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Using Facebook to Recruit Parents to Participate in a Family Program to Prevent Teen Drug Use

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Abstract

Despite strong evidence that family programs are effective in preventing adolescent substance use, recruiting parents to participate in such programs remains a persistent challenge. This study explored the feasibility of using Facebook to recruit parents of middle school students to a self-directed family program to prevent adolescent drug use. The study used paid Facebook ads aiming to recruit 100 parents in Washington and Colorado using marijuana- or parenting-focused messages. All ad-recruited parents were also invited to refer others in order to compare Facebook recruitment to web-based respondent-driven sampling. Despite offering a \$15 incentive for each successfully referred participant, the majority of the screened (70.4%) and eligible (65.1%) parents were recruited through Facebook ads. Yet, eligibility and consent rates were significantly higher among referred (76.6% and 57.3%, respectively) than Facebook-recruited parents (60.0% and 36.6%, respectively). Click-through-rates on Facebook were higher for marijuana-focused than parenting-focused ads (0.72% and 0.65%, respectively). The final sample (54% Facebook-recruited) consisted of 103 demographically homogeneous parents (female, educated, non-Hispanic White, and mostly from Washington). Although Facebook was an effective and efficient method to recruit parents to a study with equal to better cost-effectiveness than traditional recruitment strategies, the promise of social media to reach a diverse population was not realized. Additional approaches to Facebook recruitment are needed to reach diverse samples in real-world settings and increase public health impact of family programs.

Keywords

social media; recruitment; parenting intervention; teens; drug use prevention

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Compliance With Ethical Standards

Recruiting parents to preventive family programs remains a persistent challenge (Haggerty et al., 2006; Heinrichs et al., 2005) despite strong evidence that parent and family programs are effective in preventing adolescent substance use (Brown et al., 2005; Haggerty et al., 2013; Haggerty et al., 2007; Mason et al., 2003; Park et al., 2000; Spoth et al., 2001; Stormshak & Dishion, 2009). Community-wide recruitment rates into universal parenting programs are typically less than 20% (Fagan et al., 2009; Meek et al., 2004; Prinz & Sanders, 2007;). Because parent recruitment challenges reduce the potential for widespread public health impact of parenting programs, finding more effective strategies for parent recruitment is a priority.

This study explored the use of *Facebook* to recruit parents to a self-directed family program to prevent adolescent drug use and other risky behaviors. Advertising on social media to recruit study participants has been used successfully in areas such as substance use and mental and physical health (Arcia, 2014; Batterham, 2014; Chu & Snider, 2013; Fenner et al., 2012; Lohse, 2013; Morgan et al., 2013; Pedersen et al., 2015; Ramo et al., 2010; Ramo & Prochaska, 2012; Ramo et al., 2014; Topolovec-Vranic & Natarajan, 2016). Most of these studies recruited adolescents and young adults. We are aware of only two published studies (Akard et al., 2015; Gilligan et al., 2014) that relied on paid Facebook advertising to recruit parents; but to participate in an online survey, not a family program.

Parent Recruitment

Evaluations of family interventions and focus groups with parents indicate that the most successful recruitment strategies target parents directly using trusted sources (e.g., physicians and other parents) and personal networks. Effective strategies use ongoing invitations, repeated contacts, and easy access to information about the family program (Axford et al., 2012; Caspe & Lopez, 2006; Harachi et al., 1997; Heinrichs et al., 2005; Meek et al., 2004; Spoth & Redmond, 2000). The pervasiveness of social media and the ease and constancy of access via mobile devices make Facebook a promising tool to increase successful recruitment of parents not only to research studies but also to family programs in real-world settings.

Recruiting economically and ethnically diverse participants to family programs is important for broad public health impact but has been very difficult (Gorman-Smith et al., 2002; Haggerty et al., 2006; Perrino et al., 2001). Social media could be useful because of its broad reach across racial/ethnic and socioeconomic groups, different geographic areas (Rainie, 2015), and other hard-to-reach populations (Carlini et al., 2015; King et al., 2014; Lohse, 2013). Demographic disparities in online access and social media have declined, with ubiquitous mobile devices providing access when a computer is not available or affordable (Anderson, 2015).

