Social media based strategies to reach Hispanic young adults with tailored sexual health information

Sofia B. Fernandez[1], Eric F. Wagner[2], Michelle Hospital[3], Melissa Howard[4], and Staci Leon Morris[5]

Abstract: Hispanics constitute the largest ethnic minority group in the United States. As the country's fastest growing demographic, social welfare and public health professionals need to focus on ameliorating HIV-related health disparities affecting Hispanics. This study evaluated an innovative HIV prevention effort with Hispanic young adults in South Florida that utilized a social media based platform to increase access to critical HIV prevention information and services. This study (1) evaluated the effectiveness of exposure to the online campaign using an experimental design and (2) provided a systematic review of the campaign's content and user interactivity. Hispanic young adults (ages 18-24) completed baseline and follow-up assessments focused on risk perceptions and incorporation of HIV preventive behaviors. Mixed ANOVA and logistic regression analysis revealed no significant differences between groups (exposure versus no exposure to the online campaign); however, there was a statistically significant increase in awareness of HIV prevention services across both study conditions ($p < .001$). Findings reflect the challenges of and opportunities for conducting HIV prevention work online and suggest areas of future research for enhancing online engagement among hard to reach populations.

Key words: health communication; community health; health promotion; prevention; social media; online technologies; HIV; young adult

1. Post-Doctoral Fellow, Community-Based Research Institute, Florida International University
2. Director, Community-Based Research Institute, Florida International University
3. Associate Director for Research & Development, Community-Based Research Institute, Florida International University
4. Clinical Assistant Professor, Community-Based Research Institute, Florida International University
5. Associate Director for Clinical Services & Training, Community-Based Research Institute, Florida International University

Address for correspondence: sofernan@fiu.edu, Florida International University

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Introduction

Prevention efforts to eliminate the spread of HIV have had widespread impact in the United States over the past two decades. However, some groups of individuals continue to be disproportionately affected by HIV, as new HIV cases are concentrated in certain racial, ethnic, sexual, and gender minority groups (Centers for Disease Control and Prevention [CDC], 2015). Although researchers, service providers, and federal agencies have gathered considerable evidence to identify effective preventive strategies, implementation challenges persist for underrepresented and underserved groups who are disproportionately affected. Not all groups of individuals have benefited equally from advances in reducing HIV and certain groups of individuals continue to be more at risk and harder to reach (Rhodes, 2014).

In Florida, rates of HIV are on the rise despite national declining rates (Florida Department of Health, 2016). Specifically, Miami, FL, is identified as one of the areas hardest hit by the HIV epidemic and, in 2014, had the distinction of ranking number one in the number of new HIV cases per capita in the U.S. (Florida Department of Health, 2015). In addition, approximately 67% of Miami's residents identify as Hispanic (United States Census Bureau, 2016). Prevention challenges among Hispanics include cultural, social and structural barriers to HIV prevention services, contributing to their characterization as a 'high risk' or 'hard to reach' group (CDC, 2017).

Researchers and practitioners are increasingly utilizing social media technologies to disseminate HIV prevention information, primarily because social media use and accessibility continue to grow. Social media is a cost-effective platform to achieve widespread dissemination across geographical boundaries and is a strategic method to promote community conversation among audiences that have been historically difficult to reach.

The present research aimed to evaluate a social media campaign designed to raise awareness about HIV through a communication campaign and a community partnership to ensure that young adults, specifically, Hispanic young adults in a community with high incidence of HIV, know the facts about prevention and locally available prevention resources. The campaign at hand is part of a community-based research project funded by the Substance Abuse and Mental Health Services Administration (SAMHSA), through the Center for Substance Abuse Prevention. The parent project brings together a grass roots, community-based organization that provides HIV services in nonclinical settings and an academic research group housed in a large Hispanic Serving Institution (HSI). The overall goals of the parent project included: a) building environmental prevention capacities in the university, b) providing rapid point of care HIV testing, and c) implementing media advocacy and awareness campaigns for Hispanic young adults.

Background

Globally, more than 36 million people are living with HIV (WHO, 2017). The CDC (2016) estimates that 1.2 million of these individuals (13 years or older) live in the United States. Of the 1.2 million people in the U.S. living with HIV, about one in eight is unaware of their infection (CDC, 2016). Currently, in the U.S., HIV remains a mainly urban disease with the majority of new cases coming from areas with 500,000 people or more. Geographical locations of greatest concern in the U.S. include Miami, FL, Atlanta, GA, and Washington, DC (CDC, 2015).

HIV is a threat to the health and well-being of the Hispanic community (CDC, 2017). In 2015, Hispanics accounted for almost a quarter (24% or 9,798) of all new HIV infections in the U.S. and 6 dependent areas (CDC, 2017). This is disproportionate, as Hispanics represent only about 18% of the total U.S. population (CDC, 2017). A lack of culturally appropriate, evidence-based HIV prevention approaches contributes to the elevated risk of HIV among the Hispanic community (CDC, 2017). Despite widespread awareness of the over-representation of HIV infections among Hispanics, culturally sensitive, evidence-based prevention services are rarely available.

