)	10 (1.06%)	7 (1.47%)	4 (2.61%)
Native American/ American Indian	15 (1.05%)	8 (1.62%)	3 (1.45%)	2 (2.13%)	7 (0.74%)	1 (0.21%)	0 (0%)

<sup>a</sup> An additional 97 women were screened via the website Craigslist.org

<sup>b</sup> *p* < 0.01

<sup>c</sup> *p* < 0.001

**Table 2** Data from Facebook ads on mobile devices for 205 days during October 22, 2015–July 13, 2016

Platform:	Clicks to website	Reach	Average cost per click	Cost (total)
Audience network	27,360	142,932	\$0.15	\$4027.60
Mobile News Feed	9135	303,817	\$0.60	\$5502.17
Instagram	638	69,749	\$1.11	\$705.76
Total:	37,133	516,498	\$0.28 <sup>a</sup>	\$10,235.53 <sup>b</sup>

<sup>a</sup> Average cost/click obtained by dividing total cost by total clicks

<sup>b</sup> Facebook budget set at \$50/day = 205 days

## Discussion

The purpose of this study is to evaluate Facebook advertising to successfully reach the target population of predominately African American or Black women in higher HIV prevalence communities for an HIV prevention clinical trial, and compare baseline characteristics, HIV risk, and cost estimates to a sample recruited on-the-ground. This report also provides a practical guide to creating and publishing a Facebook ad for a target population, and to do so with consideration of sample representativeness, protections of human subjects, and validity of the data [8]. The approach will vary by study population. Preliminary data suggest that for this study, online recruitment via Facebook advertising offers access to the target population. Given potential limitations of resources on-the-ground that include: inclement weather, travel, time, RA or recruiter

costs and schedules; recruitment via Facebook reaches greater numbers of women at high risk, over far greater geographic areas, with greater efficiency, in ways that satisfied the criteria for reach in this study. Although 6-month retention will more reliably be evaluated on completion of the parent study, retention for those recruited during the 205 days was similar across recruitment methods. On-the-ground, the method of learning about the study was most often by receiving flyers from trained RAs or recruiters who went on to explain the study. Although online recruitment lacks this face-to-face contact, these data suggest that for many, such contact did not deter recruitment. Overall, results showed more women screened, and screened-in as high risk, when recruited by Facebook ads, compared to on-the-ground. Numerically, more women decided to join the study, consent, and go on to be randomized in the Facebook group than on-the-

**Table 3** Facebook Ad Performance Women2Women Study for 205 days during 10/22/15–7/13/16

Impressions <sup>a</sup>	2,135,058
User reach <sup>b</sup>	516,498
Mean frequency user sees ad	4.13
Total cost	\$10,235.53
Clicks on ad	37,133
Average cost-per-click	\$0.28
Clicks by region	
MA (began 10/22/15)	18,363
NJ (expanded 11/2015)	14,565
Brooklyn (expanded 4/2016)	2859
Providence (expanded 6/2016)	250
Other	1096
Clicked ad to screen <sup>c</sup>	
Complete screen	940
Screen high risk eligible for 6-month study	477
Consent to 6-month study	256
Randomized	154
Cost per randomized <sup>d</sup>	\$66.46

<sup>a</sup> Refers to total number of times ads were shown on Facebook

<sup>b</sup> Refers to how many users saw the ads

<sup>c</sup> Women who reported that they joined by clicking a Facebook advertisement (Facebook, Instagram, or audience network)

<sup>d</sup> Total ad cost/randomized

ground, although, the percent within each group that went on to be randomized was somewhat higher in the on-the-ground group (32.08 vs. 45.41%).

Preliminary findings suggested that the sample recruited via Facebook was comparable to women recruited at local venues, such as WIC, a health promotion van, downtown shopping areas and a community service organizations in high HIV prevalence neighborhoods. In terms of representativeness, age, number of sex partners was similar across platforms. Although nearly twice as many African American or Black women screened online compared to on-the-ground, the percentage that screened, and screened in as high risk, was similar across on-the-ground and online

platforms. Similarities in demographics across these platforms had also been found in a clinical trial to recruit women into prenatal care early in the pregnancy [7]. The notable exception in that study, was that women recruited by Facebook were significantly earlier in their pregnancy than compared to on-the-ground. As Parsons et al. found, online venues may provide enhanced access to target populations [10]. Criteria for representativeness in this study were whether women who were clicking the ads were predominately African American or Black women, residing in zip codes with high HIV prevalence and screening in as higher HIV risk. These criteria were developed to be consistent with the CDC High Impact Prevention Approach [27].

There is a strong advantage to recruiting on-the-ground by venue sampling [43] because the team was able to physically go to predominately African American and Black communities, to venues where women reside, shop, attend to chores, and socialize and where epidemiologic data indicate HIV prevalence to be a public health concern. That precision is not possible with the wide net cast by online advertising. It is therefore notable that use of multicultural affinities, gender, zip codes, and interest terms to target Facebook users' pages with the ads, resulted in nearly three-quarters of the online sample screened to date, to be African American and Black ( $n = 673$ , 71.60%).