Recruitment Using Facebook Ads

Most (79%) adults who use the internet use Facebook, including parents of teens (Doty & Dworkin, 2014; Greenwood et al., 2016). According to a recent Pew survey (Duggan & Smith, 2015), 91% of U.S. parents use the internet, 75% of which use social media, with

Facebook being the preferred platform (74%) followed by Pinterest (28%) and LinkedIn (27%). Furthermore, three-quarters of parents and non-parents with a Facebook account log on daily and half check Facebook several times a day (Duggan & Smith, 2015; Greenwood et al., 2016). Most parents (94%) on Facebook frequently share and post content, including parenting information. According to the Pew survey, parents are connected to, on average, 150 people on Facebook, and 47% are friends with their children, suggesting Facebook as a good way to reach parents.

Facebook sells advertising on users' newsfeeds, customized to their interests indicated by their Facebook activity and user profile. Several reviews conclude that Facebook ads are feasible, cost effective, and time efficient ways to recruit study participants (King et al., 2014; Lafferty & Manca, 2015; Pedersen et al., 2015), but not always advantageous over other methods (Topolovec-Vranic & Natarajan, 2016). Many studies use multiple recruitment methods (e.g., Facebook and other online platforms such as Google and Craigslist as well as traditional methods, including email and mass mailings; Carlini et al., 2015; Morgan et al., 2013), yet almost none measure the effectiveness of different recruitment tools or report details of recruitment strategies, such as metrics that would allow comparison across studies (including costs). Time periods for recruitment also vary, making comparisons difficult.

To test the feasibility of social media for recruiting parents for a preventive family program, this study used paid Facebook ads. With over 158 million Facebook users in the U.S. (Statista, 2015), Facebook has potential to reach a large number of parents. However, the majority of people exposed to an ad do not click on it. Typical click-through rates (CTRs, i.e., the number of clicks an ad receives divided by the number of times the ad was shown) in studies using Facebook to recruit study participants tend to be less than 0.1% (Arcia, 2014; Batterham, 2014; Chu & Snider, 2013; Lohse, 2013; Rait et al., 2015; Ramo et al., 2010; Ramo & Prochaska, 2012). Ad clicks also do not guarantee study participation. Many studies report that less than 30% of people who click on a Facebook ad complete the eligibility screener, and often only about 30% – 40% of those are eligible (Akard et al., 2015; Arcia, 2014; Fenner et al., 2012; Lohse, 2013; Rait et al., 2015; Ramo et al., 2010; Ramo & Prochaska, 2012; Ramo et al., 2014). Overall, less than 10% of people who click on a Facebook ad enroll in a study (Chu & Snider, 2013; Fenner et al., 2012; Lohse, 2013; Ramo & Prochaska, 2012). We, therefore, hypothesized that Facebook recruitment would be more effective and time efficient if combined with web-based respondent-driven sampling (webRDS; Bauermeister et al., 2012; Rait et al., 2015), a form of snowball sampling using referrals from initial Facebook ad-recruited parents. This study used this complementary method because Facebook ads alone may not yield desired sample sizes, especially in a short time period. This study examined differences in the characteristics of the resulting samples recruited via Facebook ads and webRDS.

