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# Social Media Support Groups for Youth Nicotine Vaping Cessation: An RCT

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## Abstract

**Introduction:** E-cigarettes are the most frequently used tobacco product among adolescents and young adults. Over 40% of adolescents who used E-cigarettes tried quitting in 2023, but few programs support them, particularly on social media. The aim of this study was to test the efficacy of E-cigarette cessation support groups on Instagram in an RCT.

**Study design:** A total of 500 participants were randomized to intervention or active control with baseline, 5-week (end of program), and 3- and 6-month follow-up surveys in 2022–2024.

**Setting:** Healthy volunteers in California were recruited through social media advertisements.



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Declaration of interest: None.

CREDIT AUTHOR STATEMENT

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**Participants:** Participants reported the age of 13–21 years, English literacy, using social media at least 4 days per week, using E-cigarettes at least weekly, access to device with photo capability, and considering quitting within 6 months.

**Interventions:** Instagram direct message support groups for 5 weeks provided motivational interviewing, social support, skill building, and group quit attempts. Controls were referred to state quitline resources, including telephone, online, texting, or mobile app.

**Main outcome:** A 7-day point prevalence abstinence from E-cigarette use.

**Results:** Data were analyzed in 2024–2025. Mean age was 18.9 years, 39.8% were female, and 51.2% were male; 41.1% were White, 17.2% were Hispanic, and 27.4% were multiracial; 35.1% were sexual minority. A total of 70.4% used E-cigarettes daily, and 78.2% used within 30 minutes of waking. Retention rates were 43.6% at 5 weeks, 23.0% at 3 months, and 28.0% at 6 months. Generalized linear mixed models in a time-averaged difference approach examined 7-day point prevalence abstinence accounting for repeated measures and clustering effects. Intention-to-treat (ITT) analysis counting missing as vaping found greater abstinence in the intervention group (18.2% vs 11.8%) (OR=2.15, 95% CI=1.1, 4.2, $p$=0.025). Complete case analysis also found greater abstinence over 6 months for intervention (53.9%) than for control (40.4%) (OR=2.07, 95% CI=1.21, 3.52, $p$=0.008). There were no differences in vaping reduction, attitudes, or use of evidence-based methods. Intervention participants reported higher social support with no difference in overall program evaluation.

**Conclusions:** Social media support groups were acceptable to diverse young people and improved abstinence rates on average over 6 months compared with quitline referral.

## INTRODUCTION

E-cigarettes are the most common tobacco product used by adolescents,[1] and they are widely marketed, including on social media.[2–4] Increasing adolescent E-cigarette use (colloquially called vaping)[5] is linked to high levels of nicotine,[6–9] enticing flavors,[10–13] social acceptability,[11–14] and aggressive promotion through social media influencers.[2–4] In 2020, there was a 1,000% increase in use of disposable pod vapes that are available in many flavors[15] and capable of delivering large amounts of nicotine.[9,16,17] Early exposure to nicotine increases the risk of addiction[18,19] and smoking initiation.[20–23] E-cigarette use is associated with asthma among youth[24] and has potential for adverse cardiovascular effects.[25,26] Although the purchase of nicotine products by individuals aged <21 years is prohibited, most U.S. states do not impose criminal penalties.[27] A better alternative to punitive measures targeting youth is holding retailers and tobacco companies accountable for marketing practices and supporting efforts to help young people quit vaping.

In 2020, 53.4% of adolescents who used E-cigarette intended to quit vaping, and 67.4% had tried to quit in the past year.[28] Few adolescent studies address vaping cessation[29]; one randomized trial found that varenicline and counseling improved vaping cessation rates compared with placebo.[30] A texting intervention reported significant impact on vaping abstinence in adolescents[31] and young adults.[32] Another randomized trial found substantial quit rates among young adults participating in phone coaching, nicotine replacement, and online/texting.[33] No published studies have examined support groups on social media

for E-cigarette cessation. Over 95% of adolescents had smart phones in 2023; 96% used the internet daily, and 46% used it almost constantly.[34] Adolescents and young adults are interested in digital cessation programs,[35] and in 2020, 48.4% of young adults endorsed social media for vaping cessation.[36] Instagram's widespread use,[34] convenience, and cost-effective message delivery make it attractive for cessation support.[37,38] Social media smoking cessation interventions are feasible and acceptable and have evidence of efficacy.[37–41] A peer support program for vaping cessation fits social media strengths and fills an evidence gap.

This study evaluated the efficacy of social media vaping cessation support groups in an RCT compared with an active standard care control. The study hypothesis was that intervention participants would have higher rates of abstinence over 6-month follow-up. Secondary outcomes included vaping reduction, quit attempts, readiness to quit, commitment to abstinence, and use of evidence-based cessation strategies. Program engagement and participants' support experiences were also described.

