Digital Smoking Cessation Preferences of Predominately Lower Income and Latino residents of the San Joaquin Valley in California: A Qualitative Study

Karla D Llanes, Maya Vijayaraghavan, Sara Schneider, Pamela M Ling, Evi Hernandez, Paul Brunetta, Anna V Song, Arturo Durazo

Submitted to: JMIR Formative Research
on: March 18, 2025

Table of Contents

Digital Smoking Cessation Preferences of Predominately Lower Income and Latino residents of the San Joaquin Valley in California: A Qualitative Study

Karla D Llanes[1] PhD; Maya Vijayaraghavan[2] MPH, MD; Sara Schneider[3] PhD; Pamela M Ling[2] MPH, MD; Evi Hernandez[4] BA; Paul Brunetta[5] MD; Anna V Song[6] PhD; Arturo Durazo[7] PhD

[1] Center for Tobacco Control Research & Education University of California, San Francisco San Francisco US
[2]Division of General Internal Medicine Center for Tobacco Control Research & Education University of California, San Francisco San Francisco US
[3] Nicotine and Cannabis Policy Center, Health Sciences Research Institute University of California, Merced Merced US
[4] California Health Collaborative Fresno, CA US
[5] Fontana Tobacco Treatment Center University of California, San Francisco San Francisco, CA US
[6]Psychological Sciences, School of Social Sciences, Humanities and Arts Nicotine and Cannabis Policy Center, Health Sciences Research Institute University of California, Merced Merced US
[7]Public Health, School of Social Sciences, Humanities and Arts Nicotine and Cannabis Policy Center, Health Sciences Research Institute University of California, Merced Merced US

Corresponding Author:
Maya Vijayaraghavan MPH, MD
Division of General Internal Medicine
Center for Tobacco Control Research & Education
University of California, San Francisco
490 Illinois Street,
#83C
San Francisco
US

Abstract

Background: Although rates of tobacco use in California have declined overall, adults in the San Joaquin Valley (SJV), particularly Hispanic/Latinos (“Latinos”), have disproportionately high rates of tobacco use, tobacco-related illness, and mortality. Residents of the SJV also have limited access to cessation support services, and need accessible, non-clinical alternatives. Given high smartphone use rates among Latinos and residents of rural communities, digital health tools may present an accessible approach to expand cessation support.

Objective: This study explored tobacco use behaviors, cessation experiences, and views about digital cessation tools for tobacco cessation among SJV residents. The secondary objective was to assess the appeal, usability, and necessary adaptations of two existing digital smoking cessation tools—a smoking cessation app and a social media-based intervention.

Methods: Through a SJV-based academic-community partnership, we recruited 29 predominantly Latino adults who reported current smoking. We conducted four focus groups (two English, two Spanish) to explore tobacco use and cessation experiences, and preferences for smoking cessation tools. Nine participants subsequently completed in-depth interviews where they viewed videos describing two digital smoking cessation tools — a cessation app and a social media intervention — to assess their appeal and usability.

Results: Most participants were motivated to quit despite experiencing barriers, emphasizing the need for culturally tailored digital cessation tools to enhance engagement. They preferred interventions that integrated culturally relevant content reflecting lived experiences, featured language-concordant communications, and provided social supports, such as chat rooms for peer connection. While participants appreciated the app’s private interface and comprehensive curriculum, the social-media based program was favored for its engaging design, despite privacy concerns. Preferences for specific interventions varied by age and digital literacy. Material rewards increased appeal to use both digital health tools to quit smoking.

Conclusions: This sample of predominantly Latino adults from the SJV expressed favorable interest in digital cessation support,

yet existing tools require adaptation to improve cultural relevance, accessibility, and usability. Participants emphasized language-concordant services, representation from people with lived experience, and community-building features. While digital interventions were well received, privacy concerns and digital literacy barriers must be addressed to enhance engagement.

(JMIR Preprints 18/03/2025:74105)
DOI: https://doi.org/10.2196/preprints.74105

Preprint Settings

1) Would you like to publish your submitted manuscript as preprint?

✓ **Please make my preprint PDF available to anyone at any time (recommended).**
Please make my preprint PDF available only to logged-in users; I understand that my title and abstract will remain visible to all users.
Only make the preprint title and abstract visible.
No, I do not wish to publish my submitted manuscript as a preprint.