Message Framing

Although more studies are using Facebook for recruitment, little research exists on what types of Facebook ads are most successful. Because this study sought to recruit parents in Washington State (WA) and Colorado (CO), where in 2012 nonmedical (i.e., recreational)

marijuana became legal for adults age 21+, we also tested the relevance of ad context by comparing marijuana-focused ads to ads focused on parenting. Parents in WA and CO are experiencing confusion about the new laws and are unsure how to communicate with their teens about marijuana and other drug use within the context of legalization (Kosterman et al., 2016; Mason et al., 2015; Skinner et al., 2016). Because marijuana-focused ads may provide a more salient context for parents in WA and CO, they may be more likely than general parenting-focused ads to generate ad clicks. Negatively or positively phrased ads (e.g., “what parents worry about” versus “what you and your child can do together”) may have different effectiveness in recruiting parents. Studies on message framing show mixed results as to whether positively (gain frame) or negatively (loss frame) worded messages are more effective (Akl et al., 2011; Wansink & Pope, 2015). In online advertising to recruit study participants, negatively framed ads have been more effective than positive ads (Batterham, 2014; Graham et al., 2012; Yoo, 2011).

Methods

The study aimed to recruit 100 parents of a middle school child living in WA or CO. We focused on middle school (Grades 6 to 8) because most youths age 11 to 13 have not initiated drug use. In WA, for example, 97% of sixth graders and 90% of eighth graders reported in 2014 that they had never tried marijuana (Washington State Department of Health, 2014a, 2014b).

Facebook Ads

We created ads to compare marijuana- to parenting-focused messages, with one positively and one negatively worded ad for each type of message frame. Marijuana-focused ads used the text “*What parents want to know now that marijuana is legal for adults*” or “*What parents worry about now that marijuana is legal for adults.*” Parenting-focused ads read “*Find out what you and your child can do together to succeed in the middle school years*” or “*Find out what parents fear when their child reaches middle school.*” Ads showed the study’s URL, included a “Learn more” button, the University of Washington (UW) logo, and mentioned the \$60 incentive for study participation (Figure 1). To attract parents of middle schoolers, we chose three image variations, all showing a middle school-age child with a parent, but varied the gender and ethnicity of parent and child. We did not systematically test images with different parent-child, gender, and ethnicity combinations as this would have added complexity beyond the goals of this study. Facebook uses a proprietary algorithm to pick the image that optimizes ad performance. All ads and recruitment procedures were approved by the UW Institutional Review Board (IRB).

We targeted WA and CO Facebook users. Because targeting parents based on middle school child age was not available, we targeted parents age 26 to 64 to exclude those unlikely to have a middle school child. To direct as many people as possible to the study website at the lowest cost, we followed procedures used in prior studies, choosing ad delivery optimized based on who is most likely to click on the ad (given target criteria) and paying for each ad click versus, for example, total number of people reached. Cost for ads are not fixed but depend on market competition created by other ads aimed at the target population. Instead of

manually setting the ad price, we let the Facebook algorithm automatically set the amount most likely to optimize our objectives. Because initial data did not show any discernible patterns in click responses by time of day or day of the week, ads were displayed at all times of the day on all days of the week until the daily or weekly maximum budget was reached.

We ran the ad campaign in several phases. Based on an initial 1-month trial and error phase with a \$100 weekly budget to test all steps in the recruitment procedure, determine a suitable budget, and narrow ads to those receiving the most clicks, we selected the top three ads in each of the marijuana- and parenting-focused ad sets. In the second phase, we ran these six ads using a \$5 daily budget for 41 days. Because we did not reach the recruitment goal during that time, we launched a third phase where we first increased the daily budget to \$50 for one week and then to \$100 for another 2 weeks to boost speed of recruitment. It was important to keep the recruitment period fairly short so that all parents could receive and complete the parenting program during about the same 5- to 6-week window. The total recruitment period was 13 weeks (March to May 2015), but more than half (56%) of all ad clicks were received during the last 2 weeks. Most eligible and consenting parents (75% and 79%, respectively) were recruited in the last 4 weeks.