## METHODS

The individually randomized trial compared participation in support groups on Instagram with a control group that was offered the California state quitline resources, including website, texting, and telephone counseling.[42] The study was registered on clinicaltrials.gov (Protocol Number NCT04707911) and reporting followed CONSORT guidelines. All procedures were IRB approved (WIRB Protocol Number T31IR1910), including waiver of parental consent because adolescents may conceal E-cigarette use from parents and may seek substance use treatment without parental consent in California.

### Study Sample

Details of screening and enrollment procedures have been published.[42] Briefly, 500 participants were recruited through social media advertisements in 2022. Inclusion criteria were English literacy, age 13–21 years, using social media at least 4 days per week, using E-cigarettes at least weekly, access to computer or phone with photo capability (to allow remote biochemical verification), considering quitting within the next 6 months, and California residence. Participants completed electronic informed consent, registration on the study website, and baseline survey, and then they were randomly assigned to the support group intervention or referred to quitline resources. Power analyses were generated using the 2-group repeated proportions module in NCSS PASS 14[43] assuming $\alpha$=0.05, power=0.80, rho=0.43, and a 7-day abstinence base rate of 3.2% and quit rate of 8.3% on the basis of prior research[44]; group sample size of 234 ($n_{total}$=468) was needed.

Participants were individually randomized to intervention or control by an automated computer algorithm in the study software after baseline survey completion. Participants and study staff were blinded to the assignment, but after assignment, participants and staff administering the support groups were not blind to study condition.

## Intervention

The Quit the Hit intervention adapted a Facebook smoking cessation intervention to address vaping.[44,45] Messaging posts are based on the U.S. Clinical Practice Guidelines and the Transtheoretical Model of behavior change[46] and embrace a Motivational Interviewing approach emphasizing respect, rapport, partnership, acceptance, and compassion, with person-centered collaboration.[47,48] Instagram posts utilize images, videos, text, and polls to encourage engagement. A trained cessation counselor who is a licensed therapist with years of experience leading Facebook smoking cessation groups facilitated all groups.

Intervention support groups consisted of 6–20 people to limit wait time to less than 2 weeks. Groups were stratified by age (13–17 years, 18–21 years) owing to developmental differences between adolescents and young adults. Program introduction set ground rules and values reinforcing the motivational interviewing approach. The counselor delivered 1–3 posts on week-days over 5 weeks supporting preparation, support, and a group quit date, and they moderated the group and provided advice and resource links, as detailed in the protocol paper.[42] Participants who required more intensive support were advised to seek further care, including healthcare provider–mediated prescription pharmacotherapy and/or more specialized professional support. The counselor monitored the group chat at least daily and intervened individually with participants who did not adhere to the rules. Repeated violations could lead to removal. The counselor had continuous access to the study team and physician to address concerns. Participants could direct message each other as much as they desired. It was possible that group participants could know each other, and group members were not anonymous. Participants could create Instagram profiles specifically for participation in the study to limit sharing personal information.

Participants assigned to the control condition were sent links to the California state quitline website, which is the standard of care and includes vaping cessation information, texting support, telephone counseling, and a mobile app with cessation supports. Participants were provided with a hyperlink directly to the vaping cessation web page and instructed to select any support method: texts, phone calls, chat, or an app. Participants could use any of the services for as long as they chose, free of charge.

All participants received reminders to complete surveys through direct messages on Instagram or by their preferred alternative contact methods such as email or text. Direct messages on Instagram were the primary form of contact for all follow-ups, mirroring enrollment procedures. Study incentives were $10 for baseline survey, $15 for follow-up at the end of the program, $20 for 3 months, and $25 for 6-month follow-up. Participants could earn an additional $5 if they completed the survey within 24 hours and another $5 if they confirmed cessation with a saliva cotinine test. In October 2023, the 6-month survey payment was increased by $10, and the 24-hour completion bonus was increased by $5.

## Measures

Baseline and follow-up surveys were online through Qualtrics, and data were stored on a secure server. Measures were validated for young adults and adapted from prior tobacco cessation studies,[42] including past 30- and past 7-day E-cigarette use, time to first

E-cigarette use,[49] E-cigarette dependence,[50] cessation plans,[51] desire and confidence in quitting, and commitment to abstinence.[52] Consistent with prior studies,[45,53,54] responses for motivation and confidence were measured on 5-point Likert scale and dichotomized with scores over 4 as high level. Participants reported past 30-day cigarette use and past 7-day use of other tobacco products. The Patient Health Questionnaire-2 and Generalized Anxiety Disorder 2-item questionnaires for depression and anxiety were used with standard 3-point cut offs.[55,56] Standard demographic and economic measures[57] validated for young adults were used. The primary outcome was 7-day point prevalence abstinence at the end of the program (5 weeks) and 3 and 6 months after the end of treatment. All participants who reported abstinence were mailed saliva test kits with instructions on how to perform a test and photograph the results; respondents could opt out of this procedure. Although only 15 opted out overall, too few participants provided biochemical verification for data analysis. Because this was a resource-limited, fully remote trial, in-person saliva collection or alternative mail-in procedures were not feasible.