Evidence-based HIV prevention

Systematic reviews of HIV prevention efforts highlight the need for multiple strategies for effectiveness with high risk groups. Researchers such as Rotheram-Borus et al (2009) recognize that prevention efforts must integrate behavioral, biomedical, and structural intervention strategies in multilevel programs to increase chances of success, and ultimately, eliminate the spread of HIV. Because HIV is a social and behavioral issue, and not just a medical issue, there is a push for biopsychosocial approaches to its prevention. Biomedical and behavioral evidence-based prevention strategies that reduce the spread of HIV include condom use and HIV testing among cultural groups (Thomas et al, 2015). These evidence-based biomedical and behavioral prevention interventions, though, are no 'magic bullet' for this issue and their effectiveness is strongly affected by social, environmental, and structural influences (Rotheram-Borus et al, 2009, p. 144). Limited access to culturally and linguistically appropriate risk information and testing services contribute to prevention challenges among Hispanics and exacerbates HIV risk.

Unique social, cultural and language-related barriers among Hispanic young adults make accessing HIV prevention information difficult and may deter youth from seeking HIV prevention services. Stigma-related barriers (e.g., stigma about homosexuality, and the cultural values of *machismo* and *marianismo*) present as considerable impediments to seeking out information about sexual health treatments among Hispanic groups. These barriers to receiving HIV prevention

information make it particularly challenging to ensure that messages are received and incorporated by Hispanic young adults.

Health professionals are increasingly using social media based strategies to communicate with hard to reach groups about HIV prevention and their locally available services. Social media offers the promise of eliminating both geographical boundaries and cultural barriers to accessing critical information and services. Health communication that allows for privacy, personalized feedback and tailored messaging seems increasingly necessary to ensure relevance of content, message viewing, and adoption of health promoting and disease preventing behaviors among minority groups. The participant-involved approach shows promise in increasing connections between researchers or service providers and high-risk groups. Still, there are few empirical studies examining the effectiveness of social media strategies in HIV prevention (Ems and Gonzalez, 2016).

Two systematic reviews provide rigorous assessments of the use of social media strategies in health promotion (Maher et al, 2014; Laranjo et al, 2014), and both found support for using such strategies to implement positive change in public and behavioral health. Additionally, two published studies, the Hope Study and the Just/Us Study used Facebook to engage young adults in HIV prevention and both studies supported the feasibility and relevance of employing social media strategies (Bull et al, 2011; Bull et al, 2012; Young et al, 2013). Still, it is said that the use of social media in public health communication is in its 'Wild West' phase of development, where little order or structure for evaluation is in place, let alone, enforced (Ems and Gonzales, 2016, p. 1762). Thus, there is a desperate need for the rigorous and systematic evaluation of social media approaches to ensure social media strategies are being used responsibly and effectively.

Campaign approach

The campaign under evaluation intended to increase safe sex and HIV testing service adoption among a Hispanic young adult group. Campaign messages and strategies were developed through a formative research process which included conducting a college wide needs assessment survey and four extensive focus groups. Results from the campus wide survey (N=537) indicated that 75% of students reported social media as either their first or second preference for news and information. Social media was explored further in focus groups, with participants recommending the incorporation of non-threatening sexual health advice and employing multiple avenues (both online and offline) in which to reach young adults in their community. This evolved into an innovative and developmentally relevant campaign with a spokesperson ('Cody the Camel') promoting 'Hump Day Testing' and revealing weekly 'TURN UP' tips through three social media channels: Facebook, Instagram,

and Twitter. The formative research process findings highlighted the developmental and cultural appeal of social media platforms for HIV prevention messaging targeting Hispanic young adults. To evaluate the efficacy of this online social media campaign, the following exploratory research was conducted.

Methodology

Design

A mixed method design and mixed sample approach were employed to accommodate the unique and evolving nature of both conducting real-time health promotional campaigns online and evaluating their efforts. This research (1) provided a systematic examination of a prevention campaign delivered via Facebook, Twitter, and Instagram and (2) examined its effectiveness on desired sexual health outcomes. Data were collected from a randomly assigned sample of 60 Hispanic young adults between the ages of 18 and 24. Results of the social media campaign evaluation are divided into an assessment of reach, engagement and effectiveness, in line with literature recommendations (Lim et al, 2016). Specific Aim 1 addresses reach and engagement of the online campaign and Specific Aim 2 addresses evaluating its effectiveness on influencing health-related outcomes: awareness of HIV testing and prevention services, confidence of using condoms, perceived benefits of using condoms, and frequency of reported protected sex acts. Because this research presents with two specific aims, the methodology section is divided accordingly. Each specific aim presents with a unique sample, procedure, and analysis. All study procedures were approved by the University's Institutional Review Board.

