ESTABLISHMENT, MESSAGING, REACH, AND ENGAGEMENT OF TOBACCO CONTROL PROGRAM SMOKING CESSATION WEBSITES AND SOCIAL MEDIA PLATFORMS

By

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(Under the Direction of Joel Lee)

ABSTRACT

The emergence of social media technologies and web-based interventions sponsored by many state Tobacco Control Programs now provides an alternative for smokers seeking assistance in quitting smoking. However, there is little known about social media establishment, messaging, reach and engagement among state Tobacco Control Programs. This study provides a descriptive analysis about how states are reaching their populations and engaging them through online approaches. Twenty-four state Tobacco Control Programs were included in this study sample. States delivered all available website and social media data from calendar years 2010-2012. An internet search was conducted of state websites for the presence of Facebook pages, Twitter accounts, and YouTube pages. To understand the rate of establishment of each platform, we

conducted searches for presence during quarter four of each year. Data was abstracted and coded with the total number of messages published, along with the type of messaging posted. Web and Social Media Platform metrics were used to quantify the descriptive data. All website data were collected by the programs using Google Analytics, while all Facebook and Twitter data were collected using Facebook Insights and Radian6, respectively. All reach and engagement data were adjusted per 100,000 population and smokers**.** Sixteen states (67%), have a presence on Facebook, while twelve states (50%) had a presence on Twitter and YouTube. Sixteen states with a presence on Facebook published 393 total messages with a majority of the messages published were links (36%). Eleven states published 702 messages on Twitter, of which 76% were links. When adjusting for smokers, Vermont had the highest number of monthly visits at 1,283 and Wyoming had the highest number of monthly page views at 18,121. Florida had the highest number of page likes (5,877), while Vermont had the highest total clicks (133,611). For "people talking about this," Florida had the highest engagement with 4,521. Nebraska had the highest number of followers (393). With the increased growth of social media platforms, the tobacco control community is provided with an opportunity to reach and engagement with their populations. All participating programs are reaching and engaging with their populations when compared to the general public.

INDEX WORDS: Tobacco, Smoking, Cessation, Reach, Engagement, Social Media

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I. Introduction

Despite a significant decline in smoking rates over the past 50 years, tobacco use remains the leading cause of preventable death in the United States(1). Although millions of smokers attempt to quit smoking each year, only 3% to 5% of smokers succeed long term (i.e., remain quit 6 to 12 months) (2). The low success rate for smokers' quit attempts is due, in part, to the low proportion (22%) of smokers who use evidence-based interventions as part of their quit attempts (3). Given recent stalls in previous trends of declining national smoking prevalence, innovative approaches are needed to increase the promotion, utilization, and reach of existing interventions to maximize their effectiveness (4).

Based on the most recent update to the U.S. Public Health Service Clinical Practice Guideline for Treatment of Tobacco Dependence, a comprehensive approach to smoking cessation interventions can increase the likelihood of successful quitting outcomes (5). The key elements of an effective treatment strategy include: 1) cognitive-behavioral counseling, particularly if it includes practical problem solving and skills training; 2) intra-treatment social support; and 3) pharmacotherapy, including nicotine replacement therapy (NRT) and/or prescription medications, such as Bupropion or Varenicline (5). The estimated long-term quit rate (6 months post-quit) associated with the use of any type of behavioral intervention is approximately 15.1% (95% CI 12.8–17.4) (5). To attain the greatest population impact on the prevalence of tobacco use, program managers, cessation service providers, and policymakers must consider issues of reach, efficacy, and cost related to cessation services (5). Although face-to-face counseling is one of the most effective behavioral smoking cessation interventions,

utilization rates have traditionally been low (1.3% [CI: 0.9–1.7] of smokers who attempted to quit for at least one day within the past year) and costs are high (3,6).

Over the past decade, these effective interventions have been translated to offer quitting assistance via the telephone and the Internet, modalities with the potential for high population impact given their broad reach. Telephone-based tobacco cessation services, commonly known as quitlines, have shown the potential to address with quitting assistance (7). Nearly universal access (all 50 states and the District of Columbia, Guam, and Puerto Rico operate a quitline) to free telephone counseling services provided by state Tobacco Control Programs (TCPs) and employee health programs, has reduced some of the barriers associated with face-to-face counseling (i.e., traveling to/from the sessions, inconvenience, and expense). In many states with comprehensive tobacco control programs, quitlines also play an integral role in media-based efforts to increase smoking quit attempts in the general population (8). More recently, the emergence of web-based interventions sponsored by many state TCPs now provides an additional alternative for smokers seeking assistance in quitting smoking.

Given the emergence of new and innovative interventions that are now available to the public for smoking cessation, it is important to understand when the TCPs have established their innovative approaches, as well as understand what types of messages they are sharing with their audiences. Additionally, understanding how they are reaching and engaging with their populations via innovative smoking cessation interventions is important. This study is timely and applicable given the new emphasis across all sectors of the government that provide services to the public on using “new technologies” tactically to engage with citizens. Both traditional and innovative forms of communication should be available to the public to ensure that everyone is able to recognize and access information that will enable them to make health decisions. As

private and government organizations move toward new technologies to promote and provide services, there is a greater need for public health practitioners and agencies to be able to create evidence-based websites and use innovative promotional strategies that will maximize exposure to such services. In addition, it is important to maintain traditional communication forms so that those without access to the Internet and other new technologies are still able to access services and information (9).

Statement of Purpose

The purpose of this study is to understand how Tobacco Control Programs (TCPs) have adopted innovative media activities including websites and social media platforms to share information, reach and engage with various audiences. Tobacco Control Programs employ a wide range of strategies to promote their quitlines. They often work with media agencies to develop and place advertisements in traditional media channels, such as television, radio, print, and out-of-home advertisements (e.g. billboards, posters, transit and gas pump signage). Increasingly, states are using more innovative promotion strategies, such as advertisements on websites and social networking sites (e.g., Facebook, Twitter, and YouTube). Understanding the breadth of media promotion activities among TCPs and examining what types may be effective for smoking cessation can help programs evaluate the effectiveness of their media purchases and tailor their media plan accordingly to maximize its reach to target audiences.

The following research questions will be examined:

1. What is the level of social media platform establishment and messaging type among Tobacco Control Programs? (Manuscript 1)
2. What is the level of web and social media platform reach and engagement among Tobacco Control Programs? (Manuscript 2)

It is important to describe the establishment and messaging type of innovative media activities that are being utilized by Tobacco Control Programs to maximize the reach of telephone counseling through quitlines. Additionally, understanding the levels of reach and engagement of these websites and posts on social media platforms will further provide new and relevant findings of value to national, state, and local comprehensive cancer control programs and Tobacco Control Programs, as well as to the Centers for Disease Control and Prevention (CDC), health care organizations and clinical practitioners, patient advocacy organizations, health researchers, the field of tobacco control, and policy makers. These findings will assist the CDC in developments of future funding proposals, as well as assist with the evaluation of media and communication plans provided by the programs. In addition, it will provide CDC project officers with effective ways on how to provide collaborative technical assistance to the programs. Results from this study will also inform promotion efforts surrounding the cessation services that are provided by TCPs as well as identify opportunities to improve the effectiveness of future promotion efforts.

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II. Review of the Literature

Title: Traditional and Innovative Promotional Strategies of Tobacco Cessation Services: A Review of the Literature

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

*Use of trade names is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

Abstract

Introduction: An estimated 43.5 million American adults currently smoke cigarettes. Well-designed tobacco education campaigns with adequate reach increase cessation and reduce tobacco use. Smokers report great interest in quitting but few use effective treatments including quitlines. This review examined traditional (TV, radio, print ads) versus innovative tobacco cessation (internet, social media) promotions for quitline services. Methods: Between November 2011 and January 2012, searches were conducted on EBSCO, PubMed, Wilson, OCLC, CQ Press, Google Scholar, Gale, LexisNexis, and JSTOR. Results: Existing literature shows that the amount of radio and print advertising, and promotion of free cessation medications increases quitline (QL) call volume. Television advertising volume seems to be the best predictor of QL service awareness. Much of the literature on Internet advertising compares the characteristics of participants recruited for studies through various channels. The majority of the papers indicated that Internet-recruited participants were younger; this was the only demographic characteristic with high agreement across studies. Conclusions: Traditional media was only studied within mass media campaigns with TV ads having a consistent impact on increasing calls to quitlines, therefore, it is hard to distinguish the impact of traditional media as an independent QL promotion intervention. With innovative media, while many QL services have a presence on social media sites, there is no literature on evaluating the effectiveness of these channels for quitline promotion.

Key Words: tobacco, smoking cessation, tobacco use cessation

Introduction

Cigarette smoking and exposure to secondhand smoke result in approximately 443,000 premature deaths and $193 billion in health-care costs and productivity losses in the United States each year .[1] In 2010, 68.8% of current cigarette smokers said they would like to completely stop smoking, and 52.4% had tried to quit smoking in the past year.[2] In 1999, the Centers for Disease Control and Prevention (CDC) created the National Tobacco Control Program (NTCP) to reduce disease, disability, and death related to tobacco use.[3] The NTCP funds program activities in all 50 states, the District of Columbia, eight U.S. territories and jurisdictions, six national networks, and eight tribal support centers. To help smokers and other tobacco users quit, all states now have a cessation quitline that can be accessed through a national toll-free number (1-800-QUIT NOW) with many state QL services also offering free cessation medications as part of their promotional strategy.[3] Quitlines have proven to be effective with smokers who use them[4,5,6,7] and play an integral role in media-based efforts to increase quit attempts in the general population.[8] However, the use of QL services is low and most people quit on their own. The field of advertising is inherently dynamic and has traditionally included television, radio, newsprint, and out of home (i.e., posters or billboards) promotional campaigns. The Internet has added new dimensions to this field with an estimated 85% of the US population with Internet access.[9] As such, QL services may be provided to tobacco users through an increasing array of promotional activities available via innovative digital (online and mobile) social media.[10] To improve the likelihood of long-term tobacco cessation, it is important to understand and compare how different populations respond to traditional and innovative promotional activities that increase QL usage. Understanding the reach and utilization of innovative strategies, can further assist in determining which promotional interventions lead to a

higher quitline call volume. The purpose of this literature review is to provide a summary of the published research relevant to promotional QL activities. It is not meant to be a systematic review of all research available on the topic of traditional and innovative promotional methods used in tobacco cessation.

Methods

Data Sources

A literature review was conducted between November 2011 and January 2012. Studies were retrieved from multiple peer-reviewed article databases including: EBSCO[11], PubMed[12], Wilson[13], OCLC[14], CQ Press[15], Google Scholar[16], Gale[17], LexisNexis[18], and JSTOR[19] for articles related to QL service promotion and recruitment practices with specific emphasis on its effects on QL programs of interest and usage of services. This review includes literature published from 1980 through January 2012. Articles that focused on smoking cessation interventions and laws and policies specific to cessation were excluded.

Data Extraction

Extraction was conducted independently by one researcher. Article abstracts were initially reviewed to determine relevance for inclusion. If the abstract was selected for initial review, the full article was downloaded so that the researcher could undertake a more thorough review. This resulted in a set of 52 full-text documents. After completion of in depth reviews, articles that were excluded were those that focused on smoking cessation rather than promotions, or literature that analyzed smoking laws and policies and their effects on the QL calls. An agreement was reached by the study team on the final 30 documents for inclusion.

Study Selection:

Traditional Methods Selection

Table 1 lists the search terms that were used under specific groupings to find appropriate papers on the recruitment of smokers to a quitline or cessation program through traditional channels (television, radio, print, mailings). A few studies identified by conducting a search using the television and advertisement terms only (Table 1.1); these were included because they still provided general outcomes on smoking-related traditional advertisement activities. Of the 30 total relevant references, 19 discussed at least one form of traditional promotion.

Innovative Methods Selection

Table 1.2 lists the search terms used to identify literature related to innovative QL promotional methods (web, social media, mobile applications). Seven of the 30 references we found were related to innovative channels.

Other Literature

In addition to the 19 traditional and 7 innovative references generated from the search, an additional four case studies that were published by the North American Quitline Consortium[20] were included for a total of 30 relevant references.

Results:

Traditional Promotion

Television

A majority of relevant literature available on QL promotions has been focused on television, and the literature shows that the level of television advertising is strongly correlated with QL call volume. Of the 19 references found for traditional media, 15 examined television

advertising with some incorporating additional media. Table 1.3 displays the relevant literature on traditional promotions.[21-39]

Radio

There were no relevant individual studies included in this review because radio advertising was included in the campaigns using multiple media outlets. The objectives of these studies place an emphasis on comparing or reinforcing television and/or print campaigns.[27,28,33]

Print

Print advertisements are also most often used in combination with a mass media campaign involving television, radio, and outdoor ads. Two studies reported results related to newspaper advertising. Farrelly et al.[27] found that newspaper advertising may be slightly correlated with QL call volume, and Czarnecki et al.[33] found that smokers may be less likely to report print ads as their primary referral source to a QL when compared with other media (8% of smokers who were aware of a QL program learned about it from a print ad, compared with 62% from television, 19% from word of mouth, and 14% from radio).

Direct Mailings

There was only one study that looked at direct mail as a method for QL promotion.[36] A campaign held in New York (excluding New York City) in 2005 sent two types of postcards to 70,000 households with smokers. All postcards advertised free nicotine patches from the New York State Smokers' QL, but half of the postcards also contained negative messaging. Effectiveness of the campaign was evaluated by the quitline caller's zip code and self-reported referral sources. Approximately3.7% of those exposed to this campaign had called the quitline in the 15 days post mailing. Call volume peaked 4 days after the mailing date. However, there was

no significant difference in call volume between the two different postcard versions. The estimated cost per caller associated with the campaign was $60.87.

Free Cessation Medications

Many state QLs offer free cessation medications as part of their promotional strategy. Three studies looked at the effect of free nicotine replacement therapy (NRT) on call volume and QL reach. In 2003, New York ran broadcast and print announcements in two counties for a 2-week supply of nicotine patches or gum.[37] Call volume was monitored in the two counties before, during, and after the promotion. The median number of QL calls went from 6 per day, to a peak of 148 per day, and decreased to 26 per day, before, during and after the promotion intervention, respectively. The second part of the study looked at two newspaper ads, one that offered a free stop smoking guide (control advertisement) and another that offered the free guide plus a free Better Quit® stop smoking aid (a type of cigarette substitute). The ads were run only once each, on the same day of the week and in the same section of the newspaper. In the week before the control ad ran, median calls to the QL phone service were 7 per day and they doubled to 14 per day two days after ad ran before they returned to their original level. In the 2 days after the ad offering the free substitute, the median number of calls increased to 27.5 calls per day before returning to the pre-advertisement level.