At 5-week follow-up, intervention participants reported *How often did you post or comment or like others' posts in the group chats?* and *How often did you read the group chats?*, and control participants who opted to use web, text, or the app reported their frequency of use with 7 options (*never, less than once per week*, 1-*2 days per week, 3–6 days per week, once a day, more than once a day)*. All participants reported agreement with 6 statements adapted from the Online Social Support for Smokers Scale[58]: *I got advice and support to quit vaping, I got helpful information to quit vaping, I felt I was not the only one trying to quit vaping, I felt connected to other teens trying to quit vaping, I felt encouraged and supported in my attempt to quit vaping*, and *I felt people cared about my attempt to quit vaping* on a 5-point Likert scale. All intervention participants and the control participants who opted for the quitline website, texting, or app reported agreement with 4 evaluative statements: *The program was easy to understand, I thought about what I read in the program, The program gave me something new to think about*, and *I would recommend this program to others* on a 4-point Likert scale.

## Statistical Analysis

Data were cleaned and merged, and descriptive analyses of participant characteristics were performed. Outcome data were analyzed using a generalized linear mixed model using time points 5 weeks and 3 and 6 months in a time-averaged difference approach to examine the effect of the intervention on 7-day point prevalence abstinence accounting for repeated measures and clustering effects through PROC GLIMMIX in SAS, Version 9.4 (SAS Institute, Cary, NC). The missing at random assumption expects that the probability of missingness is related to observed data (baseline characteristics or previous time-point responses) rather than the unobserved missing values themselves. For this social media study, missingness was largely driven by platform engagement patterns and low-incentive structure rather than the participants' vaping status at that specific moment.

Although the original protocol prioritized the 6-month time point, the time-averaged approach was adopted as the primary framework to maximize the use of longitudinal data and mitigate the impact of attrition. This model accounts for the correlation of

responses within individuals owing to repeated measures and clustering effects arising from treatment group membership and Instagram groupings and enables the estimate of effects using all available data, which is a more efficient and unbiased approach than a single-point analysis in the presence of missing data.[59–61] Initially, the analysis incorporated all available data from participants allocated to their randomized treatment condition, consistent with contemporary statistical conventions, recommendations, and previous trials.[44,62] The primary outcome was self-reported 7-day point prevalence abstinence. The outcome analysis was repeated, counting all missing data as vaping (intent to treat). As a rigorous sensitivity check, primary outcomes were reanalyzed using multiple imputation by chained equations. This process (using 20 imputations) specifically accounted for the longitudinal nature of the data using a wide-format imputation model allowing previous time-point responses to inform the imputation of missing values. Secondary outcomes were vaping reduction by 50% or more, confidence in ability to quit, use of evidence-based cessation strategies, making quit attempts, readiness to quit, desire to quit, and commitment to abstinence. Descriptive analyses of participant engagement, support experience, and program evaluation were conducted, dichotomizing Likert scales with top 2 boxes coded as agreement and testing comparisons between conditions using chi-square tests.

## RESULTS

Eligible participants were required to register, complete informed consent and baseline survey, and follow the study account on Instagram. Approximately one quarter of those eligible completed all of these steps and enrolled in the study (Figure 1). Participants enrolled between January 25, 2022, and April 11, 2023, and follow-up took place between April 1, 2022, and March 15, 2024. Study retention rates were 43.6% at 5 weeks, 23.0% at 3 months, and 28.0% at 6 months. Participants retained were more likely to be male (56.2% vs 45.2% of those lost to follow-up, $p<0.0008$) and slightly younger (mean age of 18.8 years vs 19.1 years for those lost to follow-up, $p=0.04$). There were no significant differences by sexual orientation ($p=0.38$), race/ethnicity ($p=0.41$), or education ($p=0.21$).

Mean age was 18.9 years; 112 (22.6%) were aged 13–17 years, and 384 (77.4%) were aged 18–21 years; 39.8% identified as female, 51.2% identified as male, and 9% identified as another gender; race/ethnicity generally reflected California demographics, and 35.1% identified with a minoritized sexual orientation group (Table 1). Education varied, with 26% in middle/high school, 27.2% in GED/community college or technical/other school, 26.2% not enrolled, and 20.6% in college. Most reported being in the middle range meeting basic financial needs. A total of 70.4% of participants reported using E-cigarettes daily, and 78.2% reported use within 30 minutes of waking. Overall, 84.4% reported high motivation to quit vaping, and 55.2% reported high confidence in ability to quit. A total of 42.9% of respondents reported smoking cigarettes within the past 30 days, and 30.1% reported using any other tobacco product, most frequently little cigars/cigarillos (11%) and nicotine pouches (9.4%), in the past 7 days. Significantly more (59.6%) participants in the intervention group had a positive depression screen than in the control group (47.9%) (chi-square[1]=6.82, $p=0.009$). There were no significant differences in demographic characteristics, E-cigarette use patterns or attitudes, tobacco product use, or anxiety by condition.