Aim 1 Mixed method data collection

To address Specific Aim 1, qualitative and quantitative data were extracted from the online, social media campaign pages on Instagram, Facebook, and Twitter over a three-month study period. Qualitative data included all the content that the social media campaign produced (the campaign's input), and were not limited to text content. Images were included in the thematic labeling of campaign content, as was done in previous evaluations of community-based organizations' use of social media for health promotion (Ramanadhan et al, 2013). The classification of content categories that were created by Ramanadhan et al (2013) for community-based organizations' use of social media in health promotion were used as the guiding framework in the content analysis. Content labels included human interest, health education, non-information, and campaign promotion (Ramanadhan et al, 2013).

Reach, impression, and interactivity were chosen as the quantitative key

performance metrics to evaluate the activity on the online social media pages. Reach was defined as the size of the user base (Veale et al, 2015). Impression was defined as the total number of times a post was displayed to any user. Interactivity was used as a measurement of engagement and was defined as any interaction that occurred between users or between a user and the prevention campaign page (Veale et al, 2015). Additionally, metric data sets available on each social media platform were extracted to utilize the analytics available on each site. These quantitative metrics, as well as available demographic data, were gathered to address Specific Aim 1.

Aim 1 Procedure and analysis

Screen captures were taken of all the content on each campaign social media page (i.e., Facebook, Twitter, and Instagram). Prior to analysis, any participant names and profile photos that were included in the screen captures were removed to maintain participant's privacy while blinding the researchers.

Each post generated by the campaign was considered a unit for analysis. Because the text used in a post and the image used in the same post were often different, post texts and post images were coded individually. Each unit (i.e., text/ image) was coded for the presence of a theme using the classification of content list, therefore, it was possible that a unit was coded for more than one theme (e.g., a post text could have contained content related to both campaign promotion and health education). All interactivity metrics were summed, as has been done in previous reviews by Veale et al (2015) and this sum was considered the measure of engagement. Summation included liking, commenting, or clicking on any part of the campaign post. Each action was considered as equal value and every time an individual interacted with the site in any way, a score (1) was added to the interactivity count.

Two coders independently coded all the content that was posted by the campaign over the study period. Coders first assigned a brief description to each campaign input. Next, using the definition and guidelines from the classification of content list, each post description was reviewed and was assigned a broader theme (Ramanadhan et al, 2013). After independently coding all inputs produced by the campaign, the two coders met to discuss assigned codes and themes. Coders checked for agreement with appropriate thematic labels of content and discrepancies were addressed until a consensus among coders was obtained, thus employing a consensual qualitative research approach (Hill et al, 1997). There were few discrepancies among coders and all discrepancies reached a consensus. Using excel software to organize the qualitative data, frequency percentages for themes were calculated.

Aim 2 Recruitment and inclusion criteria

To address Specific Aim 2, which aimed to access the impact of exposure to the social media campaign on sexual health outcomes, data from a sample of 60 participants from the parent study were analyzed. Participants were recruited from students electing to receive free HIV testing on-campus as part of the federally-funded parent project. Participants were recruited at the university campus, where members of the research team sat at a table advertising the free HIV/ STD testing services.

Once an individual was tested for HIV, he/she was then screened for eligibility to participate in the research study. To participate in the research, participants had to: 1) be between the ages of 18 and 24, 2) identify as Hispanic, and 3) agree to complete both a baseline and a one month follow up survey. After explaining the purpose and details of the study, staff obtained written consent from eligible and interested individuals, therefore, enrolling them as research participants.

Participants were randomly assigned to the exposure group or control group. Individuals in both groups were treated the same and were administered the same baseline, but those assigned to the exposure group were asked to 'like' or 'follow' one of the campaign pages on either Facebook, Instagram, or Twitter for a one-month period.

Control group participants filled out the baseline survey and received no instructions about liking or following the campaign pages. Participants in both groups were asked at baseline and follow up if they currently liked or followed the campaign on any of the available online platforms. To avoid contamination, control group participants who reported following or liking any of the campaign pages at baseline were excluded from the sample. Moreover, control group participants who reported following or liking any of the campaign pages at follow-up were excluded from the final analysis. Finally, those assigned to the exposure group who did not have an active social media account were also excluded.

Aim 2 Procedure and analysis

Participants (total n=60; n=30 exposure group; n=30 control group) were administered an in-person survey at baseline and an online survey at 4 week follow up. A $10 cash remuneration at baseline and a $20 electronic gift card remuneration at follow-up were provided to participants. Responses to the baseline and follow up surveys were used to address Specific Aim 2.

Because campaign content posted on each media site was consistent, participants in the exposure group were free to choose which social media page to subscribe to. Participants in the exposure group were encouraged to view and interact with the social media page as he/she normally would in their typical online behavior. This was purposefully stated at consent to allow for interactions with the site to occur

as naturally as possible.