2) If accepted for publication in a JMIR journal, would you like the PDF to be visible to the public?

✓ **Yes, please make my accepted manuscript PDF available to anyone at any time (Recommended).**
Yes, but please make my accepted manuscript PDF available only to logged-in users; I understand that the title and abstract will remain v
Yes, but only make the title and abstract visible (see Important note, above). I understand that if I later pay to participate in <a href="http
No. Please do not make my accepted manuscript PDF available to anyone.

Original Manuscript

Original Paper

Digital Smoking Cessation Preferences of Predominately Lower Income and Latino residents of the San Joaquin Valley in California

Karla D. Llanes[1], Maya Vijayaraghavan[1,2], Sara Schneider[3], Pamela M. Ling[1,2], Evi Hernandez[4], Paul Brunetta[5], Anna V. Song[3,6], & Arturo Durazo[3,7]

[1]Center for Tobacco Control Research and Education, University of California San Francisco, San Francisco, California, United States

[2]Division of General Internal Medicine, University of California San Francisco, San Francisco, California, United States

[3]Nicotine and Cannabis Policy Center, Health Sciences Research Institute, University of California, Merced, California, United States

[4]California Health Collaborative, Fresno, California, United States

[5]Fontana Tobacco Treatment Center University of California San Francisco, San Francisco, California, United States

[6]Psychological Sciences, School of Social Sciences, Humanities and Arts, University of California, Merced, California, United States

[7]Public Health, School of Social Sciences, Humanities and Arts, University of California, Merced, California, United States

Correspondence regarding this research should be addressed to Dr. Maya Vijayaraghavan, 490 Illinois Street, #83C, San Francisco, CA 94158. (Email: Maya.Vijayaraghavan@ucsf.edu

Tel: 617-817-8738).

Abstract

Background: Although rates of tobacco use in California have declined overall, adults in the San Joaquin Valley (SJV), particularly Hispanic/Latinos (“Latinos”), have disproportionately high rates of tobacco use, tobacco-related illness, and mortality. Residents of the SJV also have limited access to cessation support services, and need accessible, non-clinical alternatives. Given high smartphone use rates among Latinos and residents of rural communities, digital health tools may present an accessible approach to expand cessation support.

Objective: This study explored tobacco use behaviors, cessation experiences, and views about digital cessation tools for tobacco cessation among SJV residents. The secondary objective was to assess the appeal, usability, and necessary adaptations of two existing digital smoking cessation tools —a smoking cessation app and a social media-based intervention.

Methods: Through a SJV-based academic-community partnership, we recruited 29 predominantly Latino adults who reported current smoking. We conducted four focus groups (two English, two Spanish) to explore tobacco use and cessation experiences, and preferences for smoking cessation tools. Nine participants subsequently completed in-depth interviews where they viewed videos describing two digital smoking cessation tools — a cessation app and a social media intervention — to assess their appeal and usability.

Results: Most participants were motivated to quit despite experiencing barriers, emphasizing the need for culturally tailored digital cessation tools to enhance engagement. They preferred interventions that integrated culturally relevant content reflecting lived experiences, featured language-concordant communications, and provided social supports, such as chat rooms for peer connection. While participants appreciated the app’s private interface and comprehensive curriculum, the social-media based program was favored for its engaging design, despite privacy concerns. Preferences for specific interventions varied by age and digital literacy. Material rewards increased appeal to use both digital health tools to quit smoking.

Conclusions: This sample of predominantly Latino adults from the SJV expressed favorable interest in digital cessation support, yet existing tools require adaptation to improve cultural relevance, accessibility, and usability. Participants emphasized language-concordant services, representation from people with lived experience, and community-building features. While digital interventions were well received, privacy concerns and digital literacy barriers must be addressed to enhance engagement.

Keywords: mHealth, digital health, smoking cessation, e-cigarette use, smoking, Hispanic, Latino

Introduction

While the overall prevalence of tobacco use in California declined in 2022, rural regions maintain disproportionately higher smoking rates[1]. California's San Joaquin Valley (SJV) exemplifies this disparity, with a tobacco use prevalence of 15.6% in 2019[2], exceeding the state average of 11.4% in 2022[1]. The SJV is home to over 4 million people across eight counties (Stanislaus, San Joaquin, Merced, Madera, Fresno, Kings, Tulare, and Kern)[3], many of whom belong to structurally marginalized and under-resourced communities. Nearly 45% of SJV residents identifying as Latino[3], and 70% of immigrant residents originate from Central America and Mexico[4].