For outcome analysis, owing to participant lost to follow-up, the time averaged abstinence rate was used, taking into account missing data over the 6-month follow-up period (Appendix Table 1, available online, and Appendix Figure 1, available online). The time-averaged approach provides several advantages over reporting separate results for each follow-up time point. By pooling data across all postbaseline assessments into a single estimate, the analysis increases statistical power and precision because participants contribute information from any completed time points. This method efficiently handles incomplete data because mixed-effects models naturally incorporate all available observations under the assumption that data are missing at random rather than excluding participants from individual time-point analyses. A single time-averaged estimate offers a clear, interpretable summary of the intervention's overall effect, avoiding the need to present and interpret multiple separate estimates and reducing the problem of inflated Type I error that can arise from testing outcomes at each time point separately. Overall, this analysis yields a more concise, statistically robust, and clinically meaningful assessment of intervention effects.

Using complete cases, the intervention group had significantly greater odds of abstinence, with average of 53.9% over 6 months compared with the control condition (40.4%) (OR=2.07, 95% CI=1.21, 3.52, $p$=0.008). Using ITT analysis, which counted all participants with missing data as continuing E-cigarette use, the intervention group had significantly greater odds of abstinence (18.2% vs 11.8%) (OR=2.15, 95% CI=1.1, 4.2, $p$=0.025). The sensitivity analysis using multiple imputation by chained equations to account for missing data was also consistent with the original mixed-effects model; the effect of the intervention remained significant, and the direction and magnitude of the odds ratios were preserved (OR=2.82, 95% CI=1.11, 7.18, $p$=0.03). This consistency across 3 different statistical assumptions—optimistic (complete cases), conservative (ITT), and predictive (multiple imputation)—suggests that the intervention's efficacy is robust. Owing to differences in the randomized groups, an additional sensitivity analysis was conducted controlling for baseline depression score; the effect of the intervention remained significant (OR=1.86, 95% CI=1.15, 3.02, $p$=0.01).

For secondary outcomes, there were no differences between the 2 conditions in vaping reduction by 50% or more, confidence, use of evidence-based strategies, quit attempts or planning, desire to quit, or commitment to abstinence (Appendix Table 1, available online). At 5 weeks, 20% of control and 16% of intervention participants reported using pharmacotherapy at their last quit attempt, a nonsignificant difference. There were no adverse events reported.

Regarding engagement, of 121 respondents who completed the follow-up survey at 5 weeks, 104 (88%) reported reading chats at least once a day (36% daily and 52% more than once a day) (Figure 2). A total of 103 (85%) reported posting or commenting at least once a week, and 41% posted at least once a day. Chat activity showed that 59.7% of intervention participants posted or commented on the last day of the group, and 44% posted/liked at least 25 times over the 25-day intervention, suggesting sustained engagement over 5 weeks. Of the 94 participants in control condition completing the 5-week survey, 71 (76%) reported using at least 1 of the quitline services: 45 (48%) used text messages, 15 (16%) used online

counselor, 21 (22%) used telephone number, and 40 (43%) used online information. Of the 45 participants who signed up for quitline text messages, 23 (51%) read messages at least daily (29% once a day, 22% more than once a day). A total of 17 participants (18%) reported that they downloaded the app, and 5 (29%) reported using it once a day or more frequently (Figure 2).

In the intervention group, 89% reported talking to others in the past month about their quit vaping program (40% for 1–2 times, 49% for 3 or more times), whereas 84% in the control condition (59% for 1–2 times, 25% for 3 or more times) talked about it. Partcipants in both conditions reported strong agreement with all 4 general evaluation measures, with no significant differences (Figure 3). Most participants agreed with all 6 measures of support experience, but intervention participants agreed significantly more frequently with 4 statements reflecting advice, helpful information, and support. Two measures of general social support (e.g., feeling encouraged and supported and feeling that people cared about the quit attempt) were not significantly different and endorsed by only about half of participants in both conditions.

## DISCUSSION

This RCT found a significant increase in vaping abstinence over 6 months in the social media support group intervention compared with that in the active control, a referral to quitline resources. The efficacy, high engagement, and positive evaluations suggest that popular social media platforms can be used for vaping-cessation support. However, it was difficult to retain study participants over time, and the intensity of interventions that can be delivered in this setting was limited. This intervention differs from prior trials of text messages for vaping cessation[31,32] because it utilized a group support model rather than individual text messages. Group support may be more attractive to those already engaged with social media or less concerned about privacy (group posts on Instagram are not private). Unlike the text message clinical trials, this study had an active control condition (linkage to the quitline), a more rigorous efficacy standard than measurement-only controls.