Using the response data from the baseline and follow up surveys, mixed ANOVAs were conducted using the statistical software, IBM SPSS 2.0 (IBM Corp, 2011) examining the impact of exposure to the social media campaign for a 4 week period on a participants' knowledge of locally available HIV preventive services, perceived benefits and confidence of using condoms during their next sexual act, and condom use at the 4 week follow up. Mixed ANOVAs allowed the researcher to determine the effect of exposure, by using a repeated measure mixed design, examining time X condition interactions. For binary outcome variables, binary linear logistic regressions were performed to determine whether exposure to the social media prevention page predicted desired outcomes. McNemar tests were conducted to determine differences in baseline and follow up responses across conditions. Descriptive analysis including frequencies were conducted for demographic and background characteristics across the entire sample.

Results

Aim 1

The study concluded after a three-month period (97 days ranging from January 1- April 7, 2017). This was determined by the amount of time it took to recruit the sample of participants required to address Specific Aim 2 (n=60). A review of the three social media pages revealed 42 unique posts disseminated by the campaign across each platform during this 97 day period. Posts were consistent across each platform and differed only slightly in terms of length of text to accommodate character limitations for each site. Each participant in the exposure group was exposed to content for the entire 4 week period, resulting in total exposure of 12 posts (3 posts per week).

Results from Specific Aim 1 revealed that Instagram was the most active (in terms of user interactivity) and popular (in terms of reach) social media site for the online prevention campaign. By the end of the study period, 480 people followed the Instagram page. The majority of followers on Instagram were women (61%). Most followers also resided in the city of interest and were between 18 and 24 years. Aggregated demographic data provides evidence that the campaign was successful in reaching its target demographic audience.

Over the course of the study there were 15,280 impressions and 1,474 user interactions generated on Instagram, making Instagram the most successful site of the prevention campaign by a large margin. Of the reported engagement counts, 1,446 were 'likes.' Seventeen total comments by users were posted on the Instagram page over the study period. Other actions in the engagement metric included link

clicks, reposts, shares, and detail expands for more information.

The most successful Instagram post received 496 impressions and 65 user interactions. This post read, 'May your day be as fresh as these baked cookies. Treat yo self! Stop by [university lab room] today for free HUMP day [Wednesday] STD testing!' The post included an image of popular cookies sold at the local university bakery. Table 1 shows an overview of the 5 most successful posts on each platform, as determined by their interactivity scores. This table also includes thematic labels assigned to each post, which capture the topics of the posts delivered. An overview of interactivity scores, reach, and impressions for each social media site at the end of the study period is provided in Table 2.

The content on the campaign pages included providing information about screening or testing services, offering evidence-informed risk reduction messaging in the form of 'quick tips,' and providing referrals for prevention information. The campaign linked users with other established national (e.g., Planned Parenthood, CDC) and local (e.g., a campus Healthy Living Program) organizations with similar prevention goals through the use of hashtags. The campaign also posed questions, encouraging users to respond and promoting community conversation. The campaign used humor, posted time relevant and location relevant content, and used multimedia posts such as videos with audio which showcased the university's campus and students. These techniques ensured the content was broadly relevant and engaging to the population of focus (Veale et al, 2015). All the interactions that occurred on the different social media pages were organic, and not paid interactions like those commonly used in business and marketing techniques.

Using the classification of content chart (Ramanadhan et al, 2013), the following themes were identified in campaign inputs: human interest, health education/news, campaign promotion, cross-promotion, and non-informational. After coding and analysis, it was determined that 'memes' or other images imitating people or personalities were consistent with 'content that tells a personal story about a given health topic or public health initiative' (Ramanadhan et al, 2013, p. 5). Reconceptualizing the human interest label to include memes might be necessary when considering content intended for online young adult audiences, primarily on social media sites that are popularized as a result of personal profile capabilities. Using photographs, graphics, or memes that tell a story, share an opinion, or a feeling, may be appropriately labeled as human interest, even when they do not directly reflect opinions from a living or actual person. This style of communication is popularly used among young adults in order to provide an extra layer of anonymity, particularly when dealing with sensitive topics such as sexual behaviors, sexual health, and drug and alcohol use. The definition of cross promotion provided by Ramanadhan et al (2013) was also expanded to include subtle cross promotion that took place through the use of a hashtag. Table 3 provides an overview of the campaign inputs breakdown based on thematic labeling of content.