Recruitment Procedure

Those who clicked on the study's ad were redirected to a web page inviting participation in a research study. The page explained that participants would receive a free booklet, "*Parenting in the Middle School Years*" (PIMSY), and could earn up to \$60 for completing three online surveys (\$15 per completed survey plus \$15 for completing all three; at baseline, and 3 and 6 months after program completion). Those who clicked on the study link were taken to the online eligibility survey which took, on average 2.3 min ($sd = 2.8$) to complete. Eligibility required being at least 18 years old, living in WA or CO, having a child in Grades 6 – 8, and having a Facebook account. Name, email, and phone number were also collected, and the study coordinator contacted eligible parents to explain the study and consent process and answer questions. Eligible parents were emailed a link to the online consent information statement. Consent included agreeing to be randomized to a private Facebook group. Those who agreed to volunteer for the study proceeded to the online baseline survey.

webRDS was implemented by asking all parents (independent of eligibility and consent status) if they would be willing to recruit other parents for the study, being offered \$15 for each parent who joined the study through their referral. Those agreeing to invite others received an email with a personalized link to the online eligibility survey, sample text to include in their referral message, and an image they could share. The personalized referral link used a unique code to credit referrers for each successful recruitment.

Family Program

Parents agreeing to participate were mailed the PIMSY booklet, adapted from *Moving Up to High School*, a component of the evidence-based *Raising Healthy Children* (RHC) program. The RHC program reduced the frequency of adolescent alcohol and marijuana use (Brown et al., 2005). PIMSY uses the Social Development Strategy (Hawkins & Weis, 1985) to teach parents about normal teen development, maintaining strong family bonds, creating healthy

beliefs, setting clear standards about behavior, and what to do if problems such as substance use arise. Parent engagement and satisfaction with the materials and program completion in this study were high (Epstein et al., In preparation).

Demographic Characteristics and Analysis

Parents completed the baseline survey before receiving the PIMSY materials. The survey took, on average, 24 min to complete ($sd = 13$). It collected demographic information and asked about Facebook use and reasons for participating in the study. The survey also measured the hypothesized mediating factors and outcomes of the family program, which aimed at improving parenting practices (e.g., parent-child bonding and communication). Results from the evaluation of the family program are reported in a separate paper (Epstein et al., In preparation). Due to the small sample size, frequency and count measures (e.g., number of days in the past month) and questions using Likert-scale response options (e.g., 1 = *strongly agree* to 4 = *strongly disagree*) were dichotomized or collapsed into fewer categories for analysis. Differences in demographic characteristics between the Facebook-recruited and the referred sample were assessed using the Chi-Square test of independence.

Results

Recruitment Success

The study's Facebook ads were shown 406,453 times (impressions) and received 2,866 clicks, for a CTR of 0.71%. On average, the ads were shown 1.7 times to each person reached. In total, 362 people who landed on the study's webpage (70.4% through Facebook ads and 29.6% through referral) followed the link to the eligibility survey (Table 1). The CTR for the eligibility survey was 8.9% for Facebook-recruited people, but cannot be calculated for those referred because we do not know how many total referrals were made. We do know, however, that 185 people agreed to recruit other parents. Of the 362 screened parents, 65% ($n = 235$) met eligibility criteria and, of those, 103 (44%) consented to participate in the study. The eligibility and consent rates were significantly higher for referred participants (76.6% and 57.3%, respectively) than for Facebook-recruited parents (60.0% and 36.6%, respectively). Slightly more than half (54%, $n = 56$) of parents in the final sample were recruited via Facebook ads. Of the 47 parents not recruited via Facebook, 10 were recruited by study staff and 37 were referred by 14 Facebook-recruited parents, 13 of which also participated in the study (average number of recruited participants per referrer = 2.6, $sd = 2.1$, *range* = 1 to 7). Because clustering within referrer was minimal, analyses were not statistically weighted to account for intraclass correlation.

Recruitment Cost

The total cost for Facebook ads was \$2,358, or \$15.41 per eligible and \$42.11 per consented Facebook-recruited participant. The average cost per click (CPC) was \$1.22, varying little between different message frames (ranging from \$1.20 to \$1.26). We paid \$555 for participant referrals, or \$15 per consented referred participant. The combined recruitment cost was \$2,913, or \$12.40 per eligible and \$28.28 per consented participant (Facebook-recruited or referred).