Of importance, Latinas comprised an additional 22% ( $n = 206$ ) of women screened online. An evaluation of the relevance of the intervention to women of different race and ethnicity will be performed as the study progresses. Latina women were not excluded from the study because previous formative research indicated that sex-scripted themes emphasized in the intervention were consistent between young Latina and African American women who live in the same communities [30].

The team created its own ads, drawing upon the creativity of nursing and communication students who were representative of the target population. Ad creation was also based on clear understanding of the aims of the study. Ad creation, posting, and monitoring became an act of

**Table 4** How did you hear about the study?

1. Someone from the study gave me a flyer or told me about it	224 (16%)
2. A family member or friend gave me a flyer or told me about it	76 (5%)
3. Facebook advertisement	850 (59%)
5. Saw a flyer	94 (7%)
6. Other	33 (2%)
7. Instagram (started 11/11/15)	90 (6%)
8. Unknown	68 (5%)
Total Screened:	1435
Total higher risk:	684 (48%)
Total lower risk:	751 (52%)

collective judgement. Flexibility and the willingness to change ads, try new ads, take new photos and experiment with new slogans facilitated a fresh and relevant ad appearance.

Reach was established with each woman seeing an ad an average of four times totaling over 2 million views in a 205 day period. Reaching the population on third party audience networks as well as Instagram and Facebook pages meant bringing awareness of this study to women while they engaged with social media. On average, the Facebook ads received a high number of clicks/week. Overall, of the more than 37,000 clicks on the ads to the W2W study website, 940 screened, roughly half were high risk, and nearly one-third of those at risk went on to be randomized into the 6-month long study.

A framework was established to estimate the ratio of cost to those recruited into the study. It is too early in the parent study to determine the cost per completer. The average cost per click of \$0.16 was obtained by dividing total ad cost by clicks. The advertising cost per those online that were randomized into the study during this time period was \$66.46. A limitation of this approach is that it did not account for the time the team spent discussing and composing the ads, creating photos, or monitoring ad performance. A cost analysis of person hours [10] per each recruited on-the-ground at \$149.62, is also an estimate, given the vagaries of seasonal weather and RA availability. More women are recruited in temperate weather, thus, reducing the cost per person. Also, not included are minimal costs of site rentals, and transportation. Therefore, cost estimates are not precise but meant to be a general indicator that online advertising to this target population may be cost effective.

The concept of targeting advertising to online venues where the population regularly visits was also found to be a successful approach in a study seeking to describe sexual behaviors of MSM and regularly use a geosocial-networking application, such as Grindr [44]. Similar to a study primarily using Facebook advertising to reach younger adolescent men who self-identified as gay, bisexual, and/or queer into HIV prevention studies [45] advertising strategies were routinely adjusted to successfully reach a diverse sample, and to be cost effective.

In the current study, women at higher HIV risk were interested in headings relating to partner trust. Future trends may demonstrate change in the popularity and effectiveness of Facebook advertising in the population of young adult urban women. Therefore, routine review of evaluation metrics is needed in order to monitor for early changes in the number of ad clicks, and whether these result in eligible participants joining the study. To the extent that ad headlines and photos can tap into an authentic social experience, advertising on Facebook can extend reach to at-risk, young adult urban women.

## Conclusion

Adequately powered studies, a representative sample, inclusion of women, children, and people of color are NIH priorities. Advertising to elicit involvement in clinical trials via social networking sites, specifically Facebook, has demonstrated promise in expanding geographic reach while still targeting a population and maintaining confidentiality. A broad representative distribution, including those less accessible via traditional venue sampling due to stigma or locale, may be reached online for involvement in clinical trials. In this exemplar, the approach of Facebook ads reached the target population of at-risk women in higher HIV prevalence communities. The sample recruited online via Facebook ads appears to be comparable to women recruited on the ground. The reach of this HIV prevention clinical trial to women at risk, is extended beyond geographic borders of a team on the ground.

**Acknowledgements** The authors gratefully acknowledge the assistance of the Director of the Office of Information Security at Northeastern University, Mr. Mark Nardone, and the Director of Human Subject Research Protection, Nan C. Regina. We extend our gratitude to the participants in this study and to the contributions of research assistants who helped design and create and monitor the ads: Siobon Barrett, Akira Brown, Akirah Charles-Brown, Shanice Henry, Diana Jacques, Emily King, Nenser Krua, Circe Le Compte, and Angelica Recierdo.

**Funding** This study is funded by the National Institutes of Nursing Research NR014632.

## Compliance with Ethical Standards

**Disclosures** The authors report no real or perceived vested interest that relate to this article that could be construed as a conflict of interest.

**Ethical Approval** Informed consent was obtained from all individual participants included in the study. All procedures performed in this study 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. This article does not contain any studies with animals performed by any of the authors.

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