Table 1. Overview of top posts per social media site

	Facebook	Twitter	Instagram
1. Post Description	Staff Video	Volunteer Selfie	University Cookies
Assigned Theme	Human Interest	Human Interest	Health Education/ News
	Campaign Promotion	Campaign Promotion	Campaign Promotion
		Health Education/ News	
Interactivity	**7**	**38**	**65**
2. Post Description	Quick Tip: Condom Use	New Year, New You	New Year, New You
Assigned Theme	Health Education/ News	Health Education/ News	Health Education/ News
		Human Interest	Human Interest
Interactivity	**4**	**16**	**55**
3. Post Description	Valentine's Day	Wrapping up the Week	Volunteer Selfie
Assigned Theme	Human Interest	Non-informational	Human Interest
	Campaign Promotion		Health Education/ News
	Health Education/ News		Campaign Promotion
Interactivity	**4**	**12**	**51**
4. Post Description	Reading Material: Condom Use	Quick Tip: Condom Use	Avoid feeling like an ass
Assigned Theme	Health Education/ News	Health Education/ News	Health Education/ News
	Cross Promotion		Campaign Promotion
Interactivity	**4**	**11**	**50**
5. Post Description	New Year, New You	Talk to your friend about using condoms	Find the Cody Crew
Assigned Theme	Human Interest	Human Interest	Health Education/ News
	Health Education/ News	Health Education/ News	Campaign Promotion
Interactivity	**3**	**11**	**49**

Table 2. Key performance metrics overview of study period

	Reach	Impressions	Interactivity
Facebook	99	4,796	79
Twitter	67	9,521	217
Instagram	480	15,280	1,474

Note. Reach refers to total number of followers; Impressions refers to total number of times a post was displayed to any user; Interactivity refers to any interaction that occurred between users or between a user and the prevention campaign page.

Table 3. Overview of posts per theme

	Number of total posts	Top 5 posts
	n (%)	n (%)
Human Interest	11 (26%)	8 (53%)
Non Informational	13 (31%)	1 (7%)
Campaign Promotion	23 (55%)	7 (47%)
Cross Promotion	11 (26%)	1 (7%)
Health Education/ News	36 (86%)	13 (87%)

Note. Posts can be labeled with more than one theme

The most common themes identified in posts were health education and news (n=36), followed by campaign promotion (n=23). In line with campaign goals, elements of health education and news were present in 86% of the total number of posts during this study period. In the health education and news theme, the most often used code entailed information about HIV testing and condom use in the form of 'quick tips.' Other health education and news posts entailed facts and tips about alcohol and drug misuse. Table 3 also presents themes of posts that were among the top 5 posts across each site.

Aim 2

The final sample consisted of 60 young adults between the ages of 18 and 24 who identified as Hispanic. Cubans (38%) were the largest country of origin subgroup in the total sample. The sample was mixed gender, with the majority of participants identifying as male (62%). The entire sample reported being cisgender, meaning all participants identified with the gender assigned at birth. The sample was largely heterosexual (73%), followed by homosexual (13%). When asked if participants had a current primary sex partner, 58% reported they did, while 40% reported they did not. Additionally, one individual in the sample reported not knowing whether or not they had a primary sex partner, and 95% of the total sample reported being

Table 4. Demographic and background characteristics of sample

Characteristic	Total Sample	Control Group*	Exposure Group*
	n=60	n=30	n=30
Age (Mean (SD))	21 (1.95)	21 (1.95)	21 (1.98)
Foreign born	20 (33.3%)	10 (33.3%)	10 (33.3%)
Hispanic Ancestry			
Cuban	23 (38%)	12 (34%)	11 (33.3%)
Venezuelan	8 (13%)	2 (6%)	6 (18.2%)
Colombian	7 (12%)	4 (11.4%)	3 (9
Puerto Rican	7 (12%)	4 (11.4%)	3 (9%)
Dominican	5 (8%)	3 (8.6%)	2 (6%)
Mexican	3 (5%)	3 (8.6%)	0 (0%)
Peruvian	1 (2%)	0 (0%)	1 (3%)
Argentine	1 (2%)	0 (0%)	1 (3%)
Other	13 (19%)	7 (20%)	6 (18.2%)
Sex assigned at birth			
Male	37 (62%)	21 (70%)	16 (53.3%)
Female	23 (38%)	9 (30%)	14 (46.7%)
Cisgender	60 (100%)	30 (100%)	30 (100%)
Sexual Orientation			
Heterosexual	44 (73%)	23 (76.7%)	21 (70%)
Mostly Heterosexual	1 (2%)	0 (0%)	1 (3.3%)
Bisexual	5 (8%)	2 (6.7%)	3 (10%)
Mostly Homosexual	1 (2%)	1 (3.3%)	0 (0%)
Homosexual	8 (13%)	4 (13.3%)	4 (13.3%)
Other	1 (2%)	0 (0%)	1 (3.3%)
How important is religion to you? (Mean (SD))	2.49 (1.1)	2.6 (.97)	2.38 (1.15)
Not at all important	15 (25%)	6 (20%)	9 (30%)
Fairly unimportant	10 (17%)	4 (13.3%)	6 (20%)
Fairly important	24 (41%)	16 (53.3%)	8 (26.7%)
Very important	10 (17%)	4 (13.3%)	6 (20%)
Missing	1 (2%)	0 (0%)	1 (3.3%)
Current primary sex partner			
Yes	35 (58%)	18 (60%)	17 (56.7%)
No	24 (40%)	11 (36.7%)	13 (43.3%)
Don't Know	1 (2%)	1 (3.3%)	0 (0%)
Sexually active in past year	57 (95%)	28 (93.3%)	29 (96.7%)
Receiving first HIV test of lifetime	37 (62%)	19 (63.3%)	18 (60%)
Receiving first HIV test of past year	45 (75%)	22 (73.3%)	23 (76.7%)