Message Frames

Marijuana-focused ads (CTR = 0.72%) performed slightly better than parenting-focused ads (CTR = 0.65%). There was little difference between negatively (CTR = 0.71%) and positively (CTR = 0.69%) phrased ads. Negatively worded ads did somewhat better than positively framed ads for both marijuana- and parenting-focused messages, suggesting little interaction between the two types of frames. Marijuana-focused, negatively phrased ads had the highest CTR (0.73%), and parenting-focused, positively phrased ads (CTR = 0.63%) the lowest CTRs (Table 2).

Sample Characteristics

Demographics—The recruited sample consisted primarily of educated, married or cohabiting mothers (one father), all but four from WA, most living in a city (Table 3). The majority (81%) identified as non-Hispanic White or European, reflecting the racial/ethnic composition of WA (Office of Financial Management, 2015). The Facebook-recruited and referred samples differed significantly on few demographic characteristics (Table 3). Facebook-recruited parents had, on average, a lower level of education than the referred and were more likely to report a household member received some form of government assistance, e.g., TANF, food stamps, welfare, social security, SSI, disability pension, unemployment assistance, or free or reduced-price school lunch.

Facebook use—Frequency of self-reported Facebook use was fairly low in this sample. A third reported using Facebook at least a few times a week (including posting, liking, commenting, and sending a private message to other users), with only 4% using it daily. The Facebook-recruited sample reported using Facebook significantly more frequently (41% at least weekly, compared to 15% of the referred sample), but the two samples did not differ significantly in the size of their Facebook friendship network (Table 3).

Reasons for participation—Referred parents were significantly more likely than Facebook-recruited parents to say they joined the study to learn more about parenting (75% vs. 55%, respectively). Otherwise, the two samples did not differ in reasons for participation. Both joined primarily because they liked the idea of helping with research (68%). About half said that they joined the study because they worried their child may have problems in the future. The incentive payment, wanting to help because their child was having problems, and having previous positive experience with a parenting program were reasons for less than a third of the parents.

Marijuana use, attitudes, and knowledge—Because CO and WA were the first U.S. states to legalize nonmedical marijuana, it was of interest to describe and compare marijuana-related sample characteristics. Parents did not differ significantly in their prevalence of marijuana use or their child's use of drugs (alcohol, tobacco, or marijuana) by method of recruitment. The majority (83%) had discussed the new marijuana law with their child, but less than half knew that the legal age for marijuana use is 21, that the legal amount for possession and use is 1 ounce (excluding marijuana-infused products), and that homegrown marijuana for recreational use is illegal in Washington/legal in Colorado. Parents in both samples did not differ in their attitudes about the marijuana law. More than

two thirds (68%) indicated they are concerned their child will be more likely to be exposed to adult marijuana use in public as a result of the law, but only about a third (34%) were concerned that their child will be more likely to use marijuana.

Discussion

This study suggests Facebook ads can be useful and efficient to recruit parents to a self-directed family program. The ads generated considerable interest, indicated by the 2,866 website clicks, with more than half being received over just a 2-week period. This study's Facebook recruitment was more effective, as measured by its CTR (0.71%), than in other studies. We reviewed 17 such studies published since 2012, which reported CTRs between 0.02% and 0.09%; averaging 0.04%). Few studies report CTRs between 1% and 2% (Alley et al., 2016; Bold et al., 2016; Pedersen et al., 2015; Ramo et al., 2014).