Another study published in 2006 looked at the NRT voucher promotion as well as three other free nicotine patch programs in New York State that happened concurrently in different counties.[38] Cummings et al. measured the call volume and reach of each promotion. In each case, average weekly call volume increased considerably as a result of the free NRT offer. The announcement for the free patches generated more than 400,000 calls to the New York State Smokers' QL within the first 3 days of the promotion, overwhelming the capacity of the QL

phone service to respond to the calls. Program reach was limited by the available supply of free NRT. The 6-week nicotine patch program in New York City achieved the highest reach of 4.8% with a total program cost of $2.7 million.

The introduction of free nicotine patches to callers who are members of participating insurance companies or employer groups and who enroll in the counseling program from the Ohio Tobacco QL also resulted in a large increase in call volume.[39] Call volume averaged 2,351 intake calls per month before the introduction of free NRT, and this increased to an average of 3,606 intake calls per month after free NRT was offered. In the first 10 months of the NRT program, average daily call volume increased by more than 140% compared with the 9-month period before the patches were available.

Case Studies

Case studies were classified among other literature published and available to the public during this review. However, there was very little information available. The North American Quitline Consortium[20] published four case studies that highlighted the QL services in Iowa, New York, Oklahoma, and South Dakota. The results were similar with previous published literature that call volumes to QL services are directly correlated with the level of advertising.

Innovative Promotion

Online

Online promotions employed by QLs include web sites, search engine keyword ads, and banner advertisements. We found 7 articles in total that were related to online QL service promotions. However, 5 articles were not directly relevant because they were not specific to QL service promotion or recruitment and were excluded. A summary of published literature on innovative promotions, is described in Table 1.4[40-46]. One study compared traditional and online

advertisements in recruiting smokers to an online only, a phone only, or a web and phone cessation program.[40] Online advertising consisted of banner ads placed on national and local web sites purchased on a per impression basis and paid search engine ads purchased on a per click basis. Search engine ads were elicited by certain keywords, such as "quit smoking." Relevant ads were only displayed to search engine users in specific geographic regions. Similar ads were also run on traditional media during the same time period. All of the advertisements prompted viewers to click or visit a URL associated with Healthway's Quitnet for more information.[40] After reading a description of the programs on Healthway's website, viewers could choose one of three cessation treatment programs: (1) 24/7 online support via Quitnet, (2) telephone counseling, or (3) telephone and online support. Registration for the online Quitnet program was slightly higher among traditional media responders than among online responders.

Graham et al.[40] conducted a study as a partnership between Healthways QuitNet LLC, ClearWay Minnesota, and the New Jersey Department of Health and found that paid search advertising was the most cost-effective approach compared to the average cost of traditional media for promoting calls to quitlines ($5 to $8 per qutiline registrant for paid search engine advertisements versus $19 to $500 per registrant for traditional media). Overall, online advertisements cost an average of $36 per registrant. Because this is one of the first studies to examine innovative channels of QL promotion, there are limitations as described in Table 4.

An earlier study by Graham et al.[41] examined characteristics of smokers who responded to search engine advertising for an online cessation program. Internet users who entered the terms "quit(ting)" or "stop(ing) smoking" in a search engine query (AOL™*, MSN™*, Yahoo™*, Google ™*) and had no prior visit to the Quitnet (based on cookies) were interrupted by an invitation to the Quitnet web-based program. Using the broadest population denominator,

preliminary results suggest that approximately 2.7% of internet users looking for online cessation information will enroll in a research trial such as this one.

McDonnell et al.[43] focused their promotion efforts on a smoking cessation program that targeted Korean Americans in the Oakland and San Francisco areas of California. This study illustrated that online advertising can be effective in targeting a specific population; however, there are many study components that make it hard to generalize for the adult population.

A primary focus of many of the studies on innovative channels is cost-effectiveness. Milner et al.[45] presented on additional cost estimates based on advertisements for Quitnet and QL services from Colorado and New Jersey. He reported that online advertising is 5 times less expensive than traditional advertising and can be highly targeted to attract specific demographic groups.

Social Media

Evidence is lacking in the published literature to support the effectiveness of social media promotions on QL call volume. There is a limited amount of literature examining the role of social media in promoting smoking cessation in general.[46]

Discussion

Over the past 40 years, media interventions to promote population-based smoking cessation have become an integral part of comprehensive tobacco control programs. Television advertisements have been one of the most commonly used and evaluated media channels within the tobacco control community.[47] Therefore, it is not surprising that a majority of relevant literature available on QL promotions has been focused on television, while research on innovative promotional strategies is limited. The relevant studies that have focused on

traditional channels have reported consistent results and is also consistent with the findings of the Guide to Community Preventive Services.[48]

For example, the literature shows that the level of television advertising is strongly correlated with QL call volume. Similarly, the amount of radio, print advertising, and free cessation medications also appears to be associated with QL call volume but few studies on these channels exist. Therefore, among traditional media studies, television seems to be the best predictor of QL service awareness.

Among innovative promotional strategies, there is less research that has been conducted on online promotional methods. Online ads referred a higher proportion of young adults (aged 18 to 24), men, non-whites, those with a high school degree or less, those who had not yet quit smoking, and those who smoked within 30 minutes of waking up to the quitline when compared to callers who came to the quitline through other sources.[40] Published studies have been consistent in reporting that internet advertising may be more cost-effective (cost of successfully recruiting participants to a QL service) than traditional channels. The specific estimates of cost per recruited participant range from $2.25 to over $35.[40,42-45]

While there is much interest in QL promotion activities as the literature suggests, research on television advertising seems to be complete and consistent. However, the literature on the remaining traditional channels and innovative media has many gaps. This is consistent with the findings in the Community Guide Mass Reach Health Communications Interventions to promote QL use.[48] First, other traditional channels such as radio and print advertising are only studied within mass media campaigns, making their impact hard to distinguish. Second, with innovative media, many QL services have a presence on social media sites; however, there is no published literature on how to evaluate the effectiveness of these channels. As innovative media

begins to gain attention, further data and research on innovative promotional strategies will become increasingly important.

Table 1.1: Traditional Promotions Search Terms

Traditional Terms	Advertisement Terms		QL Specific
T.V.	Promotion	Calls	Quitline
Television	Ads	Reach	Cessation program
Radio	Advertise	Channels	
Print	Advertisements		
Mass media	Recruitment		
NRT			

Note: NRT = nicotine replacement therapy; QL = Quitline

Table 1.2: Innovative Promotions Search Terms

Innovative Terms	Advertisement Terms	QL Specific
Web	Promotion	Quitline
Online	Ads	Cessation program
Internet	Advertise	
Social media	Advertisements	
Social network	Recruitment	
Facebook	Banner	
Apps	Pop up	
New		

Note: QL = Quitline

Table 1.3: Relevant Literature on Traditional Promotional Strategies

	Study	Design	Relevant Findings	Limitations
Television	Pierce, Anderson, Romano, Meissner, & Odenkirchen, 1992[21]	Call volume peaks of the Cancer Information Service Telephone Line were compared to television public service announcements.	In 3 months when a public service announcement ran, call volume spiked. Promotions increased the percentage of males, callers younger than age 40, and callers with a high school degree or less.	Comparisons of ad content and call volume were discredited by the ads' different airing amounts and schedule.
	Mudde & DeVries, 1999[22]	A random sample of smokers was interviewed before and 10 months after a national campaign. A control group was also interviewed for test effects.	Most smokers were aware of the campaign, but active participation rates were low. Dose-response relationship between exposure and quitting was found. Cost per long-term quit was estimated to be $12.	The Netherlands is such a small country that national media has the potential to reach everyone, so finding a comparative control impossible; QL phone service participation was subject to self-selection bias.
	Carroll & Rock, 2003[23]	Measured the efficiency of different ads and media buy options (e.g., type of program in which ad was placed: news, comedy) in generating calls to the QL phone service.	The more graphic ad was more efficient in generating QL calls. Combining health effects ads with QL phone service ads further increased calls. Ads in programs with less viewer involvement (e.g., storyline, plot) generated fewer calls, but could actually be more efficient.	Analysis was limited by short campaign period (1.5 months). Only attributed calls to advertisements that ran within an hour of the call being received. This did not allow the impact of multiple exposures to be assessed. Length could bias shorter programs (sitcom vs. movie).
	Miller, Wakefield, &	Weekly TARPs were compared with QL call	Weekly call volume was strongly related to	Does not account for multiple

Roberts, 2003[24]	volume; three follow-ups were conducted to study quit rates.	TARPs. A greater association was observed for ads specifically promoting the QL phone service.	calls; therefore, individual callers may have been counted more than once.
Wilson, Grigg, Graham, & Cameron, 2005[25]	QL phone service registration by Māori (NZ indigenous population) was used to measure the effectiveness of a television campaign.	Higher rates of Māori calls to the QL service were found during intense campaign months. A Māori-focused ad generated 91 calls per 100 TARPs.	Analysis focused on a specific population group.
Erbas, Bui, Huggins, Harper, & White, 2006[26]	Generalized partial linear models with a Poisson distribution were used to analyze advertising levels and QL phone service calls. Covariates included day of the week and overtime trends.	Peak calls coincided with the days of the week with more advertising. Total number of ads and TARPs were positively correlated with call volume. There were seasonal variations that were not predicted by the level of advertising.	Results supported the use of this flexible modeling strategy to examine QL phone service call volume and time trends. Further analysis might include hourly data.
Farrelly, Hussin, & Bauer, 2007[27]	A linear regression of monthly total county-level calls to QL phone service was run on monthly paid television, radio, and newspaper advertisement expenditures.	Television and radio expenditures were significantly correlated with call volume, and newspaper expenditures were marginally correlated. Television expenditures produced greater call volumes than radio and newspaper expenditures.	Did not take into account ad quality, placement, or message. Ads could spill over across different media markets and would not be accounted for in the expenditures.
Mosbaek, Austin, Stark, & Lambert, 2007[28]	Cost per call was calculated for daytime television, evening television, and radio, as well as for ad message.	Daytime television was 7 times more cost-effective than evening television, and more than radio placements. Real-life testimonials and ads with practical advice on how to quit were most effective in generating calls to the QL phone service.	Majority of ads ran back-to-back so it was hard to classify "delayed callers." Continuous study means that air period differed between ads.
Siahpush, Wakefield, Spittal, &	TARPs were compared with weekly number of calls to the QL phone	Higher weekly TARPs corresponded closely to a larger volume of calls.	SES measures were based on callers'

	Durkin, 2007[28]	service for different socioeconomic groups.	Call rates varied by SES.	postcode rather than individual-level measures. Ad campaign messages may have appealed differently to different SES populations.
	Cotter, Perez, Dessalx, & Bishop, 2008[30]	Investigated the relationship between the television Target Audience Rating Points (TARPs) and the number of calls to the QL phone service during a mass media campaign.	Television advertising increased awareness of the QL and also led to a call response.	Only television TARPs were considered when it was a mass media campaign; spillover from other media could not be accounted for.
	Bui, Huggins, Hwang, White, & Erbas, 2010[31]	Modeled the relationship between the number of calls to QL and TARPs for both a Quit and NRT campaign. Also examined potential day of the week effects.	The number of calls to the QL increased with the TARPs for both types of campaigns. Relationships between day of the week and call volume were independent of TARP levels.	Analysis did not take into account other public relations activities that could generate calls to the QL phone service and cause day of the week differences.
	Cowling, Modayil, & Stevens, 2010[32]	8-year study on the relationship between aided ad recall and level of television ad placement (TARPs). Both Web and phone surveys were used to interview California smokers and nonsmokers.	Log-cumulative TARPs found the strongest relationship with aided ad recall. A one-unit increase in log-cumulative TARPs led to a 7.4% overall increase in ad recall. This relationship showed diminishing returns after a large volume of ad placements.	Did not control for emotional content of ads. Television results could be affected by spillover from other markets (radio, print, billboards, and public relations activities were also part of the campaigns).
	Czarnecki, Vichinsky, Ellis, & Perl, 2010[33]	A multimedia campaign for the New York Nicotine Patch Program, run in New York City. Awareness, interest, barriers, and future outreach plans were asked in an annual	60% of survey participants reported awareness of program. 62% heard about program from television ads, 14% from radio, and 8% from newspaper.	Response and cooperation rates for the survey were low. The measure of future outreach to the program

		population-based survey.		was self-reported as an intention rather than an actual outcome indicator.
	Durkin, Wakefield, & Spittal, 2011[34]	Weekly advertising levels (TARPs) on QL phone service call volume were examined by type of message and SES group.	For every 100 TARPs per week, calls increased by 7%. Association between TARPs and call volume did not differ by SES. Narratives with higher levels of emotion had a greater impact on call volume.	Only included ads that evoked some type of emotional response. Study may be a saturated market, which limits generalizability of study results.
	Farrelly, Davis, Nonnemaker, Kamyab, & Jackson, 2011[35]	Regression analysis was used to explain variation in quarterly media market-level per smoker calls to the QL phone service. Ads were measured on TARPs and graphic and emotional content.	Per smoker call volume was positively associated with total TARPs. Cessation ads were more effective than Secondhand Smoke ads in promoting QL calls. Ads with graphic images or no graphic images or strong emotions were associated with higher call volume.	There was no information on what time of day the ads were aired. The long time span of the study did not allow local promotional activities to be included.
Direct mail	O'Connor, Carlin-Menter, Celestino, Bax, Brown, Cummings, & Bauer, 2008[36]	Two messaging strategies were tested using post cards offering free NRT were sent to 77,527 smoker households. Call volume data was by creating a call lag score within a 30 day timeframe around mail date.	Call volume increased by 36 percent, from 139 to 189 calls per day. There was no difference in messaging strategy and increase in call volume.	Messaging differences may have been too sublte and the offer of free NRT may have been enough to increase call volume.
NRT	Bauer, Carlin-Menter, Celestino, Hyland, & Cummings, 2006[37]	Two NRT promotions were offered in New York state. Call volume was tracked before, during and after each of the promotions.	Median call volume increased 25 times above pre-promotion levels with the NRT voucher offer. Newspaper promotions including an offer for a free smoking aide doubled median QL call volume over those that did not offer this aide.	New York passed the Clean Indoor Air Act (CIAA) during the time of the NRT promotion.
	Cummings, Fix, Celestino,	Four NRT promotions were offered in New	During each time period and across locations, QL call	There are better controlled,

	Carlin-Menter, O'Connor, & Hyland, 2006[38]	York. Call volume was tracked before, during and after the free NRT giveaway promotions.	volume increased dramatically when NRT was offered.	randomized trials.
	Tinkelman, Wilson, Willett, & Sweeney, 2007[39]	Significance testing was used to examine intake call volume before and after the availability of free NRT.	Call volume increased from 2351 to 3606 intake calls per month or 78 to 188 per day.	This was an observational study. Individuals were not randomly assigned, so there may be additional reasons for the increase in call volume aside from availability of free NRT.