Note. *There were no statistically significant differences ($p < .05$) across conditions at baseline as determined by one-way ANOVA. Participants have option of selecting more than one choice for Hispanic ancestry. Therefore total percentages may exceed 100%.

sexually active in the past year. Of the total sample, 62% were tested for the first time as a result of the parent project and 75% were tested for the first time during the past year. Demographic and background characteristics of the final sample are presented in Table 4.

Results from a one-way ANOVA revealed no statistically significant differences ($p < .05$) between conditions on key demographic or background characteristics, confirming that randomization was effective.

At baseline, the majority of the total sample reported being unaware of where to receive an HIV test in the community, unaware of HIV prevention programs on campus, and unaware of HIV prevention programs in the community (60%, 53.3%, and 78.3% respectively). All participants in the sample reported condom use during sexual intercourse as either fairly important (10%) or very important (90%). The majority of the participants across the sample also reported being very confident (80%) in using condoms during their next sex act, followed by either fairly confident (16.7%) or fairly unconfident (3.3%). When asked to report condom use, participants who did not have a primary partner reported using condoms more frequently than participants who did have a primary partner (18.3% vs 10% reported always using condoms). Of participants who did not have a primary partner, 11.7% reported never using condoms, while 13.3% of participants who did have a primary partner reported never using condoms. Table 5 overleaf presents descriptive statistics of variables of interest at baseline across the entire sample.

Results for awareness of HIV services outcomes

Descriptive statistics compared mean scores of awareness variables from baseline to follow up. A slight increase in awareness at follow up was observed among participants who were exposed to the social media campaign.

Binary logistic regression was performed to assess the effects of exposure on the likelihood that participants would increase awareness of HIV services. Condition assignment did not predict differences in awareness of where to get tested for HIV in the community, of prevention programs in the community, or of prevention programs on campus in this model. Using nonparametric tests for related samples, McNemar's test results indicated that participants across both conditions showed statistically significant improvements over time in awareness of HIV prevention programs at the university (baseline M= .467; follow up M=.733). Awareness of HIV prevention programs on campus was significantly higher at follow up across conditions ($p<.001$) when compared to baseline responses. Table 6 shows descriptive statistics for awareness variables among conditions at baseline and follow up. Table 8 presents with test statistic results.

Table 5. Descriptive statistics of variables of interest at baseline

Survey Question	Total Sample	Control Group	Exposure Group
	n=60	n=30	n=30
Awareness of locally available prevention services			
Unaware of where to receive HIV test in community	36 (60%)	17 (56.7%)	19 (63.3%)
Unaware of HIV prevention programs on campus	32 (53.3%)	14 (46.7%)	18 (60%)
Unaware of HIV prevention programs in community	47 (78.3%)	20 (66.7%)	27 (90%)*
Attitudes towards condom use			
Perceived benefits of use during sexual intercourse (Mean (SD))	1.10 (.30)	1.1 (.31)	1.1 (.31)
Not at all important	0 (0%)	0 (0%)	0 (0%)
Fairly unimportant	0 (0%)	0 (0%)	0 (0%)
Fairly important	6 (10%)	3 (10%)	3 (10%)
Very important	54 (90%)	27 (90%)	27 (90%)
Confidence of using condom during next sexual intercourse (Mean (SD))	1.23 (.50)	1.3 (.52)	1.2 (.48)
Not at all confident	0 (0%)	0 (0%)	0 (0%)
Fairly unconfident	2 (3.3%)	1 (3.3%)	1 (3.3%)
Fairly confident	10 (16.7%)	6 (20%)	4 (13.3%)
Very confident	48 (80%)	23 (76.7%)	25 (83.3%)
Self-reported Condom use			
When you had sex with your current primary partner, how often did you use condoms (Mean (SD))	1.92 (1.44)	1.63 (1.42)	2.24 (1.44)
Not applicable	24 (40%)	11 (36.7%)	13 (43.3%)
Never	8 (13.3%)	3 (10%)	5 (16.7%)
Almost never	5 (8.3%)	2 (6.7%)	3 (10%)
Sometimes	5 (8.3%)	4 (13.3%)	1 (3.3%)
Almost every time	12 (20%)	5 (16.7%)	7 (23.3%)
Always	6 (10%)	5 (16.7%)	1 (3.3%)
When you had sex with someone other than your current primary partner, how often did you use condoms (Mean (SD))	1.55 (1.41)	1.61 (1.50)	1.50 (1.36)
Not applicable	22 (36.6%)	12 (40%)	10 (33.3%)
Never	7 (11.7%)	4 (13.3%)	3 (10%)
Almost never	0 (0%)	0 (0%)	0 (0%)
Sometimes	11 (18.3%)	4 (13.3%)	7 (23.3%)
Almost every time	9 (15%)	5 (16.7%)	5 (16.7%)
Always	11 (18.3%)	5 (16.7%)	5 (16.7%)

Note. *There was a statistically significant difference between group means at baseline as determined by one-way ANOVA ($F(1,58) = 5.057$, $p = .028$) for awareness of HIV prevention programs in the community (.3 (.45) control group and .1 (.31) exposure group).