Referencing legalization of recreational marijuana, a current and locally relevant issue to parents in WA and CO, may have increased the effectiveness of this study's Facebook ads. Ads placed in the context of the new recreational marijuana laws created more interest, as measured by website clicks, than ads referring generally to parenting in the middle school years. Furthermore, marijuana-focused ads that were worded to speak to parents' fears (loss frame) performed slightly better than marijuana-focused ads that spoke to what parents wish to see (gain frame). Overall, however, a loss or gain frame had little influence on the effectiveness of the ads. A few other studies using online and social media advertising found that loss frames or problem-focused language (e.g., "mental health problem") performed better than using positive language (e.g., "emotional well-being") or a gain frame, at least in terms of clicks, but not always, like in this study, when comparing CTRs (Batterham, 2014; Graham et al., 2012; Yoo, 2011). Although it is plausible that ads placed in the context of a current and locally relevant issue are more effective than generally framed ads, more research that experimentally manipulates the framing of recruitment messages is needed. Evidence so far in social media recruitment is mixed as to whether specific messages matched to a targeted population or context work better than more generally focused ads. The UW logo on all recruitment materials may have led Facebook's optimization algorithm to target more WA parents. Only 4 parents in the final sample were from CO. Ads reached 2.8 times as many parents in WA than OR. CTRs were the same in both states, however. If the UW logo had greater legitimacy in WA than CO, it may also partially explain higher eligibility and consent rates in WA than CO (91% versus 84% eligible, calculated among the 77% of all screened with location information, and 46% versus 19% consented). It would be useful if future research experimentally compared different aspects of messaging matched to the targeted population (e.g., based on cultural, demographic, and local issues).

Given this study's focus on parents in two states that legalized nonmedical marijuana for adults, it is noteworthy that only about half of participants could identify the legal age of marijuana use and other aspects of the law. This is consistent with other studies (Kosterman et al., 2016; Mason et al., 2015) showing a lack of knowledge about the law among parents, especially about the legal age of use, indicating the need for strong public health campaigns. However, as this is a pilot study with a small sample and only 4 parents were from CO, the findings are not necessarily generalizable to parents from CO and WA or other states.

Using a referral process to augment Facebook recruiting is appealing because it has the potential to increase sample size exponentially and has been successfully used in combination with social media recruitment in other studies (e.g., Bauermeister et al., 2012). In the present study, webRDS was less effective than Facebook recruitment, which is different from what Rait et al. (2015) found when recruiting adolescents. Although 185 people in our study agreed to recruit others, the majority screened (70%), and most of those eligible (65%), were recruited through Facebook ads and not referrals. However, referred parents were significantly more likely to meet eligibility criteria and consent to participation. The closer match of referred participants to the eligibility criteria and their greater willingness to participate in the study might be an advantage of webRDS, but needs to be weighed against its disadvantages. Facebook ads may lead to a more diverse sample than webRDS and might also be less costly because little staff time is needed once ads are placed. In this study, webRDS required an additional step to email a personalized referral link to those who agreed to recruit other parents. However, this process could potentially be automated.

A challenge with webRDS is that it can lead to biased samples not representative of the larger population, whereas social media might reach a more diverse audience. Although this study's sample was fairly homogenous, the Facebook-recruited sample was slightly more diverse than the referred sample. The two samples did not differ greatly, however, with respect to parent and child drug use and attitudes about and knowledge of the marijuana law. Although Facebook has successfully been used to recruit samples fairly representative of targeted populations (e.g., Bauermeister et al., 2012; Fenner et al., 2012; Gilligan et al., 2014; Pedersen et al., 2015), recruiting for a research study may inherently result in more selected samples because it attracts those who wish to help with research. The extent to which Facebook recruitment can be useful in a real-life setting, e.g., for communities hoping to recruit parents to family programs, has yet to be seen. Given the results of this study, we suspect Facebook could be a good tool for recruiting for a parenting program if combined with traditional recruitment methods such as flyers and newsletter in libraries, community centers, and schools, in-person outreach, and direct mail.