As the potency of nicotine devices increases,[63] so may the needs for pharmacotherapy, which was not offered in this program because it requires prescriptions for adolescents. In this trial, 16%–20% of participants reported using nicotine replacement therapy (NRT) or pharmacotherapy. A clinical trial of quitline coaching calls to young adults with and without mailed NRT found that 24% of those who were not mailed NRT reported use, and 83% of those who were mailed NRT reported use.[33] Although NRT did not increase vaping abstinence more than coaching alone, over 40% of participants in each study arm reported abstinence. Another 2025 clinical trial found that varenicline and weekly behavioral counseling was superior to counseling alone or text messaging support.[30] In low-touch social media interventions that cannot provide pharmacotherapy, vaping support groups could encourage pharmacotherapy use through education, normalization, and advice about how to access clinical treatment.

There was no difference in secondary outcomes of vaping reduction, increasing confidence, desire, or commitment to quit. The prior trial of Facebook support groups for smoking

cessation also found no difference in these secondary outcomes.[44] It is possible that cessation is related more to social support than individual attitudes or experience with quitting. Intervention participants reported higher levels of support than the control, suggesting that social support is important for vaping cessation, especially because feelings of loneliness are associated with continued vaping.[64] However, some general measures of support were not significantly different; future analyses with specific measures of group experience and quality of support could shed more light on the role of social support in vaping cessation. Because quitline resources are freely available in California, cross-contamination was possible, which would weaken the observed treatment effect.

The trial enrolled diverse participants, with more multiracial participants than a national sample. In addition to racial/ethnic, educational, and socioeconomic diversity, 168 (35%) study participants identified with a sexual- or gender-minoritized group, suggesting that social media vaping cessation support groups may be particularly attractive for this population, which has higher rates of E-cigarette use than their straight counterparts. This is consistent with prior studies,[45] including an evaluation of tailored sexual or gender minority smoking cessation support groups on social media.[62]

Although social media is nearly ubiquitous among young people, the changing social media landscape and regulations created challenges for study procedures. Changes to Instagram rules prohibited social media outreach to participants who did not follow the study account. Participants became unresponsive, and 84 users changed their Instagram handle; users can easily create multiple fake accounts.[65] Implementing study procedures in multiple channels, frequent incentivized low burden text messages,[32] higher incentives, gamification, or peer outreach might improve longitudinal retention. The intervention posts could be implemented widely on any social media platform that allows multimedia posts in group chats. However, because it uses a live coach and advertising campaign, scalability is limited by staffing and advertising budgets. Artificial intelligence chatbots are now being used for tobacco cessation and motivational interviewing.[66–68] It might be possible to train a future artificial intelligence chatbot as moderator, although this intervention appeals particularly to those who wish to interact with other people, and human supervision is still needed. Training lay people to convene and coach groups may be another way to scale the intervention while preserving human interaction.

## Limitations

Retention of study participants over time was lower than expected on the basis of past trials, so time-averaged analyses were conducted to take into account missing data, which differed from the original protocol. Participants demonstrated a lower commitment to research procedures than in studies at medical clinics or in person, although retention rates in this study were comparable with those of past trials using low touch social media platforms, community advertising, and modest incentives.[69,70,71] It was not feasible to do biochemically validated outcomes as originally planned. Although few participants opted out, few actually sent photos of their biochemical test strips. The self-reported outcome rates are consistent with those of other randomized trials,[31,32] and scientific guidelines note that biochemical validation is not uniformly appropriate for all types of studies.[72]

Self-reported point prevalence abstinence outcomes are subject to social desirability and other bias. Finally, trial participants were limited to California where there are different demographics, a unique regulatory environment, and strong public health awareness, so findings may not generalize to other locations.