The SJV region is considered a medical desert, with severe shortages of healthcare provides, limiting access to health care, specialty services, and tobacco cessation resources. Low literacy skills and limited English proficiency[4] also make it more challenging to navigate healthcare systems and access cessation support. The SJV also has one of the highest poverty rates in California, with 20% of residents in most counties living below the federal poverty level, compared to 12% statewide[3].

The high prevalence of tobacco use, healthcare shortages, economic hardship, and linguistic barriers in the SJV create significant obstacles to smoking cessation in the SJV, particularly for Latino residents. Without accessible, culturally tailored cessation interventions, Latinos in the region remain at heightened risk for tobacco-related illnesses [5].

Although Latinos in California attempt to quit smoking at higher rates than the general population (56.5% vs 55.1%), they are less likely to use evidence-based cessation treatment such as nicotine replacement therapy (NRT) and receive cessation advice from health care providers[6]. In 2023, of the 21,500 people who used the free cessation program known as Kick It California, which includes the state Quitline, text, web, and chat support, only 21.1% identified as Latino, while 37.7% identified as white[1]. Latinos face disparities in access to health care and health insurance[6], and 46.7% of Latino adults who smoked were advised to quit versus 49.9% of all California adults[1],

which may contribute to underutilization of cessation supports. Other reasons for not using cessation supports include misperceptions about the addictiveness of NRT[7], hesitation to use support because of the cultural belief that using willpower is a way to take personal responsibility for quitting[8], or being dual users of cigarettes and e-cigarettes(8.1% of Hispanics are dual users versus 8.8% non-Hispanic White)[9], which might make it more challenging to quit[10].

Given these disparities, there is an urgent need for culturally responsive and affirming smoking cessation interventions for Latinos in the SJV. Expanding cessation resources beyond traditional clinical settings—particularly through digital health solutions—may help address gaps in cessation services for Latino who smoke and face significant barriers to treatment.

While expanding access to healthcare is critical for increasing cessation treatment utilization, many Latino adults who smoke face persistent barriers such as lack of insurance, limited access to healthcare providers, and language barriers. These challenges are exacerbated in rural regions such as California's SJV, where access to healthcare and cessation services is highly limited. Digital cessation tools offer a promising and cost-effective alternative, providing a scalable approach to reaching those who may otherwise lack access to cessation support.

Latinos in the US have among the highest rates of smartphone adoption (93%) [11], –often using smartphone devices as their primary means of internet access—compared to 91% of non-Latino Whites. Additionally, 95% of Latinos use the internet[12] and 84%[13] engage with social media platforms, making digital health interventions a viable strategy for smoking cessation. A systematic review of 60 studies found that digital interventions, including mobile appes, text messaging, web-based programs, significantly increased smoking abstinence compared to printed materials for adult smokers (*Risk Ratios* = 1.32 for prolonged abstinence and 1.14 for point prevalence abstinence)[14]. These findings highlight the potential of leveraging mobile and social media-based interventions to improve cessation support among Latinos, particularly in hard-to-reach, rural communities like the SJV.

Social media interventions may also enhance engagement by leveraging existing social networks. For example, the Tobacco Status Project (TSP), a 90-day Facebook smoking cessation intervention, delivered evidence-based counseling to young adults in group meeting on Facebook[15]. Social media interventions have been studied in national samples of young adults[15-17] and can be adapted to users' preferences. Social media-based interventions, whether delivered through existing platforms like Facebook, Instagram, and WhatsApp or through specialized platforms, have been shown to be efficacious in increasing abstinence compared to control conditions[18].