Note: NRT = nicotine replacement therapy; QL = Quitline; TARP = target audience rating point

Table 1.4: Relevant Literature on Innovative Promotional Strategies

Study	Design	Relevant Findings	Limitations
Graham, Milner, Saul, & Pfaff, 2008[40]	Compared traditional and online advertisements in recruiting smokers from New Jersey and Minnesota to an online-only, a phone-only, or a Web and phone cessation program	130,214 unique identifiers were created on the Quitnet server, with 18.4% from traditional media responders and 81.6% from online ad clicks. Of the online clicks, 6.8% selected the Web-based program only, 1.1% chose phone counseling only, and 1.25% selected the combination of Web and phone services	Study relied on cookies to track Web site utilization among registered users of the program. Regularly deleted cookies would not be recognized as a return user and could be counted more than once. For campaigns featuring the same ad scheme, it is hard to measure spillover effects between different types of media
Graham et al. (2006)[41]	Examined characteristics of smokers who responded to search engine advertising for an online cessation program	28,297 individuals were invited, with 39.4% acceptance of invitation, 19.6% were eligible, and 12.8% participated. Of the original number invited, 47.1% were referred through Google, 32.8% through Yahoo, 17.6% through MSN, and 2.6% through AOL. The majority of study participants were female (60.5%), white (86.4%), and college educated (48.4%)	The advertising was only designed to promote a Web cessation program, and search engine ads target users who are presumably already interested in and taking steps toward quitting
Gordon, Akers, Severson, Danaher, & Boles, 2006[42]	Examined comprehensive recruitment strategies to an online cessation program for smokeless tobacco users	The majority of participants reported learning about the study from newspaper articles (33%) and online sources, such as Google	Only targeted smokeless tobacco users, a much smaller proportion of the population than

		ads and other Web sites (34%). Participants also self-reported the following referral sources: radio interviews (10.8%), word of mouth (7.8%), television stories (5.5%), and direct mail (1.4%). The total cost per participant of the Google campaign was $6.70, $36 for direct mail, $92 for media campaigns, and $115 for newspaper ads.	cigarette smokers, and the media campaign and budget was very limited.
McDonnell, Lee, Kazinets, Moskowitz, 2011[43]	Examined promotion efforts of a smoking cessation program that targeted Korean Americans in the Oakland and San Francisco areas of California.	44% found the study through a text link (most likely Google AdWords), 35% through a graphic link (online newspaper ads), and 10% reported hearing about the program through multiple channels. Overall cost per participant was $66.50, with Google ads being the most cost-effective (number not reported).	Because the study was trying to meet a certain participant quota, additional campaign media were constantly being added to try to recruit additional participants. Salient channels to the Korean American community were chosen; therefore, the results may not be representative of the general population.
Houston & Ford, 2008[44]	Evaluated an Internet-delivered intervention for smoking cessation	The cost per click for study recruitment was $0.47, and for every 4.8 users that clicked through to the site, one was recruited. The cost per participant was	The study focused on program effectiveness rather than the recruitment strategies

		$2.25. Most users of the online program were younger than age 45 years, white, and from urban counties.	implemented
Milner, Long, & Kazimir, 2005[45]	Evaluated cost effectiveness and provided a descriptive analysis of audience targeting of online advertising to promote cessation in Colorado and New Jersey.	Online advertising was 5 times less expensive.	Although results were presented on registrants and ad concept testing, study was mainly focused on cost effectiveness and costs per enrollee.
Backinger, Pilsner, Augustson, Frydl, Phillips, Rowden, 2010[46]	Conducted a content analysis of smoking cessation videos on YouTube to look for quit smoking messaging using evidence-based practices.	42% of the most viewed (determined by video views) quit smoking videos contained evidence based practices.	Search strategies based on the terms 'quit smoking' may have limited search results.

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Supplement to Literature Review

For manuscript I, it is important to understand the characteristics of both the participating versus non-participating states or tobacco control programs. While inclusion into this study was solely voluntary and did not include any funding to the program, a map of Annual Percent Change (APC) for tobacco related cancer (i.e., cancers of the lung and bronchus, oral cavity and pharynx, larynx, esophagus, stomach, pancreas, kidney and renal pelvis, urinary bladder [invasive and in situ cases], cervix, and acute myeloid leukemia) incidence by state, 2005-2009 will be used. These years were chosen for this study because recruitment of the tobacco control programs began in 2011. Therefore, these were the years prior to recruitment of the programs into the study. Annual Percent Change rates are not available for comparison purposes after the study period as the data has not been published. The source of this data and map is the Centers for Disease Control and Prevention's National Program of Cancer Registries NCI's Surveillance, Epidemiology, and End Results Program (1). The data represent 100% of the US population. The 2014 Surgeon General Report, marking its 50th anniversary, on the Health Consequences of Smoking clearly states that cigarette smoking is a cause of lung , (the leading cause of cancer deaths in this country) larynx, oral cavity, and esophagus in men and women (2). Therefore, displaying a map with Annual Percent Change (APC) for tobacco related cancer by state from 2005-2009, will help to identify the similarities and/or differences in those states that chose to participate and those states that did not choose to participate in this study which began recruitment in 2011.The map depicts those states where APC rates remained stable, those with APC rates <2%, and >/= 2%. A 2% cut-off point was used as this was the standard used in the literature from Underwood, JM et al. (3).

According to Underwood and colleagues, tobacco related cancer incidence rates (age-adjusted to the 2000 US population and expressed per 100,000 persons) declined ≥ 2% per year from 2005-2009 in the following states:

1. Missouri
2. South Carolina
3. Utah
4. District of Columbia

Tobacco related cancer incidence rates declined 0.7-1.9% per year in the following states:

1. California
2. Florida
3. Maine
4. New Mexico
5. North Carolina
6. North Dakota
7. South Dakota
8. Virginia

Tobacco related cancer incidence rates remained stable in all other states.

For this manuscript, I will utilize the 2005-2009 APC rate data presented by Underwood, JM and colleagues to develop a map to identify the tobacco-related cancer incidence of the participating versus non-participating states in order to contextualize the trends of tobacco-related cancers in each of these states. This information will examine the burden or trends in those states who participated in this study when compared to those states who did not choose to participate.

The twenty-four tobacco control programs (only states participated) that participated in this study include:

1. Alabama (rates were stable)
2. Arizona (rate was stable)
3. Arkansas (rate was stable)
4. California (rates declined 0.7-1.9% per year)
5. Delaware (rates were stable)
6. Florida (rates declined 0.7-1.9% per year)
7. Indiana (rates were stable)
8. Iowa (rates were stable)
9. Louisiana (rates were stable)
10. Massachusetts (rates were stable)
11. Michigan (rates were stable)
12. Missouri (rates declined >/= 2% per year)
13. Nebraska (rates were stable)
14. Nevada (rates were stable)
15. New Hampshire (rates were stable)
16. New York (rates were stable)
17. North Carolina (rates declined 0.7-1.9% per year)
18. Oregon (rates were stable)
19. Rhode Island (rates were stable)
20. Texas (rates were stable)
21. Utah (rates declined >/= 2% per year)

22. Vermont (rates were stable)

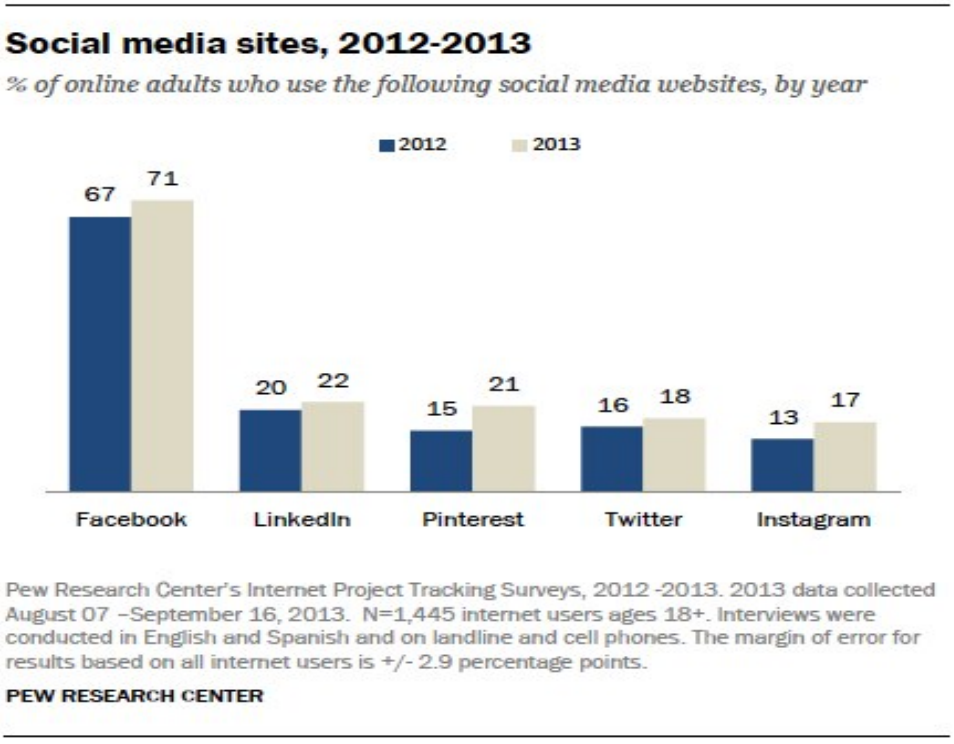
23. Wisconsin (trend could not be calculated)

24. Wyoming (rates were stable)

Based on the information above, in the twenty-four participating states, eighteen states (75%) showed stable APC rates for tobacco related cancer incidence between 2005 and 2009. This is an important finding that can have potential impact on this study sample. While the opportunity to join the study was voluntary and did not offer funding to the state programs, the literature seems to suggest an incentive on the programs to join. The stable incidence rates of participating states suggests that these states would benefit from the tailored reports of their particular programs, providing best practices on the implementation of effective cessation services, and how they are reaching and engaging with their population.

In addition, by understanding if tobacco control programs are adopting social media platforms at rates similar or different when compared to the general public will help us better understand how to maximize the effectiveness of "new technologies" to promote quitline services. The Pew Research Center is a nonpartisan fact tank that informs the public about the issues, attitudes and trends shaping America and the world. The Center conducts public opinion polling, demographic research, media content analysis and other data-driven social science research (4). According to the Social Media Update 2013, 73% of online adults use a social networking site of some kind (5). Facebook is the dominant social networking platform in the number of users, but a striking number of users are now diversifying onto other platforms. Some 42% of online adults now use multiple social networking sites (4).

Social Media Adoption of General Public, 2012-2013



In conclusion, there was additional literature that I have included as a supplement in this section for this study. Understanding incidence rates and annual percent change of these rates prior to recruitment and participation of the TCPs will provide a description of the current landscape of the participating versus non-participating states prior to them joining this voluntary study which does not provide state funding or incentives. In addition, by understanding if tobacco control programs are adopting social media platforms at rates similar or different when compared to the general public will help us better understand how to maximize the effectiveness of "new technologies" to promote quitline services.

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CHAPTER 3

THE ESTABLISHMENT AND MESSAGING OF SOCIAL MEDIA PLATFORMS AMONG TOBACCO CONTROL PROGRAMS[1]

[1] Momin, Behnoosh. To be submitted to *Journal of Medical Internet Research.*

Abstract

Introduction: Social media has a potential to connect public health programs, such as the Tobacco Control Programs, with the general public. However, there is little known about social media establishment and messaging among state Tobacco Control Programs. **Methods:** Twenty-four state Tobacco Control Programs were included in this study sample to assess establishment and messaging of their social media platforms. Annual percent change (APC) of tobacco-related cancer incidence was assessed to understand the current landscape of the programs during the recruitment period. States delivered all available website and social media data from calendar years 2010-2012 via e-mail or through the online CDC promotions portal. An internet search was conducted of state websites for the presence of Facebook pages, Twitter accounts, and YouTube pages on the Internet. To understand the rate of establishment of each platform, we conducted searches for presence during quarter four of each year. Data from the fourth quarter of 2012 was abstracted and coded with the total number of messages published on the social media platform, along with the type of messaging posted. **Results:** Eighteen states (75%), showed stable APC rates between 2005 and 2009. Sixteen states (67%), have a presence on Facebook, while twelve states (50%) had a presence on Twitter and YouTube. In 2010, social media establishment was low when compared to the sudden uptake during the following two years. During Quarter 4 of 2012, sixteen states with a presence on Facebook published 393 total messages on their pages with a majority of the types of messages published being links (36%). During Quarter 4 of 2012, eleven states published 702 messages on Twitter, of which 76% were links. **Discussion:** With the increased growth of other social media platforms such as Instagram, LinkedIn, and Pinterest the tobacco control community is provided with an opportunity to reach and increase the impact of

tobacco cessation services. There is also an underutilized opportunity to connect with the population through photos or videos.

Introduction

Despite significant reductions in smoking prevalence nationally and changes in social norms surrounding tobacco use, tobacco use persists as the leading cause of preventable illness and death in the United States (1, 2). Tobacco smoke contains a deadly mix of more than 7,000 chemicals; hundreds are toxic, and about 70 can cause cancer (3-5). Tobacco smoking increases the risk for serious health problems, numerous diseases, and death (3, 4). People who stop smoking greatly reduce their risk for disease and premature death. Although the health benefits are greater for people who stop at earlier ages, quitting is beneficial at all ages (3, 4, 6, 7). Among current U.S. adult cigarette smokers, 68.8% report that they want to quit completely (8). Starting in 2002, the number of former smokers has exceeded the number of current smokers (8).