## CONCLUSIONS

This randomized trial found that social media support groups for adolescents and young adults were associated with significantly greater cessation rates than a referral to quitline vaping cessation resources. Social media platforms may be a useful way to deliver social supports for nicotine vaping cessation that is accessible and utilized by young people.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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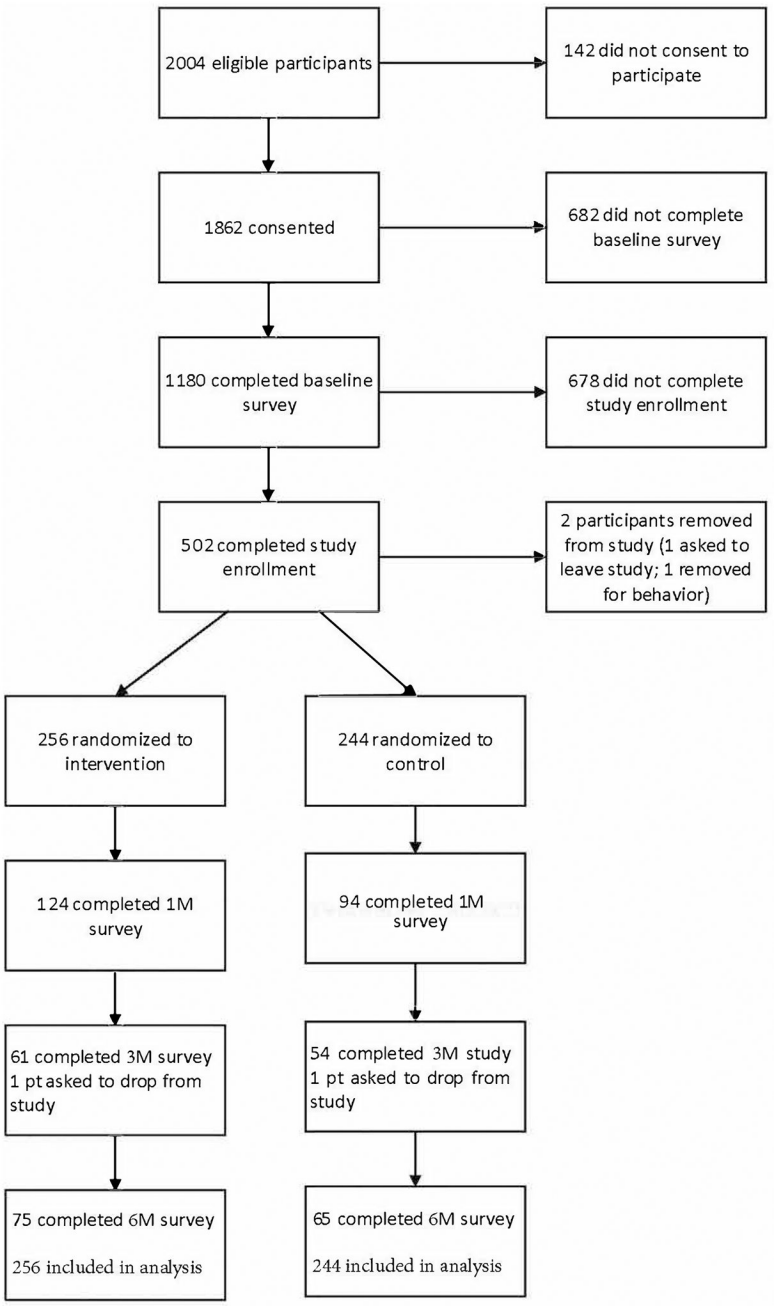


**Figure 1.**

Number of participants enrolled and completing baseline and follow-up surveys by randomized condition.