Smoking cessation smartphone applications when used in combination with pharmacotherapy may also be an effective aid[19]. A 2023 meta-analysis of randomized controlled trials compared continuous smoking abstinence rates between young adults receiving smartphone text cessation support messages and those receiving only self-help materials or referrals to the Quitline (i.e., controls), found an overall increase in abstinence among those receiving SMS text messaging interventions[20]. The subgroup analysis (k=5) showed that continuous abstinence rates were higher in the SMS messaging interventions compared to control groups at one-month, three-month, and six-month follow-ups (*Relative Risk*s = 1.90, 1.64 and 1.35, p<.05; respectively); only two apps reported continuous abstinence outcomes [20]. Since most apps have not been evaluated in clinical trials or published in scientific literature it makes determining the efficacy of cessation apps largely inconclusive[20-22]. A 2021 search in the IOS App Store and Android App Store generated 228 apps for smoking cessation, and evaluations of each app revealed that very few apps are evidence-based, and 53% were inaccessible due to the financial costs of using the app after downloading[21]. However, 25% of the apps were available in Spanish, signaling potential interest in Spanish language apps[21]; however, we are not aware of any apps developed specifically for lower-income Latino adults.

Given the limited access to cessation services in rural SJV communities and the growing

reliance on digital tools among Latinos, this study aimed to explore tobacco use behaviors, cessation experiences, and views about digital cessation tools for tobacco cessation among SJV residents. The secondary objective was to assess the appeal, usability, and necessary adaptations of two existing digital smoking cessation tools—a smoking cessation app and a social media-based intervention—to determine their potential acceptability and reach within this population.

Methods

In partnership with the California Health Collaborative (CHC), a leading, non-profit community-based organization in the SJV, we recruited 29 adults from the SJV. CHC advertised our study through their social networks, affiliated organizations and word of mouth. Eligible participants were 18 years of age or older who reported cigarette smoking in the past 30 days.

We developed focus groups and semi-structured interview guides with input from CHC, the study investigators, and undergraduate students proficient in Spanish.

Measures

Brief survey

Using a brief survey in English or Spanish, we measured age, gender identity, race and ethnicity, preferred language and English proficiency, tobacco use history and current behavior, time to first cigarette, quitting intentions and experience[23]. To assess financial insecurity, we asked participants whether they were able to save money each month (yes/no), had 3 months of savings to cover an expense, and owned a home.

Focus Groups

Using an adapted discussion guide from existing studies we explore participants' tobacco use, past experiences with quit attempts, motivation for quitting, and prior use of cessation aids and resources, and interest in digital cessation tools. The focus group discussion used open-ended questions to allow for participants to provide their general interest and desired features of digital cessation tools. The focus groups were about an hour and began with introductions and ground rules,

and study purpose, followed by open-ended questions that explored participants' experiences with tobacco use, explored past experiences with quit attempts, motivation for quitting, and explored views about resources and cessation aids, internet and apps to quit smoking.

Interviews

During each one-hour interview, participants viewed two 10-15 minutes videos describing an app to quit smoking called "MO"[24], and a vaping cessation group intervention on Instagram called "Quit the Hit"[25]. The demonstration video for MO and Quit the Hit were originally created in English by two of the intervention or app's co-developers (i.e., PB for the MO app and PML for Quit the Hit intervention). AD translated and recorded the MO demonstration video in Spanish and KDL translated and recorded the Quit the Hit demonstration video in Spanish. After viewing each video describing each intervention, participants were interviewed about their general impressions, what they liked and disliked about each tool, and their preferences for one, both, or neither. During the interviews, participants identified additional appealing and unappealing features they might not have generated on their own during the focus groups.

MO*:* The MO app for smoking cessation creates an individual profile, tracks smoking, and suggests activities to help users prepare to quit[26]. It includes gamification awarding points for desired behavior, provides badges to recognize quitting milestones, offers daily check-ins and video stories to support motivation[26].

Quit the Hit: Quit the Hit intervention is a person-centered 5-week social media cessation intervention delivered over Instagram[25], adapted from a Facebook smoking cessation program[16, 17, 27] that increased abstinence at the end of treatment (3-months) compared to referral to a smoking cessation website[15]. Participants join support groups moderated by a cessation counselor with weekday posts supporting preparation, skill building, a group quit date, and social supports to

quit. Participants were informed that Quit the Hit was adapted from a smoking cessation intervention and could be adapted to address other tobacco use.

Procedures

Study procedures for the focus groups and Semi-Structured interviews

We obtained informed consent prior to conducting all study procedures. AD led the initial round of informed consent in both English and Spanish before administering survey. Participants each received a $50 gift card for participating in the focus group and an additional $50 gift card for participating in an in-depth interview. All participants read and provided informed consent before proceeding with the survey, focus groups, and interviews. They were assured confidentiality, as survey responses were only linked to a self-generated study ID number.