While traditional methods to quit smoking, such as quitline services, have been shown to be effective in improving one's chances of successfully quitting, Internet-based quitting methods represent an emerging and innovative way to increase choice and access to smoking cessation. It is estimated that from 2000-2014 there was a growth of 676.3% of Internet users worldwide (9). The Internet has the potential to deliver behavior change interventions, (10-13) including web-based smoking cessation programs. Internet-based material is an attractive dissemination tool because of relatively low costs per user, resulting in high cost-effectiveness (12). According to the Pew Internet & American Life Project (14), seven percent of adult U.S. Internet users, approximately eight million people, reported having searched online for information on "how to quit smoking."

Social media are convenient means of communication by which people create, share, and exchange information and ideas across Internet-based communities and networks throughout the world (15). Social media sites are popular because users can easily generate content and

instantaneously make that content widely available and accessible (16). Social media has an unexploited potential in connecting public health agencies, such as the Tobacco Control Programs (TCPs), with the general public. Additionally, the effective use of social media can enhance communication between the public and various organizations by encouraging population interaction and engagement. There is very little known about social media adoption and messaging among state Tobacco Control Programs.

Given the emphasis across government sectors to utilize newer, more innovative technologies, the purposes of this study are to: 1) identify the current landscape of tobacco-related cancer incidence of Tobacco Control Programs; and 2) examine the level of social media platform establishment and messaging type among tobacco control programs. Findings from this study have implications to increase understanding about timing of social media adoption by Tobacco Control Programs and the types of messaging they are disseminating using these novel techniques.

Methods

State Recruitment

All states and U.S. territories were invited to participate in this study, announced by the Centers for Disease Control and Prevention's (CDC) Office on Smoking and Health (OSH) state media network call and OSH's state tobacco control program (TCP) call in October of 2011. Additionally, study announcements and invitations were distributed in the same month on the North American Quitline Consortium's (NAQC's) listserv. One month later, TCPs were contacted directly by their CDC project officers to encourage participation in this voluntary CDC study in which no incentives were provided for participation. While enrollment efforts continued through January 2012, data were collected for the time period of 2010-2012. The final sample

included twenty-four state TCPs. To understand the current landscape of the various participating tobacco control programs, the tobacco related cancer incidence by state was assessed.

Tobacco- Related Cancer Incidence, by State

After a 7-year (1997–2004) decline in smoking among adults around the turn of the century, rates plateaued at 20% in the late 2000s (17). With twenty-four states included in this sample for data collection and analysis, it is important to identify the tobacco-related cancer incidence of the participating versus non-participating states to contextualize the trends of tobacco-related cancers in each of these states. There were no eligibility requirements to participate in this study nor funding provided by the CDC. Figure 2.1 displays the participating versus non-participating states, as well as the annual percent change of tobacco related cancer incidence, by state from 2005-2009 (18). Data available from population-based cancer registries affiliated with CDC's National Program of Cancer Registries and NCI's Surveillance, Epidemiology, and End Results Program were used in this analysis. The data represents 100% of the US population (19).

Data Sources

States (TCP staff, phone and Web-based quitline vendors, or state media contractors) reported available data on a quarterly basis throughout the calendar year via e-mail or online through a portal which was created specifically for the purpose of uploading data from states for this study. The portal featured a simplified file upload option to manage data transfers in a secure environment. Detailed instructions about how to process reports to yield requested data and timelines for data submissions were provided to states. Participating states were asked to provide all available website and social media data for each day (or smallest available time period) of the

full study period. Data for YouTube were not complete, (only one state provided YouTube data) and therefore YouTube messaging was not analyzed for this study. The raw data were cleaned and consolidated into an aggregate data spreadsheet that included each message and posting date by social media platform (Facebook and Twitter) for each state.

An Internet search was conducted systematically of state TCP websites for the presence of state TCP Facebook pages, Twitter accounts, and YouTube pages on the Internet. This was done by searching for state TCP names in the search field of state department health websites. To understand the rate of establishment of each social media platform among those states that were utilizing social media, we conducted searches for presence among each participating state during quarter four of each year during this time period (2010-2012). Lastly, for the two social media platforms, Facebook and Twitter, data from the fourth quarter of 2012 were abstracted from the spreadsheet and coded with the total number of messages published on the social media platform during this quarter, along with the type of messaging posted.

Coding

Facebook and Twitter messages were coded by message type: link, photo, status update, video, and share. Messages were coded in the following manner: a "link" if a specific link or URL was provided; a "photo" if a photo was posted; a "status update" if it included a generic message without a link, photo, or video; a "video" if it included a video link; and a "share" if it was sharing a post from other group. One coder (BM) coded each message from the last quarter of 2012 for each social media platform. To determine the proportion of each type of message within each platform, the number and percent of messages for each message type was calculated. Due to the large amount of Twitter data collected from the state of Florida, (n=800) we took the average number of posts in this period from the other states (n=64 posts) and used SAS to

generate a simple random selection of 64 messages from the 800 posts For every other state or platform, we coded every post received during the study time period.

Results

Of the twenty-four states that participated in the study, eighteen states (75%), showed stable APC rates for tobacco related cancer incidence between 2005 and 2009. Only five states had cancer incidence rates that had statistically declined during this period, while one state trend could not be calculated due to an interruption in data collection related to changes in the state's software program. Figure 1 displays a visual representation of the participating states that had stable and declining APC rates for tobacco related cancer incidence. In 2012, sixteen of the twenty-four states (67%), had a presence on Facebook, while twelve states (50%) had a presence on Twitter and twelve states (50%) had a presence on YouTube (Figure 2.2). In 2010, social media establishment was low when compared to a sudden uptake during the following two years as presented in Figure 2.3. In 2010, twelve states had an established Facebook presence, and two years later only four additional states had established a presence. In 2010, six states had a Twitter presence, and this number doubled two years later. Seven states had a YouTube presence in 2010, and five additional states established presence in 2012. There were eight states that submitted both Twitter and YouTube data (Arkansas, Arizona, Florida, Indiana, Louisiana, Massachusetts, Michigan, and Oregon).

During Quarter 4 of 2012, the sixteen states with a presence on Facebook published 393 total messages on their page. Table 2.4 provides a summary on the social media message type by platform. A majority of the types of messages published were links (36%). Examples of the types of links that were being published include links to websites which provide tips on ways to quit smoking, ways to cope with quitting tobacco, and links to articles that highlight the latest news

on tobacco products and the consequences of smoking. Nearly one-third (30%) of the posts were photos that were shared. Examples of the types of photos shared include photos of the number to the quitline with a tag line, or photos highlighting statistics of smokers. Approximately, a quarter of the posts were status updates, which included ways to state simple facts or relay messages to the audience. Videos (n=29, 7%) and Shares (n=12, 3%) were not being utilized as much when compared to links (n=140, 36%) and photos (n=117, 30%).

During Quarter 4 of 2012, eleven of the twelve states submitted complete data. The eleven states published 702 messages on Twitter, of which 76% were links. The types of links that were published include information and resources on the Great American Smoke out, links on quit tips, knowing your triggers, links to news about tax increases and statistics of smoking in the state, webinar links on tobacco cessation, as well as partner links to share resources. While photos or videos were rarely published by TCPS on Twitter, nearly a quarter of the messages were status updates. Examples of the types of updates published include Quit Now state contest winners, statements on interventions that can help one quit, updates or reminders on events including Lung Cancer Awareness month, the Great American Smoke Out, or how the state Quitline can help.

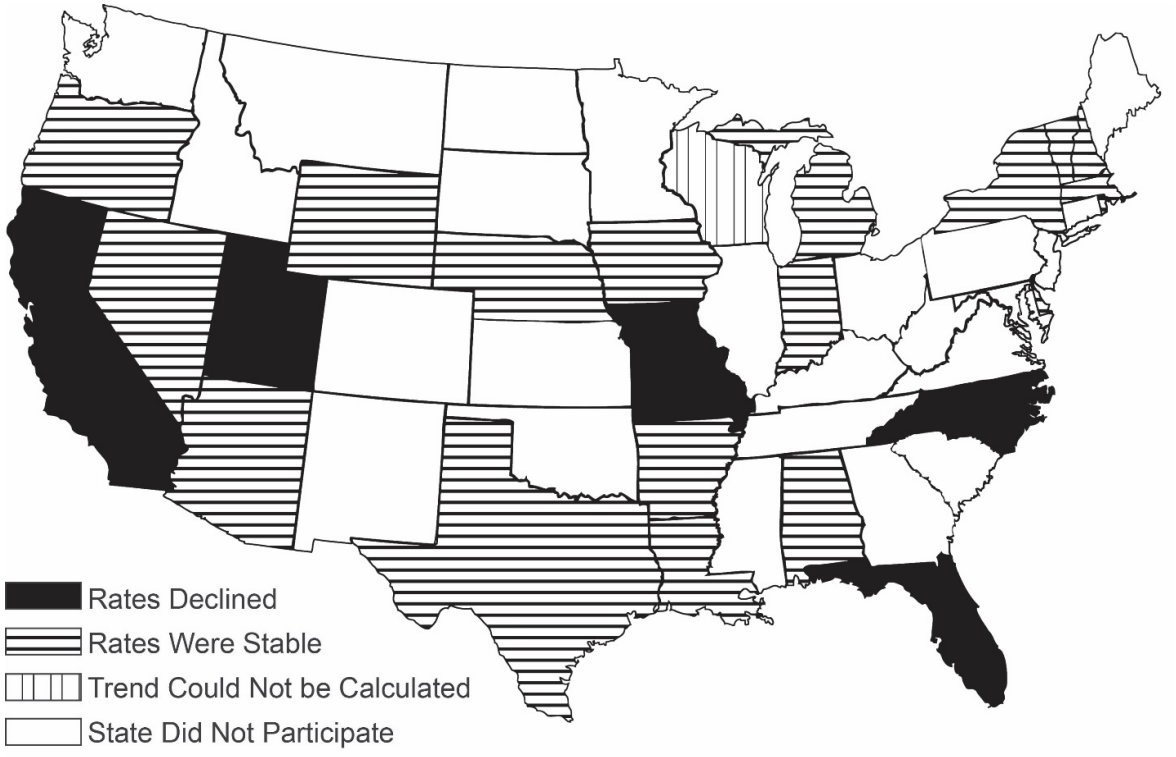


Figure 2.1: Annual Percent Change for Tobacco Related Cancer Incidence, Participating vs Non-Participating States, 2005-2009

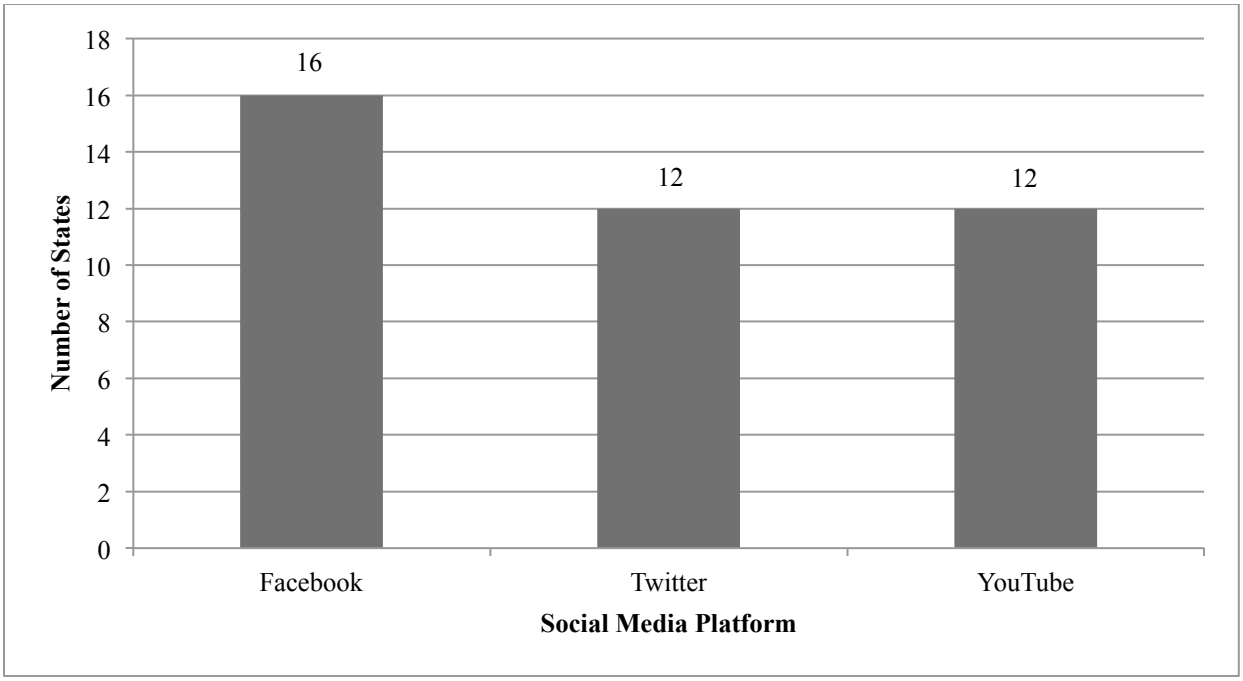
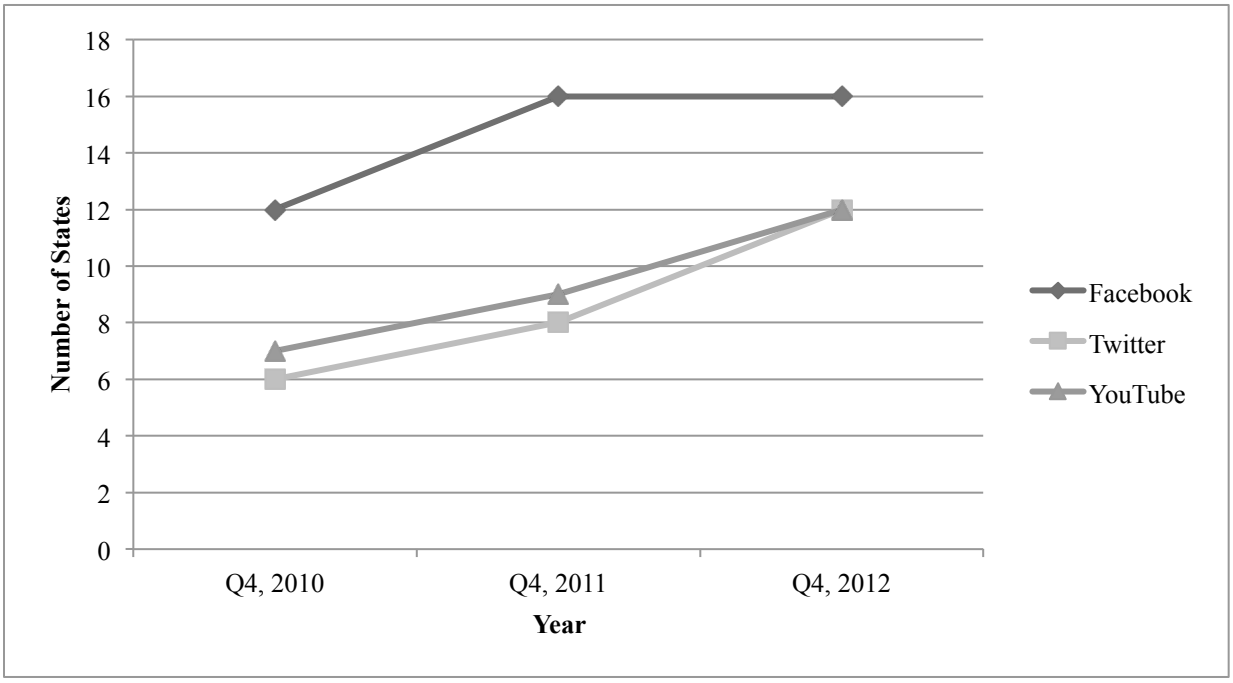