Table 6. Descriptive statistics for awareness outcomes

	Condition	Baseline	Follow up
		Mean (SD)	Mean (SD)
Awareness of where to receive HIV test in the community	Control	.43 (.50)	.40 (0.49)
	Exposure	.36 (0.49)	.43 (0.50)
Awareness of prevention services in the community	Control	.33 (.47)	.33 (.47)
	Exposure	.10 (.30)	.33 (.47)
Awareness of prevention services on campus	Control	.53 (.50)	.73 (.45)
	Exposure	.40 (.49)	.73 (.45)

Note. 0= no awareness; 1= awareness

Table 7. McNemar's Test Statistics for awareness outcomes

	N	Exact Sig. (2-tailed)
Awareness of where to get tested for HIV in the community at baseline and follow up	60	1
Awareness of HIV prevention programs in the community at baseline and follow up	60	0.118
Awareness of HIV prevention programs on campus	60	.000*
Note. Binomial distribution used.		

Note. *= p<.005

Results for perceived benefits and confidence of condom use outcomes

Descriptive statistics for perceived benefits of using condoms and confidence of condom use at next sex act indicated little to no changes in scores from baseline to follow up across conditions. Results from a Mixed ANOVA revealed no statistical significance in the interaction between time and condition on a participant's perceived benefit of using condoms during his/ her next sex act or perceived confidence of using condoms during his/ her next sex act. Table 8 shows descriptive statistics for benefits of using condoms and confidence of condom use outcomes among conditions at baseline and follow up. Baselines scores indicate participants were highly confident in using condoms and perceived use highly important across both conditions at the start of the study.

Table 8. Descriptive statistics for perceived benefits and confidence of condom use outcomes

	Condition	Baseline	Follow up
		Mean (SD)	Mean (SD)
Confidence of using condoms at next sex act	Control	1.26 (0.521)	1.26 (0.51)
	Exposure	1.20 (0.484)	1.26 (0.52)
Benefits of condom use during sex act	Control	1.10 (0.305)	1.16 (0.37)
	Exposure	1.10 (0.305)	1.13 (0.34)

Note. 1=very important, 4= not at all important

Results for protected sex acts outcomes

Descriptive statistics for condom use indicate slight increases in reporting using condoms from baseline to follow up among participants in the exposure group. Table 9 shows descriptive statistics of self-reported frequency of protected sex acts among conditions at baseline and follow up.

Table 9. Descriptive statistics for frequency of protected sex acts outcomes

	Condition	Baseline	Follow up
		Mean (SD)	Mean (SD)
Condom use with primary partner	Control	1.63 (1.42)	2.17 (1.77)
	Exposure	2.24 (1.44)	2.00 (1.64)
Condom use with someone other than a primary partner	Control	1.61 (1.50)	1.25 (1.58)
	Exposure	1.50 (1.36)	1.30 (1.42)

Note. 1= always, 4= never

Results from a Mixed ANOVA did not reveal a statistically significant interaction between time and condition on a participants' use of condoms during his/ her next sex act when having sex with a current primary partner. Results indicate that those participants in the exposure group who reported frequency of condom use with a primary partner were more likely to increase positive preventive behaviors over time when compared to those in the control group, yet this interaction was not statistically significant. The interaction approached significance (p= .075). Finally, results from a Mixed ANOVA revealed no statistical significance in the interaction between time and condition on a participants' use of condoms during his/ her next sex act when having sex with someone other than a current primary partner. Results suggest that mean changes in scores were equal over the study period. Participant responses from those in the exposure group did not differ significantly from those in the control group.

Discussion

The current study explored the reach, engagement, and effectiveness of an online prevention campaign that aimed to increase safe sex and HIV testing service adoption among Hispanic young adults. This study was exploratory in nature and was designed to provide knowledge regarding conducting health promotional efforts online and examining their effectiveness on health outcomes. This study was uniquely designed for a hard to reach group that have been historically marginalized in terms of accessing necessary HIV prevention information and services.

Overall, findings revealed that Hispanic young adults were receptive to the online campaign and were most actively engaged with the prevention campaign on Instagram. Users commented on posts and made personally salient contributions to the conversations surrounding prevention. Instagram successfully minimized barriers between researchers and young adults and messaging became participant-involved with interactive responses and feedback. Facebook was the least active site among users in this study in terms of engagement. Although Facebook is still the most popular website in the U.S. after Google and YouTube, our findings suggest Hispanic college students prefer other social media sites (Alexa Internet, Inc., 2017). Timely attention to social media platform of choice among minority groups is necessary to successfully reach populations of interest.