Survey Administration

First, participants completed the brief survey assessing their tobacco history, interest in quitting, and past methods used for smoking cessation.

Focus group protocol: needs assessment for digital smoking cessation support

After completing the survey, participants participated in a focus group discussion about their tobacco use behaviors, cessation experiences, and views about digital cessation tools for tobacco cessation. Focus groups took place in-person or via Zoom, in English or Spanish, depending on the participants' preference. Three focus groups were conducted online (2 in Spanish, 1 in English), and one focus group was conducted in-person (in English). The focus groups lasted 60-90 minutes, and were led by a moderator accompanied by note-takers. AD and KDL authors, who are highly proficient in English and Spanish, moderated the focus group discussions. An external professional transcription company transcribed the English and Spanish focus group discussions.

Semi-structured interview protocol: appeal and usability of digital

smoking cessation tools

All 29 focus group participants were invited to participate in a follow-up semi-structured interview. In total, 9 agreed to participate in the 1 hour, follow-up interview. Three (1 female, 2 males) interviews were conducted in English and 6 (2 males, and 4 females) were conducted in Spanish. KDL and SS conducted the semi-structured interviews. An external professional transcription company transcribed the interviews.

Data analysis

Audio files were transcribed verbatim and translated from Spanish to English and uploaded to ATLAS.ti version 24. Two coders (KDL, SS) read each transcript, coded them, and identified themes. We used thematic analysis (inductive approach) to identify individuals' needs for smoking cessation digital tools to facilitate their quitting process[28, 29]. The codebook was refined as new themes were identified during the coding process. Discrepancies in coding were discussed and resolved by consensus, including discussion with a third coder (AD), if necessary.

Positionality

We paid particular attention to ensure that participants fully understood the nature of the research and their rights, given potential language barriers and vulnerabilities. We also acknowledge our own positionalities as researchers and how they may have influenced the research process. AD is a health communication researcher and is a second-generation Mexican American Californian who grew up with Spanish as his first language, and KDL is a bilingual (i.e., first language was Spanish), Latina public health postdoctoral scholar with roots in the Southwest. Our shared cultural and linguistic backgrounds contributed to trust-building with participants, particularly in communications requiring sensitivity to language access and cessation support experiences among racial/ethnic minority and Spanish-speaking individuals. Additionally, to ensure cultural and linguistic appropriateness, our community partner and co-author, EH, reviewed and provided feedback on the Spanish translations of the consent form, survey, and focus group guide. This partnership helped

ensure that research materials were accessible and culturally relevant for SJV residents.

Ethical Review

This study was reviewed and approved by the UCSF (IRB 22-37978) and UC Merced (IRB UCM2022-119) institutional review boards. All participants read and provided informed consent on Zoom or in-person. Researchers reassured participants of confidentiality. Participants were also offered a printed or electronic copy of the informed consent form. The researchers deidentified surveys, focus groups, and interviews by using a self-generated ID number for each participant.

Results

Sample characteristics (Table 1)

The majority of participants were Latino (24/27; 88.9%), 51.9% (14/27) self-identified as female, and average age was 41 years old (*SD* = 14.04, range 21-77). Most (14/26; 53.8%) preferred Spanish language, 38.4% (10/26) reported limited English proficiency, and 63% (17/27) reported they were unable to save money each month (Table 1). Those who preferred Spanish were predominantly from Madera County, older, preferred smoking cigarettes, and were less comfortable with technology. Focus group participants from Fresno County, were younger, English speaking, primarily used e-cigarettes, and were comfortable with technology. Participants from Merced County were older, preferred English-language, most smoked cigarettes, and the focus group was conducted in person. Overall, 82.1% (23/28) had made a quit attempt in the past year, and most intended to quit smoking in a month to six months, with 11.1% (3/27) never expecting to quit.