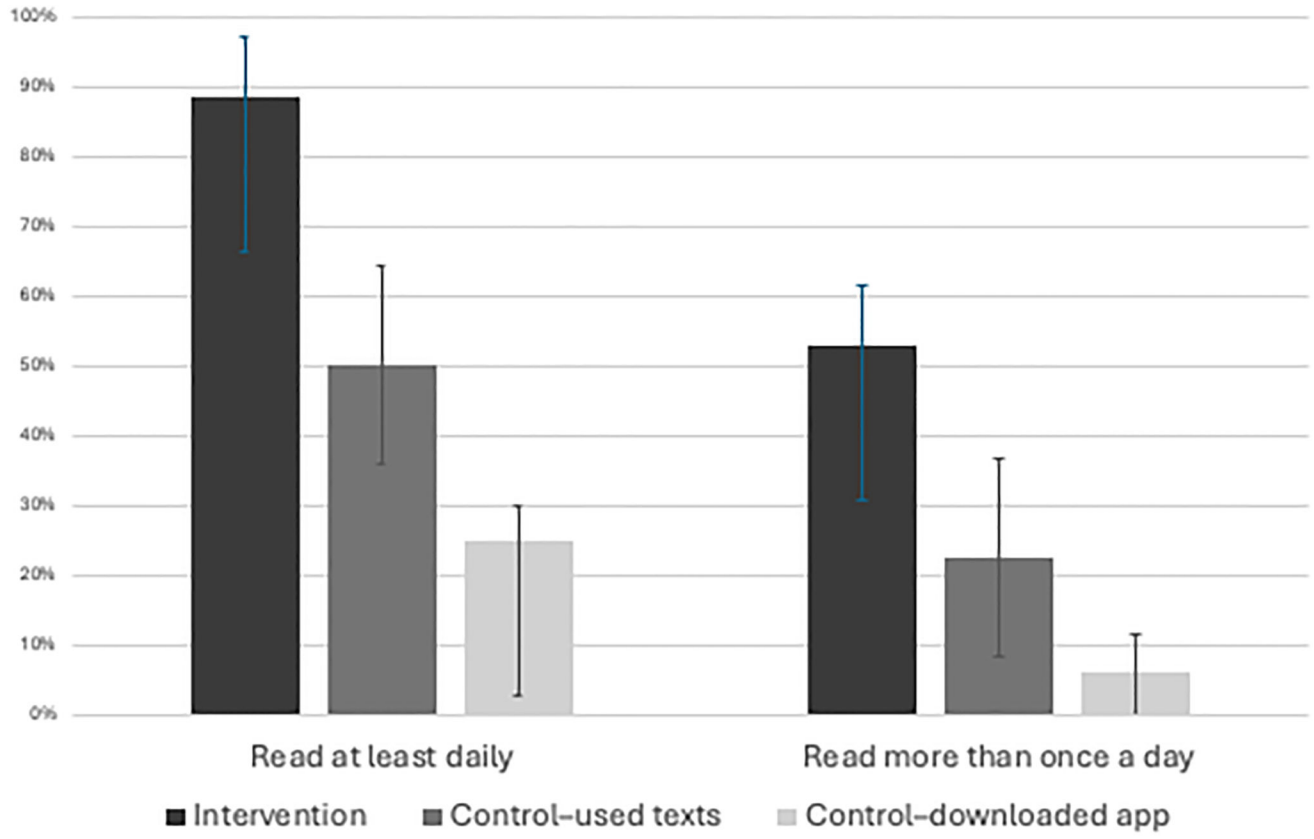


**Figure 2.**

Self-reported engagement daily (left) or multiple times a day (right) by participants assigned to receive the intervention Instagram group posts or by participants assigned to the control condition who either selected to receive text messages or chose to download the quitline's mobile app.

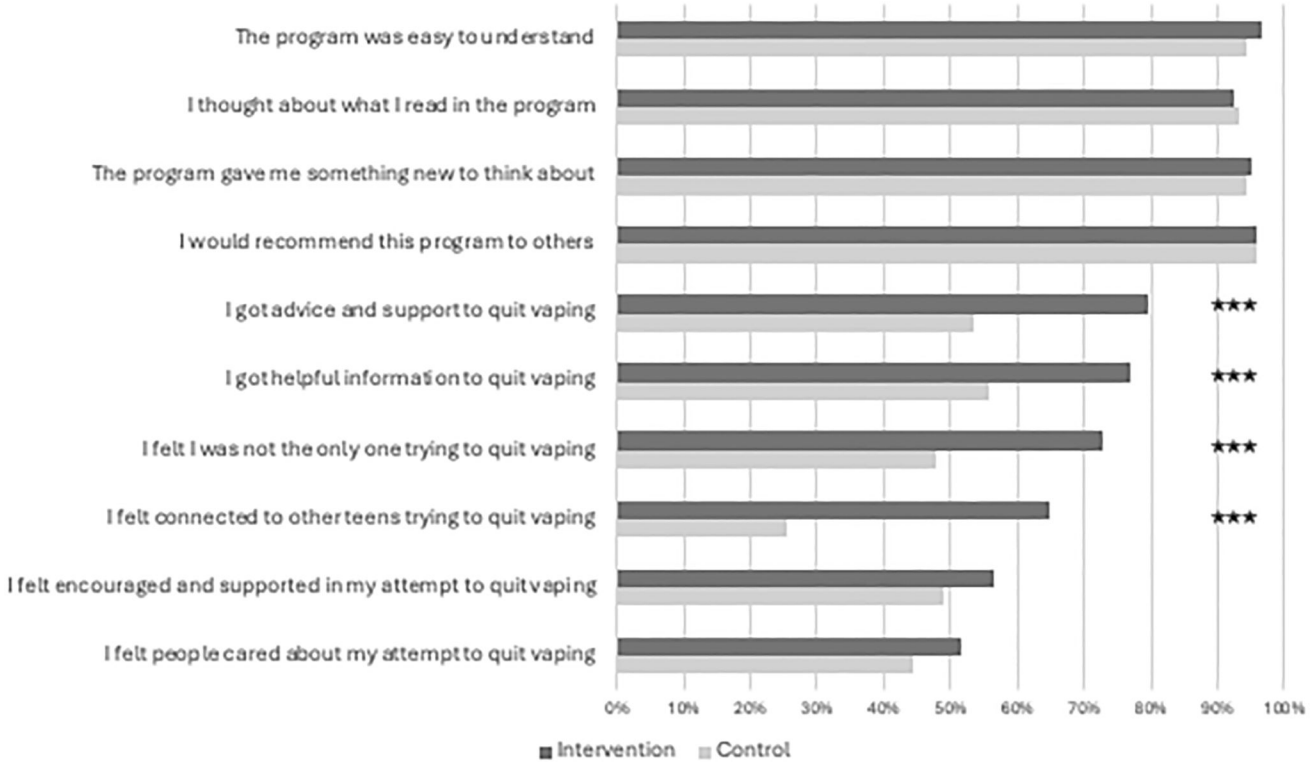


**Figure 3.**

Percentage of participants agreeing with self-reported measures of supportive experiences in the assigned program.

*Note*: Participants randomized to the intervention condition reported greater agreement with measures of social support. ***$p<0.001$.