Figure 2.2 Presence of Social Media Platforms among Tobacco Control Programs, 2012 (n=24)



Q4- Quarter 4

Figure 2.3 Social Media Establishment by Platform among Tobacco Control Programs, 2010–2012

Table 2.4. Social Media Messaging Type by Platform among Tobacco Control Programs, 2012

	Total Messages	Link	Photo	Status Update	Video	Share
Facebook (n=16)	393	140 (36%)	117 (30%)	95 (24%)	29 (7%)	12 (3%)
Twitter (n=11)	702*	532 (76%)	0 (0%)	169 (24%)	1 (0%)	N/A

*64 messages from a total of 800 in the state of FL were included in this sample
N/A-Share is not a twitter metric. Twitter uses re-tweets" and we are unable to capture this data.

Discussion

Traditional cessation programs have adopted a clinical (individual) rather than a public health approach (20) to tobacco cessation. Over the past decade, however, there has been an effort to adopt a more public health-oriented approach to cessation (21), that is, one that is concerned not only with the cessation rate of the individuals who seek help to quit, but with that of all tobacco users in the population. In this approach, cessation becomes an integral part of a comprehensive tobacco control program, by making help available for those who seek it, and by actively promoting cessation in the general population.

Telephone-based tobacco cessation services, commonly known as quit lines, have shown the potential to address both of these aims. First, their effectiveness with smokers who use them is well established (22-24). Second, in many states with comprehensive tobacco control programs, quitlines play an integral role in media-based efforts to increase quit attempts in the general population (25). Today, residents in 10 provinces and two territories in Canada, Mexico, and all 50 U.S. states, Puerto Rico, Guam, and the District of Columbia have access to quit line services (26).

Emerging technologies, such as text messaging, web, and social media interventions, could potentially extend the reach and increase the impact of quit lines by complementing

telephone cessation assistance with quitting motivation and support delivered through other modalities (27). These interventions are in some ways more convenient and readily accessible than quit lines and might engage young adult smokers, (9.2% of high school students according to the CDC in 2014) who may be especially likely to use these technologies and may prefer receiving cessation support through these familiar channels (27, 28).

During recruitment for this study, three-quarters (n=18) of participating states showed stable tobacco-related cancer APC incidence rates. Of these states with stable rates, 78% (n=14) were utilizing at least one innovative activity, (i.e. Web, Facebook, or Twitter) for tobacco cessation. Eight of the states (18%) were utilizing at least two activities, while 17% (n=3) of the states were utilizing all three innovative activities for tobacco cessation. While the opportunity to join the study was voluntary and states were not offered any source of funding for involvement, these data suggest that many tobacco control programs were committed to finding and utilizing new and more innovative ways to engage with their population despite their stable APC incidence rates. States would benefit from the tailored reports of their particular programs and interventions, which in turn would provide best practices on the implementation of effective cessation services within their state, and how they are reaching and engaging with their population.

According to Pew Research Center, in 2011, two-thirds of online adults (66%) use social media platforms (29). In a new survey conducted in 2014, Pew found that Facebook remained by far the most popular social media site. Although its growth has slowed, other platforms such as Twitter saw increases over the year (30). This information is similar to the level of adoption of social media by tobacco control programs. Tobacco Control Programs have a similar level of presence on Facebook (67%) when compared the general public; however, they have a lower

presence on Twitter and YouTube (50%), suggesting that there is an opportunity where programs can utilize these newer platforms to reach their audiences. Tobacco Control Programs are also showing a consistent trend when it comes to establishment of a social media platform. While establishment of a Facebook presence slowed from 2011-2012, there was a significant growth in TCPs establishing Twitter and YouTube accounts during that time period. When comparing this trend to the general public, according to PEW Research Center, 16% of online adults reported using Twitter in 2012, with the percentage rising each year thereafter (29). As of May 2011, 71% of online adults reported watching videos on a video-sharing site such as YouTube (31). Similar to the audiences utilizing and/or subscribing to tobacco control programs' social media platforms for messages or news on smoking cessation, the general public also gets their news from various social media sites. Roughly half of both Facebook and Twitter users (47% and 52% respectively), get news on those sites, with 20% of YouTube users getting news from YouTube (32).

On a global perspective, more than three-quarters of tobacco control advocates currently use social networking sites but only 18% said their organization offered formal training on the use of social networking sites and only 9% have a staff person dedicated to online communications (33). It is unknown whether TCPs have had the ability to train their staff in social networking or have staff dedicated solely to online communications as these undertakings may have the ability to increase reach and engagement with their audiences. With the increased growth of other social media platforms such as Instagram, LinkedIn, and Pinterest the tobacco control community is provided with an opportunity to reach and increase the impact of tobacco cessation services. Although, the programs are utilizing their social media presence through the posting of links or status updates, there is an underutilized opportunity to connect with a

population through photos and/or videos. Photos and videos have become an integral part of the online social experience. In a new survey conducted by Pew Research Center's Internet Project, more than half of internet users post or share photos or videos online. In this survey, 54% of adult Internet users post original photos or videos online that they themselves have created and 47% of adult Internet users take photos or videos that they have found online and repost them on sites designed for sharing images with many people (32). Tobacco Control Programs are posting/reposting photos (30%) more when compared to videos (7%) to get their tobacco messages across to their audiences; however, when compared to the general public, they are not utilizing this promotional approaches to tobacco cessation to their maximum potential (32).

The CDC Tips Campaign (34) provides video of real smokers, living with serious long term health effects from smoking and secondhand smoke exposure. These videos feature compelling stories that can help to build awareness of the health damages associated with smoking, encourage smokers to quit as well as not smoke around others (34). Messages and images that make tobacco use appealing are everywhere, (35, 36) therefore, there is an opportunity for statewide tobacco prevention and control to utilize emerging innovative technologies to counteract these messages with images and videos of the realities of those living with the consequences of smoking and tobacco.

The results of this study are presented with five limitations. First, the analysis was conducted solely by one coder, which does not allow for double-coded data to account for inter-rate reliability, thus it undermines reliability of the data. Second, as with any descriptive data analysis, the coding has some element of subjectivity. Third, while this sample of twenty-four programs consists of a large number of programs, each program varies in their tobacco cessation promotional activities, which is based on program resources and funding among others;

therefore, not analyzing data from all states and U.S. territories is a limiting factor for this study. Fourth, the programs upon joining the study were aware that their promotional activities were being monitored for this study and thus could have over-utilized their innovative activities more than normal during this time period thus allowing for potential bias (misrepresentation) in the results. Lastly, due to the disproportionate volume of Twitter data from the state of Florida, 64 messages from the total sample of 800 were coded for this study. Although the disadvantages to this type of sampling include the opportunity for bias to be brought into the results of the survey, which often lead to skewed data collection, this technique is easy and cost-effective for this study, as well as reliable since the method for selecting the sample was random thus minimizing bias.

Tobacco control programs, especially the ones who have shown stagnant incidence rates in their populations are eager to utilize newer and more innovative approaches for tobacco cessation. A majority of the participating programs are utilizing at least one innovative approach to share information on tobacco cessation. The types of messages that these approaches allow are being utilized in inconsistently among the programs. The sharing of links on social media platforms is the most preferred choice among the programs. Although these social media platforms allow for the ability to post videos and photos, the programs are not maximizing this opportunity as much when compared to messaging types. Therefore, while programs are moving in a positive direction in terms of utilizing social media platforms to provide tobacco cessations resources to their populations of interest, there may be some missed opportunities that could help to maximize their approach.

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CHAPTER 4

REACH AND ENGAGEMENT OF WEB AND SOCIAL MEDIA PLATFORMS AMONG TOBACCO CONTROL PROGRAMS

[1] Momin, Behnoosh. To be submitted to *Journal of Medical Internet Research.*

Abstract

Introduction: The emergence of social media technologies and web-based interventions sponsored by many state Tobacco Control Programs (TCPs) now provides an alternative for smokers seeking assistance in quitting smoking. This study provides a descriptive analysis about how states are reaching their populations and engaging them through innovative approaches, such as cessation websites and social media platforms to promote their cessation services. **Methods:** We collected retrospective data from 2010-2012 with a final sample of twenty-four state TCP's. Web and Social Media Platform metrics were used to quantify the descriptive data. All website data were collected by the state programs using Google Analytics, while all Facebook and Twitter data were collected by state programs or state media vendors using Facebook Insights and Radian6, respectively. All reach and engagement data was adjusted per 100,000 population and smokers**. Results:** Vermont and Wyoming had the highest number of monthly visits at 211 and 202 per 100,000 population and 1,283 and 929 per smokers, respectively. Vermont and Wyoming had the highest number of monthly page views at 588 and 3,952 per population and 3,576 and 18,121 per smokers, respectively. Florida had the fewest visits per month at 11 and 60 visits, respectively. Florida had the highest adjusted number of page likes (1,040), with Vermont coming in second (218). Vermont had the highest total clicks at 21,984 during this period adjusted by population. For "people talking about this," Florida and Vermont were amongst the top two states with 187 and 165, respectively. When adjusting for 100,000 smokers, Florida (5.877) and Vermont (1,327) had the highest number of page likes, with Vermont having the highest total clicks (133,611). For "people talking about this," Florida and Vermont were amongst the top two states with 4,521 and 1,003, respectively. Nebraska had the highest number of followers when adjusted for population (78) and smoking population

(393). **Discussion:** While there is considerable variability among tobacco programs on the reach and engagement of their states' quitline website, a majority of the states are reaching and engaging with the general population, and to a larger extent, with their smoking population when compared to the general public.

Introduction

Despite declines in adult cigarette smoking prevalence during the past 50 years, tobacco use remains the nation's leading preventable cause of death and disease (1). One national survey indicates that about 41% of smokers try to quit smoking each year, but only 4.7% maintain abstinence for at least 3 months (2). Recent stalls in the decline of national smoking prevalence are suggesting that innovative approaches are needed to increase the promotion, utilization, and reach of existing smoking cessation interventions to maximize their effectiveness (3).

Health promotion organizations are increasingly embracing social media technologies to engage end users in a more interactive way and to widely disseminate their messages with the aim of improving health outcomes. However, such technologies are still in their early stages of development and, thus, evidence of their efficacy is limited (4). Fortunately, the online communication landscape now enables a multidirectional flow of information where consumers increasingly encounter content that is tailored to their interests in a format that facilitates immediate engagement, response, and sharing with one's social network (5). Further, many news and blog platforms provide opportunities for the public to interact with content by posting public comments, rating or "liking" stories, or sharing content through other social media platforms (6).

The emergence of social media technologies and Web-based interventions sponsored by many state Tobacco Control Programs now provides an alternative for smokers seeking assistance in quitting smoking. Social media has the potential to connect federal and state public health agencies with the general public; however, little is known about social media reach and engagement among state Tobacco Control Programs. Examining the level of web and social media platform reach and engagement among Tobacco Control Programs has the potential to address gaps in the literature by documenting the reach and engagement of each innovative

platform (Web, Facebook and Twitter) that are being utilized by the TCPs. Secondly, findings from this study will suggest strategies for approaching the use of online media that may benefit other tobacco control efforts. Finally, the use of effective social media can enhance communication between the tobacco control programs and the public by facilitating reach and engagement, and therefore the findings will assist the programs in developing and revising future and current communication plans to maximize the most effective tobacco cessation approaches.

Methods

State Recruitment

All states and U.S. territories were invited to participate in this study during an announcement by the Centers for Disease Control and Prevention's (CDC) Office on Smoking and Health (OSH) state media network call and OSH's state tobacco control program (TCP) call in October of 2011. Additionally, study announcements and invitations were distributed in the same month on the North American Quitline Consortium's (NAQC's) listserv and addressed to the TCPs. One month later, TCPs were contacted directly by their CDC project officers to encourage participation in this voluntary CDC study in which no incentives were provided for participation. We collected available and complete retrospective data from 2010-2012. The final sample included 24 state TCP's. Quitline cessation services vary by state and vendor. Some vendors supply services to multiple states, while other states have a unique vendor (7). Participating states were requested to submit website and social media reach and engagement data. Figure 3.1 highlights the participating states that submitted web and social media platform data, by vendor. A majority (n=21) of the participating states use Allere-Wellbeing and National Jewish Health as their vendor for cessation services. Other states (Arizona, California, and New York) chose a Cancer Institute or a University affiliated vendor.