In addition to being feasible, social media recruiting needs to be cost effective. The average CPC in this study was \$1.22—slightly higher than in other studies (mean = \$0.77, sd = \$0.44, range \$0.27 to \$1.73 in 16 studies we reviewed; see also Topolovec-Vranic & Natarajan, 2016). The cost per consented Facebook-recruited participant in this study was \$42, compared to the \$15 incentive payment per consented referred participant, but this does not include cost for staff time communicating with eligible parents interested in participating. We found that an initially more automated process that linked eligible parents from the online screening survey directly to the consent information statement was a barrier to recruitment. We suspect a main reason for this was that many parents took the eligibility survey on a mobile phone, since the majority of ad clicks were made on a mobile device. The consent statement was a text-heavy document (3 pages) not optimized for viewing on a mobile platform. To reduce this barrier to consenting, we changed the consent process (with IRB approval) and had the study coordinator contact all eligible parents to explain the study, answer questions, and go over the consent information statement before emailing a link to the online consent and baseline survey. Before we changed the procedure, only 4% of

website clicks yielded eligible participants, of which 38% consented. After the change, 10% of web clicks resulted in eligible parents, with 45% consenting.

We estimate that including staff time would more than double the recruitment cost in this study to at least \$26 per eligible and \$59 per consented participant compared to \$12 and \$28, respectively, when not including staff time. Although these per-participant costs are higher than in other studies, online recruitment appears to be at least equally if not more cost effective than traditional recruitment methods. Different types of offline recruitment methods (e.g., radio and newspaper ads, direct mail, newsletters, flyers or posters, and random-digit dialing; Harachi et al., 1997) vary widely in cost, but start at about \$40 per participant or completed survey, and can be as high as several hundred dollars per participant for newspaper ads (Batterham, 2014; Buller et al., 2012; Carter-Harris et al., 2016; Gilligan et al., 2014; Topolovec-Vranic & Natarajan, 2016). However, detailed cost comparisons are difficult as few studies report recruitment costs. We recommend that more future studies do so (including recruitment cost for staffing) to facilitate better cost-effectiveness comparisons.

Although Facebook was an effective and efficient method to recruit parents to a study with equal to better cost effectiveness than traditional recruitment strategies, the promise of social media to reach a diverse population was not realized. Future research needs to determine how Facebook can be used to recruit parents from diverse backgrounds to participate in a preventive family program, especially in a real-life setting. Because differences in online access and behavior by education, income, and rural/urban location remain (Perrin & Duggin 2015), including in self-efficacy around searching for parenting information online (Dworkin et al., 2012), targeting of Facebook ad campaigns based on demographic characteristics may increase sample diversity. Other new technologies (e.g., text messaging, YouTube videos) and traditional approaches (e.g., in-person outreach through local organizations) are likely also needed to achieve broad reach and public health impact.

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Figure 1.
Sample Facebook Ads

Table 1

Eligibility and Consent by Recruitment Method

	Total	By recruitment method				$\chi^2=9.159^{**}$
		n	%	Facebook	Referred ^a	
Eligibility						
Eligible	235	64.9%	153	60.0%	82	76.6%
Not eligible	43	11.9%	34	13.3%	9	8.4%
Cannot be determined	84	23.2%	68	26.7%	16	15.0%
Total screened	362	100.0%	255	70.4%	107	29.6%
Study consent						
Consented	103	43.8%	56	36.6%	47	57.3%
Not consented	132	56.2%	97	63.4%	35	42.7%
Total eligible	235	100.0%	153	65.1%	82	34.9%

^aSome referrals were made by study staff, which account for 10 of the 47 consented referred.