**Table 1.**

Participant Characteristics Overall and by Study Condition (N=500)

| Variable | Full sample (N=500) | Control (*n*=244) | Treatment (*n*=256) |
|---|---|---|---|
| Age in years (mean, SD) | 18.90 (1.83) | 18.92 (1.8) | 18.89 (1.9) |
| Age 13–17 years, % (*n*) | 22.6 (112) | 23.4 (57) | 21.5 (55) |
| Age 18–21 years | 77.6 (388) | 76.6 (187) | 78.5 (201) |
| Gender identification, % (*n*) | | | |
| Male | 51.2 (256) | 52.3 (130) | 49.2 (126) |
| Female | 39.8 (199) | 38.1 (93) | 41.4 (106) |
| Other | 9.0 (45) | 8.6 (21) | 9.4 (24) |
| Sexual orientation, % (*n*) | | | |
| Straight/heterosexual | 64.9 (310) | 63.2 (148) | 66.4 (162) |
| Gay | 2.7 (13) | 4.3 (10) | 1.2 (3) |
| Lesbian | 2.3 (11) | 3.4 (8) | 1.2 (3) |
| Bisexual | 25.7 (123) | 23.5 (55) | 27.9 (68) |
| Other | 4.4 (21) | 5.6 (13) | 3.3 (8) |
| Race or ethnicity, % (*n*) | | | |
| Caucasian | 41.1 (201) | 45.2 (108) | 37.2 (93) |
| Native American/Alaska Native | 0.8 (4) | 0.4 (1) | 1.2 (3) |
| Black/African American | 3.9 (19) | 2.5 (6) | 5.2 (13) |
| Asian/Pacific Islander | 7.2 (35) | 7.1 (17) | 7.2 (18) |
| Hispanic/Latino | 17.2 (84) | 15.1 (36) | 19.2 (48) |
| More than 1 | 27.4 (134) | 26.8 (64) | 28.0 (70) |
| Other race | 2.4 (12) | 2.9 (7) | 2.0 (5) |
| Education, % (*n*) | | | |
| In middle school | 5.2 (26) | 6.1 (15) | 4.3 (11) |
| In high school | 20.8 (104) | 20.5 (50) | 21.1 (54) |
| Not enrolled | 26.2 (131) | 24.2 (59) | 28.1 (72) |
| Taking GED or community college | 21.8 (109) | 25.8 (63) | 18.0 (46) |
| In 4 years, college | 20.6 (103) | 19.3 (47) | 21.9 (56) |
| In technical or other education | 5.4 (27) | 4.1 (10) | 6.6 (17) |
| Household income, % (*n*) | | | |

| Variable | Full sample (N=500) | Control (*n*=244) | Treatment (*n*=256) |
|---|---|---|---|
| Live comfortably | 25.2 (126) | 26.3 (64) | 24.2 (62) |
| Meets needs with a little left | 28.3 (141) | 30.9 (75) | 25.8 (66) |
| Just meet basic expenses | 30.9 (154) | 25.1 (62) | 35.9 (92) |
| Do not meet basic expenses | 15.6 (78) | 17.3 (42) | 14.1 (36) |
| Puffs per day (mean, SD) | 93.66 (122.3) | 92.35 (121.8) | 94.91 (123.1) |
| Days per week vaped (mean, SD) | 5.92 (1.9) | 5.98 (1.7) | 5.87 (2.0) |
| Vape within first 30 minutes of waking, % (*n*) | 78.2 (391) | 76.2 (186) | 80.0 (205) |
| Daily vaping, % (*n*) | 70.4 (338) | 68.1 (162) | 72.3 (176) |
| High desire to quit, % (*n*) | 84.4 (422) | 83.6 (204) | 85.2 (218) |
| Highly confident, % (*n*) | 55.2 (276) | 54.9 (134) | 55.5 (142) |
| Tobacco use | | | |
| Past 30-day cigarette use | 42.9 (214) | 40.2 (98) | 45.5 (116) |
| Past 7-day little cigar use | 11.0 (55) | 8.6 (21) | 13.3 (34) |
| Past 7-day spit tobacco use | 3.8 (19) | 3.3 (8) | 4.3 (11) |
| Past 7-day hookah use | 4.6 (23) | 4.5 (11) | 4.7 (12) |
| Past 7-day nicotine pouch use | 9.4 (47) | 10.7 (26) | 8.2 (21) |
| Past 7-day other tobacco product use | 30.1 (150) | 31.1 (76) | 29.0 (74) |
| Mental health | | | |
| Depression PHQ2 ≥3 | **53.9 (269)** | **48.0 (117)** | **59.6 (152)** ** |
| Anxiety GAD2 ≥3 | 62.9 (313) | 60.5 (147) | 65.1 (166) |

*Note*: Boldface indicates statistical significance (**$p$<0.01).

GAD2, Generalized Anxiety Disorder 2-item; PHQ2, Patient Health Questionnaire-2.