Our findings revealed the most successful posts either a) leveraged attention generated by individuals' social media accounts who were actively a part of the campaign efforts both on and offline or b) had an element of a human story or human interest embedded in the post. Tagging individuals in posts, using images that were of people, and relaying a relatable human sentiment for the audience were successful strategies. Findings suggest incorporating such elements into online posts to drive interactivity and user engagements in prevention messaging.

It is important to note that it is quite challenging to discern the unique social media impacts of a campaign when social media is just one component of a larger environmental prevention program. The parent project incorporated multiple environmental prevention strategies and channels-- such as lawn signs, billboards, flyers that anyone on the university campus could have seen. This multi-channel exposure may overwhelm and obscure any effect specific to social media. As is reflected in the findings pertaining to the analysis for Specific Aim 2, participants in both study conditions improved significantly over time, possibly in response to other ongoing on-campus environmental prevention initiatives. Findings suggest using multi-channel strategies are more effective than relying on social media strategies alone for health promotion campaigns.

Limitations of method and sample

There are notable limitations in this research. Individuals eligible to participate in the study had already been tested for HIV, and thus had already engaged in an HIV preventive behavior. These individuals may have already been more motivated and comfortable with performing positive sexual health and HIV preventive behaviors than the general Hispanic young adult population.

Also, follow up data were collected after only a 4 week period. Longer lasting effects of the social media campaign were unstudied. Furthermore, 'dosage' of the messaging was relatively small, which may have made effects harder to detect. Future campaigns could consider increasing the 'dosage' (frequency and cross platform saturation) of messaging. Furthermore, the sample considered for Specific Aim 1 and the sample considered for Specific Aim 2, while overlapping were not equivalent. Because of this, we cannot say that all the engagement reported in Specific Aim 1 came from participants in Specific Aim 2. Tightly controlled experiments may increase the opportunity for detecting influence of exposure, yet the we believe offering a mixed sample method for this study was more appropriate, to foster broad uptake and reach of critical campaign messaging.

Conclusions and implications for future research

Extensive work remains to improve the effectiveness of social media based strategies in health communication. Future implementation and research must include encouraging and soliciting individuals from the population of focus to share their stories, participate in message creation, and collaborate on ideas that can be shared on prevention campaign's social media sites. Promoting user-generated content and user responses will increase the authenticity and relevance of health messages and can capitalize on the use of two-way communication online.

To increase user engagement, it is recommended that motivated volunteers leverage their connections from their personal accounts to generate interactivity and reach online. Furthermore, disseminating content that provides a story or a shared human sentiment may be most successful in increasing engagement. Additionally, partnering with organizations and people who already have an established social media presence and following can improve reach and interactivity as well as posing questions and encouraging user engagement and message creation.

Key metrics used in this and previous evaluation research are different from the data directly exported from the social media sites. In social media-based evaluation research, reach refers to the number of users or followers on a particular site (Lim et al, 2016). Contrastingly, in Instagram analytics, reach refers to the number of unique accounts who saw any part of a post or story. Thus, consideration must be

given to how each platform's analytic variables are operationalized to ensure accurate reporting and interpretation of findings. Overlap of terms with differing definitions from site to site can present as a challenge in both interpreting results and translating result implications (Tufekci, 2014). While there is a plethora of social media metric data available, sorely needed is consensus on metrics most relevant to prevention program impact. This will streamline interpretation of metric data and will lead to necessary knowledge advancement.

In terms of evaluation, research should continue to incorporate mixed method approaches. By incorporating different collected data sources (both quantitative and qualitative) into research studies, researchers can gather more formative and complete information which is critical in the formulation of evaluation knowledge (Creswell, 2013). Pairing social media data with surveys, interviews, or other traditional data collection methods can help balance the biases and shortcomings of each method in order to arrive at more complete analysis and understanding (Tufekci, 2014).

In conclusion, social media based strategies offer a cost effective way to personalize and tailor messaging to specific groups at risk for HIV. Social media provides the opportunity to post relevant risk information (that is, culturally, linguistically, and developmentally appropriate, location specific, time relevant) in real time and in a cost effective manner to reach high risk groups of individuals. Furthermore, this tailored and participant involved communication can increase authenticity and perceived relevance of risk information among young adults. It also offers the opportunity to ask questions and receive personalized feedback, which can increase transparency and provide opportunities for critical health engagement. Moreover, social media technologies allow for interventions to be incorporated in people's daily routines and habits instead of being an extra burden (Laranjo et al, 2014). When used in thoughtful and systematic ways, social media can enhance the timeliness of, attention to, and response to comprehensive disease prevention and health promotion efforts among hard to reach and marginalized risk groups.

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