* p < .01

Table 2

Performance of Facebook Ads by Message Frame

	Website clicks	Impressions	CTR	Amount spent	CPC
Total	2866	406,453	0.71%	\$2,358.08	\$1.22
Marijuana-focused	2423	338,552	0.72%	\$2,000.73	\$1.21
Parenting focused	443	67,901	0.65%	\$357.35	\$1.24
Loss-framed	1645	226,195	0.71%	\$1,320.43	\$1.23
Gain-framed	1245	180,258	0.69%	\$1,037.65	\$1.20
Marijuana-focused/loss-framed	1350	185,694	0.73%	\$1,104.61	\$1.22
Marijuana-focused/gain-framed	1073	152,858	0.70%	\$896.12	\$1.20
Parenting-focused/loss-framed	271	40,501	0.67%	\$215.82	\$1.26
Parenting-focused/gain-framed	172	27,400	0.63%	\$141.53	\$1.22

Impressions = number of times the ad was delivered; CTR = Click-through-rate based on impressions; CPC = Cost per click.

Table 3

Sample Demographic and Baseline Characteristics

	Total (n = 103)		Recruitment method				χ^2
	n	%	Facebook (n = 56)	Referred (n = 47)	n	%	
State							
Washington	99	96%	52	9.3%	47	100%	3.49
Colorado	4	4%	4	7%	0	0%	
Place of Residence							
City	66	64.1%	31	55.4%	35	74.5%	4.11
Small town	30	29.1%	20	35.7%	10	21.3%	
Rural	7	6.8%	5	8.9%	2	4.3%	
Mothers	101	98%	54	9.8%	47	100%	0.86
Race/Ethnicity							
Non-Hispanic White or European	83	80.6%	42	75.0%	41	87.2%	3.97
Latino or Hispanic	7	6.8%	4	7.1%	3	6.4%	
Native American or Alaskan Native	7	6.8%	6	10.7%	1	2.1%	
Other	6	5.8%	4	7.2%	2	4.3%	
Has BA degree or higher	67	65.7%	25	45.5%	42	89.4%	21.68***
Married or cohabiting	87	80.7%	46	82.1%	41	87.2%	0.51
Received government assistance ^a	28	27.2%	21	37.5%	7	14.9%	6.60*
Frequency of Facebook use							
At least weekly	30	29.1%	23	41.1%	7	14.9%	8.50*
Once a month	36	35.0%	16	28.6%	20	42.6%	
A few times a year or less often	37	35.9%	17	30.4%	20	42.6%	
Number of Facebook friends							
0-250	64	62.1%	31	55.4%	33	70.2%	2.40
More than 250	39	37.9%	25	44.6%	14	29.8%	
Reasons for participating							
I like the idea of helping with research	70	68.0%	37	66.1%	33	70.2%	0.20

	Recruitment method						χ^2
	Total (n = 103)		Facebook (n = 56)		Referred (n = 47)		
	n	%	n	%	n	%	
I want to learn more about parenting	66	64.1%	31	55.4%	35	74.5%	4.06*
I am worried about my child having problems in the future	51	49.5%	26	46.4%	25	53.2%	0.47
I have participated in a parenting program in the past and found it helpful	33	32.0%	15	26.8%	18	38.3%	1.56
This is an opportunity to make some extra money	23	22.3%	13	23.2%	10	21.3%	0.06
My child is having problems and I want help	17	16.5%	10	17.9%	7	14.9%	0.16
Child has ever used drugs ^b	9	8.7%	7	12.5%	2	4.3%	2.18
Past-year marijuana use	19	18.4%	9	16.1%	37	21.3%	0.46
Has discussed new marijuana law with child	85	82.5%	46	82.1%	39	83.0%	0.01
Correctly answered marijuana law quiz ^c	43	41.7%	25	44.6%	18	38.3%	0.42
As a result of the change in the marijuana law, I am concerned ^d that my child will be more likely...							
...to use marijuana	35	34.0%	16	28.6%	19	40.4%	1.60
...to be exposed to adults using marijuana in public	70	68.0%	37	66.1%	33	70.2%	0.20

* p < .05

*** p < .001.

^aIncludes TANF, food stamps, welfare, social security or SSI, disability pension, unemployment assistance, and free or reduced-price school lunch.

^bParent report of child's use of alcohol, tobacco, or marijuana.

^cLegal age, legal amount, and legality of homegrown marijuana.

^dModerately or very concerned.