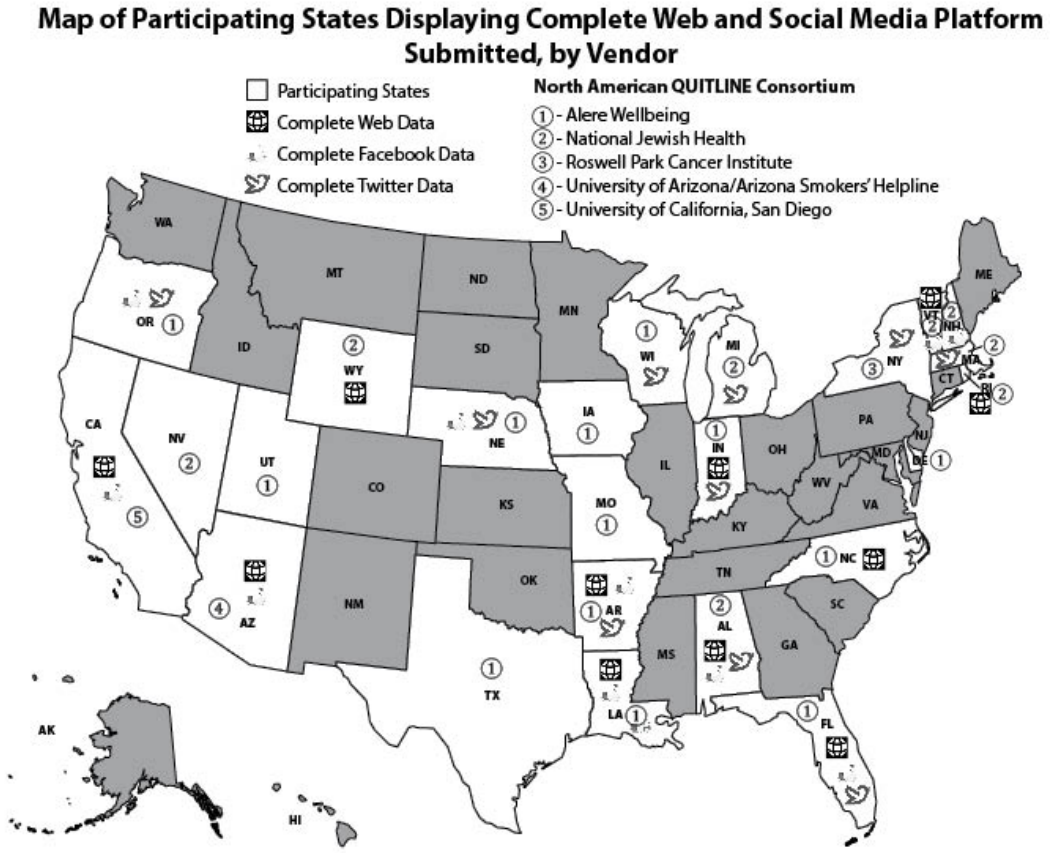

Figure 3.1 Map of Participating States Displaying Complete Web and Social Media Platform Submitted, by Vendor

Web and Social Media Platform Metrics

Web and Social Media Platform metrics were used to quantify the descriptive data. State data for Web along with two social media platforms, Facebook and Twitter were included in this study as these were the innovative promotional data provided by the programs. These metrics illustrate how reach and engagement of web and Social media data were analyzed for this study. Table 3.2 summarizes the metrics used for website and each social media platform, as well as defines reach and engagement within each platform and metric.

Table 3.2 Web and Social Media Platform Metrics

Platform	Metric	Definition	Type of Data
Website	Average visits per month	The mean number of visits by month; there may be multiple visits per visitor	Reach
	Average visits by month per 100,000 population	The mean number of visits to the website per 100,000 population by month	Reach
	Avg. visits by month per 100,000 Smokers	The mean number of visits to the website per 100,000 smokers by month	Reach
	Average page views by month	The mean number of pages viewed by month	Engagement
	Average page views by month per 100,000 population	The mean number of page views to the website per 100,000 population by month	Engagement
	Average page views by month per 100,000 smokers	The mean number of page views to the website per 100,000 smokers by month	Engagement
Facebook	Number of page likes	The total number of people who have liked the page	Reach
	Number of page likes per 100,000 population	The mean number of likes to the Facebook page per 100,000 population	Reach
	Number of page likes per 100,000 smokers	The mean number of likes to the Facebook page per 100,000 smokers	Reach
	Total Clicks	The total number of clicks on the Facebook page	Engagement
	Total Clicks per 100,000 population	The total number of clicks on the Facebook page per 100,000 population	Engagement
	Total Clicks per 100,000 smokers	The total number of clicks on the Facebook page per 100,000 smokers	Engagement
	People talking about this	The number of users engaging with the page by posting to the page's wall; commenting; sharing one of the page posts; answering a question posted; RSVP'ing to events; mentioning the page; or photo tagging the page.	Engagement
	People Talking about this per 100,000 population	The number of users engaging with the page per 100,000 population	Engagement
	People Talking about this per 100,000 smokers	The number of users engaging with the page per 100,000 smokers	Engagement
Twitter	Followers	The total number of Twitter users who have agreed to receive tweets from the state	Reach
	Followers per 100,000 population	The total number of Twitter users per 100,000 population	Reach
	Followers per 100,000 smokers	The total number of Twitter users per 100,000 smokers	Reach

[a] Google Analytics. https://developers.google.com/analytics/devguides/reporting/core/dimsmets
[b] Facebook Page Insights. http://www.facebook.com/help/336893449723054/
[c] Twitter Glossary. https://support.twitter.com/articles/166337-the-twitter-glossary#

Data Sources and Analysis

To examine the reach and engagement of online platforms by TCPs, we conducted an internet search of all participating states' health department websites to identify the universal resource locator (URL) to the tobacco control program. If the URL's were not available, we

scanned for information about the state Quitline using the state name followed by "Quit Tobacco Program. (e.g.. Wyoming Quit Tobacco Program). We conducted a similar internet search for additional innovative platforms. Cessation websites and names of each social media platform were noted for each state. The information gathered was further cross-referenced with data submitted directly from the state program to the CDC via the CDC promotions portal, an online repository of state program data created specifically for this study. While states submitted data in a variety of formats, we consolidated the raw data into an aggregate dataset, which included available data for each state website and social media platform data by day for each participating tobacco control program.

All website data on reach and engagement were collected by the state programs using Google Analytics (8), a free tool that provides metrics on how people are using a product on each platform. All Facebook data were collected by state programs or state media vendors, using Facebook Insights (9), a free tool available on all Facebook pages. For this study, Facebook Insights provided reach and engagement data as described in Table 3.2. Twitter data were collected by state programs using Radian6 (10), a free tool that allows for measuring and tracking of social media metrics. For this study, radian6 provided reach data as described in Table 3.2.

Since population size most likely influences the variation in Web traffic across states, all reach and engagement data was adjusted per 100,000 standard population and smokers in their respective states. We adjusted for both population and the number of smokers to not only take into account within state comparisons, but to understand the tobacco cessation efforts through targeting of those who smoke. The population adjustment was based on the 2010 census (11). The adjustment made for the number of smokers in the state was based on the percentage of

smokers in 2012 as estimated from CDC's Behavioral Risk Factor Surveillance System (12). This percentage was used to calculate the number of smokers in the state from the 2010 census population, then adjusted per 100,000. This adjustment was critical for this analysis as it allowed for comparison of state results. Standard deviations for all averages were performed and included.

Results

Of the 24 participating states, 13 states (54%) submitted complete Web data, 11 states (46%) submitted complete Facebook data, and 11 states (46%) submitted complete Twitter data. Only one state submitted complete YouTube data, and therefore YouTube data were excluded from this analysis. In addition, one state submitted complete Facebook data but was excluded from the Facebook analysis since the format of the data collection was inconsistent with other states. Figure 3.1 provides a visual representation of the participating states that submitted complete data by vendor. A majority (n=21) of the participating states use Allere-Wellbeing and National Jewish Health as their vendor for cessation services. Other states (Arizona, California, and New York) chose a Cancer Institute or a University affiliated vendor.

Table 3.3 summarizes the reach and engagement of each state website. When adjusting for population and smokers, Vermont and Wyoming had the highest number of monthly visits at 211 and 203 per population and 1,279 and 930 per smokers, respectively. Louisiana had the fewest visits per month when adjusted for population and smokers at 7 and 27 visits, respectively. When adjusting for population and smokers, Vermont and Wyoming had the highest number of monthly page views at 589 and 3,955 per population and 3,567 and 18,140 per smokers, respectively. When adjusting for population and smokers, Oregon had the fewest number of monthly page views at 11 and 61, respectively. There was some degree of variability

when calculating the average visits and page views in each state. Arizona had the highest level of standard deviation at 146.36 visits, while Rhode Island had the smallest standard deviation at 5.26 visits. Alabama had the highest standard deviation for the average monthly page views at 494.83 views, while Nebraska had the smallest standard deviation at 16.67 views.

Reach and Engagement of the state Facebook page was also analyzed. Table 3.4 summarizes the reach and engagement of each state Facebook page, adjusted for population. Table 3.5 summarizes the reach and engagement of each state Facebook page, adjusted for smoking population. Although all participating states have established a Facebook page for over two years, the state of Florida has the longest (n=60 months) established page. Correspondingly, Florida has the highest adjusted number of page likes (1,040), with Vermont coming in second (218). Vermont surpasses the other states with 21,984 total clicks during this period adjusted by population. For "people talking about this," Florida and Vermont were amongst the top two states with 187 and 165, respectively.

When adjusting for smoking population, Florida (5,877) and Vermont (1,327) had the highest number of page likes, with Vermont surpassing all other states in total clicks (133,611). For people talking about this, Florida and Vermont were amongst the top two states with 4,521 and 1,003, respectively.

Lastly, Table 3.6 summarizes the reach data of each state for Twitter, adjusted by population and smoking population. Nebraska had the highest number of followers when adjusted for population (78) and smoking population (393).

Table 3.3 Reach and Engagement of State Quitline Websites among Tobacco Control Programs, September 2010- December 2012

			Reach				Engagement			
State	**State Quitline Website**	**# of Months of Data (2010-2012)a**	**Avg. Visits per month**	**Avg. Visits per month (Standard Deviation)**	**Avg. Visits by month per 100,000 population**	**Avg. Visits by month per 100,000 Smokers**	**Avg. Page Views per month**	**Avg. Page Views per month (Standard Deviation)**	**Avg. Page Views by month per 100,000 population**	**Avg. Page Views by Month per 100,000 smokers**
Alabama	www.alabamaquitnow.com	27	2335	144.51	48.85	205.26	11997	494.83	251.00	1054.61
Arizona	www.ashline.org	26	6171	146.36	96.54	564.59	20743	-	324.52	1897.80
Arkansas	www.stampoutsmoking.com	27	1091	64.92	37.42	149.66	2774	122.16	95.13	380.53
California	http://www.californiasmokershelpline.org/	27	2951	83.64	7.92	62.87	9043	182.36	24.27	192.65
Florida	http://floridaquitline.com/	15	2854	58.65	15.18	85.76	3189	65.38	16.96	95.83
Indiana	http://www.quitnowindiana.com/	7	2414	-	37.23	155.14	4516	-	69.65	290.23
Louisiana	http://quitwithusla.org/	21	305	9.02	6.73	27.14	1003	29.85	22.13	89.23
Nebraska	http://quitnow.ne.gov/	18	451	9.11	24.69	125.35	808	16.67	44.24	117.83
North Carolina	http://www.quitlinenc.com/	6	2578	84.58	27.04	129.35	5878	178.73	61.65	294.93
Oregon	http://public.health.oregon.gov/PREVENTIONWELLNESS/TOBACCOPREVENTION/GETHELPQUITTING/Pages/oregonquitline.aspx	14	246	8.10	6.42	35.87	420	21.13	10.96	61.25
Rhode Island	http://www.quitnowri.com/	22	154	5.26	14.63	84.09	277	22.00	26.32	151.24
Vermont	http://www.vtquitnetwork.org/	27	1321	33.41	211.11	1279.46	3683	95.51	588.58	3567.17
Wyoming	http://wy.quitnet.com	27	1143	12.51	202.79	930.25	22289	274.99	3954.57	18140.31

[a]= While the data was collected from years 2010-2012, states submitted complete monthly data for those that were available.

-= Standard Deviation data not available

Table 3.4 Reach and Engagement of Facebook Pages among Tobacco Control Programs, July 2011-December 2012, Adjusted by State Population

				Reach		Engagement			
State	**Name**	**# of Months Platform Established**	**Months of Data Collected[a]**	**Page Likes[b]**	**# of page likes per 100,000 population[f]**	**Total Clicks[g]**	**Total Clicks per 100,000 population**	**People Talking about this[h]**	**People Talking about this per 100,000 population**
Alabama	Alabama You Choose	33	18	340	7.11	3166	66.25	67	1.40
Arizona	ASHLine	32	18	424	6.63	16264	254.44	463	7.24
Arkansas	Stamp Out Smoking	35	18	705	24.18	19784	678.46	486	16.67
California[c]	TobaccoFreeCA	37	16	17453	46.85	1165672	3128.98	35207	94.51
Florida	Tobacco Free Florida	60	18	195602	1040.38	-	-	150458	187.26
Louisiana[c]	Quit With Us, Louisiana	29	17	183	4.04	9297	205.10	362	7.99
Nebraska	Smoke-Free Counter & Calculator	24	18	481	26.34	64253	3518.78	1376	75.36
New Hampshire[d]	Dear Me New Hampshire	20	15	362	27.51	32649	2480.93	336	25.53
Oregon[e]	Smokefree Oregon	25	15	2563	66.90	50059	1306.68	1044	27.25
Vermont	Vermont Quit Network	24	17	1367	218.37	137619	21983.87	1033	165.02

a= Months of data collected between the study period July 2011-December 2012 for a total of 18 months. However, not at states submitted the complete data for the entire period.
b= total page likes on the final day of study period, December 31, 2012
c=as of November 30, 2012, as this was the final month of complete data received
d=as of September 30, 2012, as this was the final month of complete data received
e=as of October 31, 2012, as this was the final month of complete data received
f= Population estimates taken from U.S 2010 Census data available at: http://www.census.gov/2010census/.
g=total clicks: the total number of users that click on the site out of the total users that viewed the site
h=people talking about this: The number of unique users engaging with the page by posting to the page's wall; commenting; sharing one of the page posts; answering a question posted; RSVP'ing to events; mentioning the page; or photo tagging the page.
-= data not available

Table 3.5 Reach and Engagement of Facebook Pages among Tobacco Control Programs, July 2011-December 2012, Adjusted by Smoking Population