Table 1. Participant Characteristics

Characteristics	2 Focus groups from Madera (*n*=16)	1 Focus group from Fresno (*n*=5)	1 Focus group from Merced (*n*=8)	Overall (*N*=29)
	n (%)	n (%)	n (%)	n (%)[a]
Age (years), Median (*IQR*)	46[b] (15)	25 (6.5)	41 (18)	41 (22)

Gender					
	Female	10 (71.4)	4 (80)	0 (0)	14 (51.9)
	Male	4 (28.6)	1 (20)	8 (100)	13 (48.1)
Race and ethnicity					
	Non-Hispanic White	0 (0)	0 (0)	3 (37.5)	3 (11.1)
	Hispanic/Latino[c]	14(100)	5(100)	5 (62.5)	24 (88.9)
Preferred language					
	English	1 (7.1)	5 (100)	6 (85.7)	12 (46.2)
	Spanish	13 (92.9)	0 (0)	1 (14.3)	14 (53.8)
English proficiency (English language preference)					
	Very Well	0 (0)	5 (100)	7 (100)	12 (46.2)
	Well	4 (28.6)	0 (0)	0 (0)	4 (15.4)
	Not well	7 (50)	0 (0)	0 (0)	7 (26.9)
	Not at all	3 (21.4)	0 (0)	0 (0)	3 (11.5)
Years Smoked (years), Mean (SD)		18.4 (14)	3.2 (1.4)	12.4 (11.8)	14.0(13.1)
Cigarettes smoked per day, Mean (SD)		2.1 (2.8)	2.8 (0.8)	13.5 (8.5)	5.5 (8.1)
Time to first cigarette use					
	Within 5 minutes	1 (6.7)	1 (20)	3 (37.5)	5 (17.9)
	6-30 minutes	1 (6.7)	1(20)	2 (25)	4 (14.3)
	After 60 minutes	10 (66.7)	3 (60)	2 (25)	15 (53.6)
	Question is unclear	3 (20)	0 (0)	1 (12.5)	4 (14.3)
Voluntary Quit Smoking for 24 hours in past year					
	No	2(13.3)	1(20)	2 (25)	5(17.9)
	Yes	13 (86.7)	4(80)	6 (75)	23 (82.1)
Quitting intentions					
	Never expect to quit	1 (7.1)	1 (20)	1(12.5)	3 (11.1)
	Will quit in the next month	5 (35.7)	2(40)	2 (25)	9 (33.3)
	May quit in the next 6 months	1 (7.1)	1 (20)	4 (50)	6 (22.2)
	Will quit in the next 6	7 (50)	1(20)	1 (12.5)	9 (33.3)
Ability to save each month					
	No	10 (71.4)	0 (0)	7 (87.5)	17(63)
	Yes	4 (28.6)	5 (100)	1 (12.5)	10 (37)
3 months savings to cover expenses					
	No	12 (85.7)	3 (60)	8 (100)	23(85.2)
	Yes	2 (14.3)	2 (40)	0 (0)	4 (14.8)
Own home					
	No	6 (42.9)	5 (100)	8 (100)	19 (70.4)
	Yes	8 (57.1)	0 (0)	0 (0)	8 (29.6)

[a]Percentages for all variables include only participants who provided a response to survey items. Responses are complete for 26 participants. Four participants skipped questions resulting in missing data for all the variables.

[b]Two participants did not report their age.

[c]Hispanic/Latino category included individuals selecting any race or not selecting a race category

Focus groups

Smoking and vaping initiation and current use

Participants reported initiating smoking at a young age, with many starting between 9 and 20 years. Some began with materials other than tobacco such as smoking lawn grass. Family influences played a significant role in cigarette smoking behaviors, with multigenerational influences being common.

> *"I learned from my dad … I would steal his cigars, I would even get drunk with him … from then on, I started to want to buy cigarettes. I used to make corn leaves, which came from him, toasted tobacco in a corn leaf."* [63-year-old, male, Madera]

Social settings also contributed to the initiation and continuation of tobacco use, especially use at parties and while drinking alcohol.

> *"Definitely when you're drinking alcohol, a lot of friends just drinking and a couple of them have it, you just decide to experiment with it, but then you decide to go off and buy your own, even when you're not drinking, and it becomes more of an addiction."* [25-year-old, male, Fresno]

Using tobacco to cope with stress was a critical factor, contributing to sustained use and diminished motivation to quit.

> *"[E]very time you have anxiety or are stressed, you have a lot of work, the kids are yelling at each other, or whatever, you go out at night, and you take [a cigarette]."* [39-year-old, female, Madera]

Motivations to quit smoking or vaping

Many in the older Spanish-speaking group were parents, and their motivation to quit was their children or family. For the younger English-speaking group, having children was a reason to

quit in the future but not currently.