				Reach		Engagement			
State	**Name**	**# of Months Page Established**	**Months of Data Collected[a]**	**Page Likes[b]**	**# of page likes per 100,000 smokers**	**Total Clicks**	**Total Clicks per 100,000 smokers**	**People Talking about this[f]**	**People Talking about this per 100,000 smokers**
Alabama	Alabama You Choose	33	18	340	29.88	3166	278.21	67	5.89
Arizona	ASHLine	32	18	424	38.79	16264	1488.01	463	42.36
Arkansas	Stamp Out Smoking	35	18	705	96.71	19784	2713.85	486	66.67
California[c]	TobaccoFreeCA	37	16	17453	371.82	1165672	24833.23	35207	750.04
Florida	Tobacco Free Florida	60	18	195602	5877.46	-	-	150458	4520.97
Louisiana[c]	Quit With Us, Louisiana	29	17	183	16.28	9297	827.14	362	32.21
Nebraska	Smoke-Free Counter & Calculator	24	18	481	133.61	64253	17848.06	1376	382.22
New Hampshire[d]	Dear Me New Hampshire	20	15	362	160.18	32649	14446.46	336	148.67
Oregon[e]	Smokefree Oregon	25	15	2563	373.62	50059	7297.23	1044	152.19
Vermont	Vermont Quit Network	24	17	1367	1327.18	137619	133610.68	1033	1002.91

a= Months of data collected between the study period July 2011-December 2012 for a total of 18 months. However, not at states submitted the complete data for the entire period.
b= total page likes on the final day of study period, December 31, 2012
c=as of November 30, 2012, as this was the final month of complete data received
d=as of September 30, 2012, as this was the final month of complete data received
e=as of October 31, 2012, as this was the final month of complete data received
f= people talking about this: The number of unique users engaging with the page by posting to the page's wall; commenting; sharing one of the page posts; answering a question posted; RSVP'ing to events; mentioning the page; or photo tagging the page.
-= data not available

Table 3.6 Reach of Twitter Metrics among Tobacco Control Programs, October 2010–December 2012

State	Name	Months Established[a]	**Date**	**Followers**	**Followers per 100,000 population**	**Followers per 100,000 smokers**
Alabama	@alabamaquitnow	33	12/28/2012	53	1.11	4.66
Arkansas	@ASHLineAZ	-	12/28/2012	1195	40.98	163.92
Florida	@tobaccofreefla	34	12/31/2012	1841	9.79	55.32
Indiana	@QuitNowIndiana	18	12/17/2012	126	1.94	8.10
Louisiana	@QuitWithUsLA	23	11/13/2012	272	6.00	24.20
Massachusetts	@MakeSmkngHistry	-	12/31/2012	294	4.49	27.37
Michigan	@MIHealth	42	12/28/2012	4094	41.42	177.77
Nebraska	@NebraskaDHHS	-	12/31/2012	1416	77.55	393.33
New York	@nysmokefree	-	12/31/2012	93	.48	2.96
Oregon	@smokefreeoregon	36	12/21/2012	1064	27.77	155.10
Wisconsin	@UWCTRI	-	12/14/2012	43	.76	3.71

a= Months since first tweet as of December 31, 2012
-Not available

Discussion

The mass media landscape has transformed over the years to include platforms, such as Internet marketing and advertising strategies, social networking, mobile messaging, and the growing fragmentation of traditional broadcast media. As a result, the amount and variety of tobacco information available across media platforms has proliferated (13). In keeping with the growth of social media in the United States, many states currently use social media sites to disseminate health information (14). The purpose of this study was to assess the reach and engagement of social media activities among Tobacco Control Programs. Although many state

quitlines have a cessation information website, there is notable variability among the states in regards to establishment (how long the site has been available to the public) of their Web sites.

While many states have had established Websites to share tobacco related information, others have more recently established their sites, suggesting that many TCPs are only recently utilizing the Web as a tobacco cessation resource. While traditional quitlines often have hours of service limited to a typical business day, cessation information is available on the website 24 hours per day, making it an important tool for reaching and engaging with smokers and the general population around the clock. Thus, all participating tobacco control programs in this study reach their smoking population through the use of a smoking quitline website (i.e. have established a Website).

When comparing reach and engagement levels of state websites, all TCPS are reaching and engaging with their populations, suggesting that the use of a state Website as a communication tool is successful. Interestingly, many of the states with a smaller population, such as Vermont and Wyoming, are reaching and engaging (*respectively*) at greater levels when compared to states with a larger population. Although Vermont had the highest levels of reach of their state Website within their populations, in 2012, CDC's Behavioral Risk Factor Surveillance System (BRFSS with confidence intervals (CI) reported that 16.5% (CI 15.1-17.8) of the state population were adults who are current smokers. In 2013, the system report 16.6% (CI 15.3-17.9) of the population in Vermont as adults who are current smokers. On the other hand, Wyoming had the highest levels of engaging with their populations through their quitline Website. In 2012, BRFSS reported that 21.8% (CI 19.9-23.7) of the population in Wyoming were adults who currently smoke. In 2013, the system reported 20.6% (CI 19.1-22.2) of the adult population who currently smoke, suggesting that reach alone does not account for decreased

cessation rates, but the act of engaging with a targeted population will allow for decreased cessation rates. Furthermore, understanding the types of promotional activities and interventions that are being adopted and utilized in Wyoming to engage their smoking population would help other states to increase their levels of engagement. Additionally, both Vermont and Wyoming are operated by the same quitline vendor, a national vendor whose role is to host and maintain interactions of the quitline and Website, and therefore further research would be needed to understand if a vendor's role on reach and engagement would impact a state's quitline Website by providing higher reach and/or engagement levels.

While only ten states submitted complete Facebook data, all participating states in the study had a Facebook presence, eleven states had a Twitter account and twelve states a YouTube account, with the state of Vermont launching a YouTube account in December of 2012 (the end of this study period). Therefore, Facebook is a dominant social media platform when compared to other social media platforms among TCPs. This is consistent with available literature in that despite growth of other social media services, Facebook remains the dominant social networking platform (15). The finding suggests that in public health, Facebook serves as an important driver for sharing smoking cessation resources. It is a free, easy, and a reliable platform for TCPs to utilize. The information is available 24 hours a day, is a great opportunity to connect with people, and there is not a minimum amount of text that is required for sharing.

In a study published by Thackery and colleagues (14) among thirty state health departments, (SHD) using at least one social media application, 56% (n=17) had a Facebook account, 87% (n=26) had a Twitter account, and 43% (n=13) had a YouTube Channel. Therefore, while Facebook seems to be a predominant social media application with the TCPs, a majority of SHDs are also utilizing Twitter to reach their audiences, suggesting that this platform

with its brief "mini-blog" format allows users to quickly post and follow up on last minute information.

Among participating states, many states established their Facebook pages much earlier than others. The range between established pages is less than 2 years to 5 years. While all states had considerable reach on their Facebook pages with their smoking population, there was a disproportionately higher reach and engagement among California and Florida. This could be the result of the age of the state populations or socioeconomic status. Although their Facebook presence has been established longer than other states during this time period, these two states are examples of how the effective use of social media can successfully generate reach and engagement with a specific audience. Between 2012 and 2013, California's percentage of adults who currently smoke went from a 12.6% (CI 11.8-13.4) to 12.5% (CI 11.7-13.4), and Florida's percent of adults who currently smoke went from 17.7% (CI 16.3-19.1) in 2012 to 16.8% (CI 15.9-17.7) in 2013, suggesting that reach and engagement are in fact influencing the outcome of a decrease in cessation rates. Therefore, understanding the types of promotional strategies and activities of these two states within their media and communications plan, including the amount of posts and new information made available daily or weekly can serve as best practices for other TCPs. When compared to SHDs, TCPs are not reaching their populations at the levels the SHDs are reaching. The mean number of people who liked a SHD Facebook page was 789 in a 2012 report by Thackery and colleagues (14). Only four of the ten participating states had reach levels above this, suggesting that 60% of TCPs need to improve ways to reach their audiences via Facebook in order to be comparable with SHDs with their audience reach. Although all states are engaging with their smoking population at some varying degree through Facebook page clicks, the opportunity to engage the population through discussion remains low, suggesting that TCPs

need to offer more ways to encourage dialogue about a topic or post through, rather than promoting a one way communication mechanism. This could be done through sharing of CDC's TIPS campaign videos, or posting of articles with follow-up discussion questions. This finding is consistent with the literature on SHDs where the majority (86%) of Facebook posts had received no comments (14). The negative implication is that this is allowing for only one-way dialogue between the programs and their audience, therefore reach and not engagement is occurring. In addition, a study conducted by PEW Research, on Social Media and Health, reported that 7% have posted comments, queries, or information about health or medical matters in an online discussion, listserv, or other online group forum (16). With social media's influence on the rise as more and more people look for advice from peers as well as experts (17), the idea is that, if people can pool knowledge and learn to track their own health metrics, they can make better choices and have better health outcomes (18).

Twitter is another social media platform that is being utilized by many TCPs. While the number of followers varies between programs, five programs showed significant reach with over 1,000 followers surpassing the 983 average number of Twitter followers of state health departments. However, when adjusting for smoking population, the number of followers dropped significantly, suggesting that innovative ways to reach the smoking population via Twitter are needed. This can include a creative way to utilize the maximum number of characters that are allowed on a Twitter post. For example, posting of a question to encourage dialogue and discussion. One state, Nebraska, had the highest number of followers when adjusting for smokers suggesting that the state may offer more ways to reach with their smoking population through Twitter and could potentially serve as a model for other programs. However, further research is warranted to understand the level of tweets, retweets, and comments being posted onto a state

page which could further attract more followers, thus enhancing reach and allowing for opportunities to engage with Twitter followers.

Future Implications and Research

Although understanding the reach and engagement of TCP is important for guiding future developments and implementation of promotional strategies, understanding how and if TCPs are diversifying their social media platforms, engaging in mobile applications, and implementing some of the more recent, less utilized social media included Instagram, YouTube, Pinterest and LinkedIn. Another opportunity for research would include conducting qualitative research through focus group or key informant interviews to understand specific barriers and facilitators of the uptake of social media in a state's communications plan. While the metrics to measure engagement of TCP with their audiences is limited in this study, the ability to develop metrics to measure and capture blogging data, health updates, and podcasts views are other future research opportunities.

Limitations

Some study limitations should be noted. First, while the social media industry owns vast amounts of data, each company shares different types of metrics with its users. Therefore, we did not have the flexibility to request standard metrics across social media platforms. As a result, the richness of this study's overall dataset varied by social media platform. In some instances, we were limited in our ability to make comparisons across states without having complete data available for some states. Subsequently, states that were early adopters of social media consistently exhibited a greater level of reach, therefore adjusting metrics by year of adoption may solve this limitation. Second, we did not adjust for age or socioeconomic status to take into account those individuals who may not have access to a computer, and therefore, this may pose a

bias in the data. Third, during the data collection period, Facebook launched a new version of its free analytic service to page owners. The newer version of Facebook Insights included many more metrics for page owners and changes to variable definitions were also made. Furthermore, states that had not archived previous reports were unable to submit Facebook data to the study coordinator for the period before July 19, 2011. Thus, only data collected after July 19, 2011, could be used for descriptive findings with standard measures. This impacted the data by allowing for a shorter period to collect metric data for analysis. Fourth, standard deviations for all averages could not be calculated due to unavailability of all data points for calculation purposes, thus limiting our ability to observe variations in the averages. Fifth, some states have less data for analysis when compared to other states due to recent establishment of their Web or social media platforms or not submitting complete data and would need to be adjusted for. This could lead to an underestimate or overestimate of the metrics to capture reach and engagement data for the state, thus impacting final conclusions for the state. Sixth, some states utilize more than one Website for their quitline or host their quitline site within their program site. While we listed the specific site that was measured for reach and engagement, other sites could have offered higher or lower levels of reach and engagement, thus negatively impacting the findings of this study. Lastly, there could have been several individuals that may have seen a message, but not have liked a page, or engagement with the message through clicking on content or engaging in discussion via comments. Therefore, our findings could be underestimating the level of reach and engagement with the populations.

Overall, TCPs are utilizing social media platforms to reach and engage with their audiences. It would be important to assure that TCPs have developed a social media plan that can be integrated into their communications plan and that TCPs that are more actively reaching and

engaging with their population develop a best practices tool for other states to follow. This study is an important first step toward understanding how these tools can be used to promote cessation behaviors and services, as well as provide an understanding of the program's current reach and engagement with its audiences through the use of Web and social media platforms. Furthermore, as the number of states that integrate social media platforms into their overall promotion strategy increases, this information may help inform future media planning.

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III. Conclusions

Over the past decade, effective smoking cessation interventions have been translated to offer quitting assistance via the telephone and the Internet, modalities with the potential for high population impact given their broad reach. Telephone-based tobacco cessation services, commonly known as quitlines, have shown the ability to help smokers quit. Nearly universal access (all 50 states and the District of Columbia, Guam, and Puerto Rico operate a quitline) to free telephone counseling services provided by state TCPs and employee health programs, has reduced some of the barriers associated with face-to-face counseling (i.e., traveling to/from the sessions, inconvenience, and expense). In many states with comprehensive tobacco control programs, quitlines also play an integral role in media-based efforts to increase quit attempts in the general population. With a growing number of individuals with access to the Internet, the emergence of Web-based interventions sponsored by many state TCPs has also emerged and now provides an additional alternative for smokers seeking assistance in quitting smoking.

The purpose of this study was to understand how TCPs have adopted innovative media strategies including social media platforms to share information, reach and engage with various audiences. Tobacco Control Programs employ a wide range of strategies to promote their quitlines. They often work with media agencies to develop and place advertisements in traditional media channels, such as television, radio, print, and out-of-home. Increasingly, states are using more innovative promotion strategies, such as advertisements on websites and social networking sites (e.g., Facebook, Twitter, and YouTube). Understanding the breadth of media promotion activities among Tobacco Control Programs and examining what types of messages,

their reach and engagement are effective interventions to determine the impact of these strategies or activities on smoking cessation rates and can help programs evaluate the effectiveness of their media purchases and to tailor their media plan accordingly to maximize its reach to target audiences.

Traditional media promotion activities are defined in the literature as television, radio, print, and direct mail advertisements; while innovative media promotion activities are defined as online and include paid digital, paid search, and social media advertisements. The current literature on the traditional type of media promotion activities is consistent in that it provides evidence that television advertisements that promote cessation quitlines result in an increase in call volume to quitlines. Unfortunately, there is still limited research available on the remaining traditional and innovative media promotion activities. Additionally, evidence on the use of social media platforms services is also lacking. Therefore, this study first identified the initial level of social media presence among Tobacco Control Programs and then examined the type of messages that were being shared with their audiences using social media platforms.

In regards to the level of social media presence among TCPs, upon conclusion of the study period, 67% of TCPs had a presence on Facebook, while 50% had a presence on Twitter or YouTube. In 2010, the beginning of the study period, 12 TCPs had a Facebook page, six had a Twitter account, and seven had a YouTube account. Although social media establishment was low, there was a notable uptake during the following two years with 16 Facebook pages, and 12 Twitter and YouTube accounts. These findings suggest that TCPs are utilizing the opportunities available for innovative media promotion. It would be helpful to observe the trend in uptake of social media platforms from 2012 until present. Additionally, it would be helpful to understand if

TCPs have begun to diversify and reach and engage with their audiences through other social media platforms including Pinterest, Instagram and mobile applications.

During the final quarter of the study period, the states with a presence on Facebook published nearly 400 total messages on their page. 36% of the type of messages were links that provided tips on ways to quit smoking, ways to cope with quitting tobacco, and links to articles that highlight the latest news on tobacco products and the consequences of smoking. Nearly one-third of the posts were photos that were shared with their audiences and included photos of the number to the QL with a tag line, or photos highlighting statistics of smokers. Approximately, a quarter of the posts were status updates, which included ways to state simple facts or relay messages to the audience. While TCPs are sharing various messages with their audiences, there is a missed opportunity for sharing videos. Given the success of the recent CDC TIPS campaign, the opportunity to share these videos with their audiences who may not be seeing them on television is not being utilized to its full potential. During this same quarter, over 700 messages were being shared on Twitter, of which 76% of them were links including information and resources on quit tips, tax increases, campaigns, and state smoking statistics. While states are utilizing Twitter through sharing various messages, the opportunity to maximize the use of sharing videos and photos is missed here.

Next, this study identified how states are reaching their populations and engaging them through innovative approaches, such as cessation websites and social media platforms to promote their cessation services.

In regards to reach and engagement of a state's quitline website, all participating states at some degree were reaching and engaging with their population based on the metrics used to evaluate this including monthly visits and page views. However, many states had quitline

websites that were established much earlier than others, and thus could have had a greater opportunity to reach and engage with their audiences. Additionally, not all states may possess a communications plan which includes promotion of a state quitline website. Those that have such a plan in place, may have an advantage over others in that they are already evaluating their own reach and engagement as well as could be sharing messages that have been piloted or tested with other audiences and have shown the ability to successfully reach and show impact. Some states may also have a media plan within their communications plan, where others may not. Again, this could also be an advantage and contribute to the varying degrees of reach and engagement of the TCP websites. Finally, some state possess a media vendor that provides themwith an immense amount of support in terms of monitoring and evaluating their state media activities.

In regards to reach of the state Facebook page, the state of Florida has the longest established page as well as the highest adjusted (*both population and smokers*) number of page likes with Vermont coming in second. Vermont and Florida also surpasses the other states in terms of engaging with their population. Again, it would be helpful to understand possible contributors to this including tobacco funding provided to each state, and how each state utilized their funding dollars in terms of media promotion activities. In terms of reach for Twitter pages, Nebraska possessed the highest reach levels (*number of followers*) when adjusted for both population and smokers.

Overall, the future of media promotion activities seems to be changing rapidly. While the traditional quitline was once the only avenue for reaching and engaging with smokers, the Internet has provided several alternatives for smokers who would like assistance or support. The rise of state quitline websites have provided an opportunity for TCPs to utilize this channel to provide quitting assistance. While some websites may offer more services than others, it would

be important to understand if there is a relationship between those sites that offer more services and their utilization rates when compared to others. Since there is not consistency between what each state offers, maybe given the fact that operating vendors are different, the opportunity to work with vendors to encourage consistency in services is another gap that needs to be further explored. Social media platforms have also offered an additional opportunity for TCPs to reach and engage with audiences. While many TCPs are taking advantage of this opportunity, they are all reaching and engaging with their audiences at varying levels. There could be many contributing factors for this which all would need to be further explored.

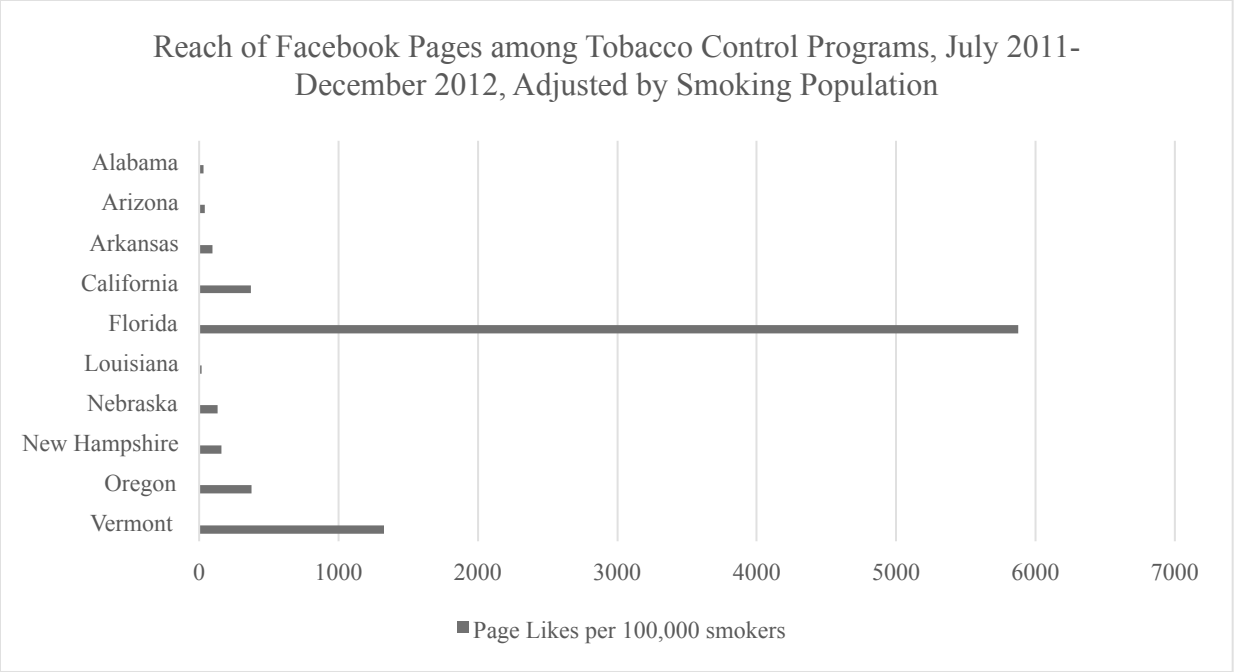
While this study contributes much to the literature, there are future opportunities for research that need to be explored. A future opportunity or next step that would be important to add to the literature includes determining if there is a relationship between the promotion of various innovative media activities and a quit line's call volume. Additionally, there are several other social media platforms that have gained popularity and are widely being used. These include Pinterest, Instagram, YouTube as well as mobile applications. All of these could also be evaluated and monitored as well as determine if TCPs have started to utilize any of these platforms to reach and engage with their audiences.

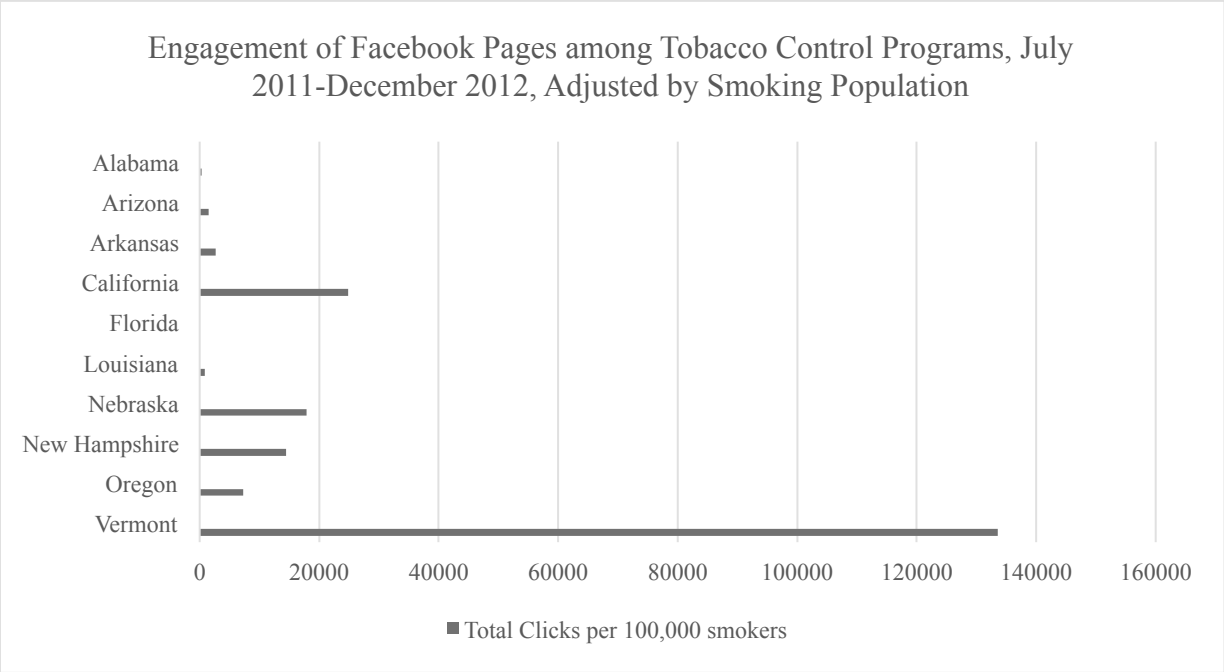
In conclusion, this study provided an important venue to describe, for the first time, the level of presence of state quitline websites, their messages and reach and engagement with their audience. This study was also valuable to the field as a dissemination channel for transferring state-level data to other states, which has the opportunity for those states who may need assistance in how to better establish their presence, messages, reach and engagement with those who already doing so. This process of sharing best practices can help to maximize a state's communication and media plan activities, thus offering more effective cessation services to help

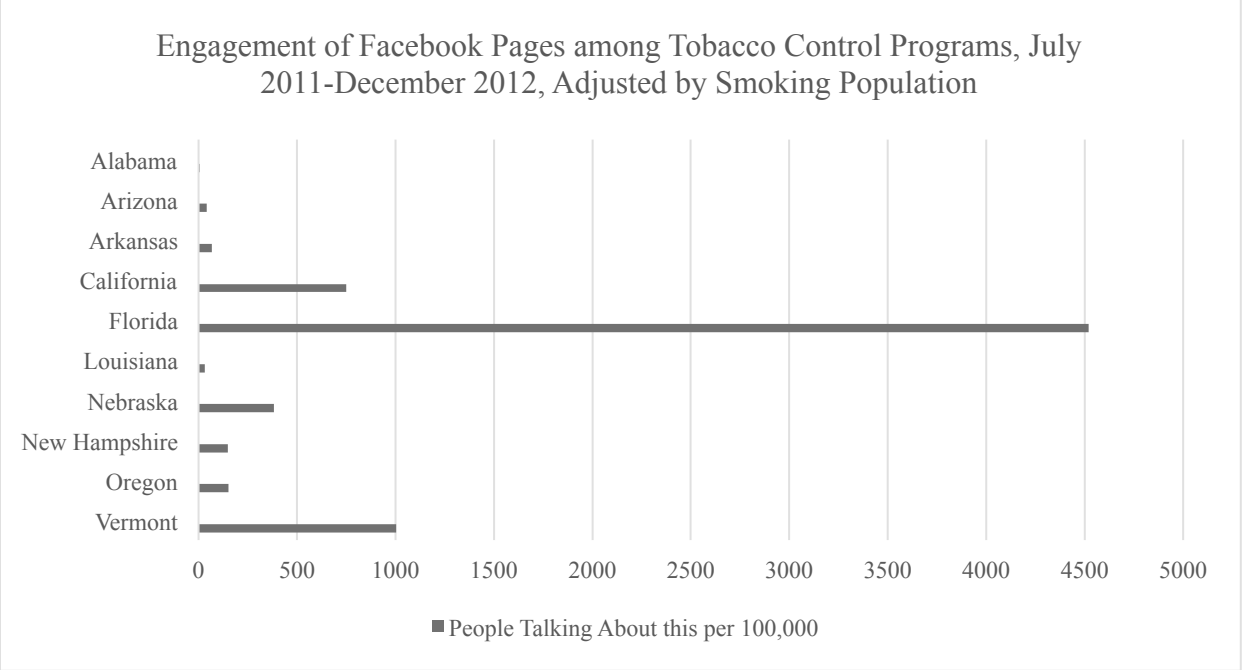
achieve their goal of increasing smoking cessation rates. This study will also provide CDC's project officers (those who provide programmatic and technical assistance to the states) with the ability to offer participating states the necessary assistance they may need in this area utilizing the findings from this study. As described earlier, findings from this study should serve as a foundation for additional research on media promotion activities of cessation services in the future. Further work should explore the effects of innovative media promotion activities on visits to tobacco control websites and registrations to Web-based cessation intervention services as well as quitline call volume. In addition, research into the cost-effectiveness of online advertisements to increase registrations to Web-based cessation services, compared with traditional media activities, may also be helpful to states as they maximize resources to promote services with budgetary constraints. Finally, this study should assist in future attempts to set appropriate benchmarks for innovative media activities in the promotion of tobacco cessation.

APPENDIX A:

MANUSCRIPT 2, TABLE 4 (BAR GRAPHS)




Engagement of Facebook Pages among Tobacco Control Programs, July 2011-December 2012, Adjusted by Smoking Population
Alabama
Arizona
Arkansas
California
Florida
Louisiana
Nebraska
New Hampshire
Oregon
Vermont
0
20000
40000
60000
80000
100000
120000
140000
160000
Total Clicks per 100,000 smokers


Engagement of Facebook Pages among Tobacco Control Programs, July 2011-December 2012, Adjusted by Smoking Population
Alabama
Arizona
Arkansas
California
Florida
Louisiana
Nebraska
New Hampshire
Oregon
Vermont
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
People Talking About this per 100,000