Participants described being concerned about their health. Illnesses made them more aware of their overall health and motivated them to quit or reduce smoking. One participant got COVID-19, another had asthma, and a third was worried about developing cancer.

> *"So, like, I got COVID and I was just really, really scared because that was the first time I had gotten it, and I was like, "Maybe – yeah, I think I just have to stop doing everything altogether."* [24-year-old, female, Fresno]

Tobacco regulation efforts like flavor bans or price increases motivated some individuals to quit smoking or vaping. Flavors enticed many younger participants to initiate vaping, and a participant reported that she smoked less because of the flavor ban.

> *"That new law that got passed with the flavored vapes has made things super inaccessible and super hard to find, so that has been one reason why I have not been smoking too much lately."* [24-year-old, female, Fresno]

Participants tried different methods to quit smoking and vaping. Only a few participants had used nicotine replacement therapy (NRT), some when hospitalized, which had helped them to temporarily quit. Most had tried to quit on their own (i.e., cold turkey), and one participant interpreted ongoing use of nicotine replacement therapy (NRT) as a reason not to use it.

> *"I've been trying to quit cold turkey. I don't really feel like the gum or anything like that works too well, and my brother did actually quit, and he used the gum. It was hard for him to even stop using the gum because it still has the nicotine in it. His recommendation to me was to quit cold turkey*." [25-year-old, male, Fresno]

A few participants used cannabis to cope with nicotine withdrawal symptoms.

> *"Smoking marijuana at night to get me to sleep was actually pretty helpful because I would go to sleep, with cold sweats, not having the nicotine in my system."* [25-year-old male, Fresno]

Participants described that tobacco and other substance use was common, where some participants substituted other substances (e.g., cannabis) for smoking. One participant found that decreasing the use of other substances decreased their cigarette consumption.

> *"Crystal [methamphetamine] and cigarettes went hand in hand. After you use one, I mean, you're gonna want the other, a finishing, topping off, type deal… I'd slow down, and then I stopped doing crystal, and then I kinda slowed down smoking."* [46-year-old male, Merced]

Another individual switched from combustible cigarettes to e-cigarettes to quit smoking but found he instead increased nicotine use.

> *"I did try to quit, but this was when the vape stuff started coming out, those little box mods. I found out that it made me crave tobacco even more. So, my smoking habit doubled from the time that I started vaping."* [Unknown age, male, Merced]

Recommendations for digital cessation tools

Many of the Spanish-speaking participants in the focus groups felt that what was available did not meet the specific needs, challenges, or preferences of other members in their community. Participants discussed that smoking cessation tools should be not only linguistically appropriate but also include lived experience of someone who understands their culture. Offering services in Spanish alone was not sufficient to be culturally appropriate.

> *"People who really correctly understand the words that we're saying, who understand and comprehend us. If they know the culture, maybe they know a reason why we seek refuge in cigarettes …. Maybe they could understand us and help us a little more."* [46-year-old, female, Madera]

In addition to information on quitting, participants felt that instructional materials to increase awareness of the dangers of secondhand smoke should be incorporated.

> *"I think it's really important for all of us smokers to be aware that secondhand smoke is harmful, especially for our immediate family, our spouse, our kids, even our neighbors or*

coworkers." [54-year-old, male, Madera]

When asked for general recommendations for digital cessation tools, participants expressed interest in social connections.

"Just the fact of being able to kind of communicate with people that are dealing with the same issues as you is nice." [24-year-old, female, Fresno]

Younger participants from Fresno also expressed interest in *"more real-life examples instead of just a big X on a vape pen."*[36-year-old, female, Fresno] and something easy to navigate.

"*Something that's user friendly. Something that doesn't require too many clicks. There's nothing worse than downloading an app, or opening a website, and "Oh, you have to do this step, and this step."* [24-year-old, female, Fresno]

Some individuals expressed interest in daily digital posts that they could relate to.

"I think something like an app designed to hook you in. I know a lot of people open up these like word of the day, something that'll cause you to think, "Okay. Am I feeling that? I think that would be a good way to help people stop smoking, if you have a day to day, like, "Oh, let me check the app and see if I can relate to it today." [25-year-old, female, Fresno]

Semi-structured interviews on perspectives of the MO app and Quit the Hit intervention

Appealing features of the MO smoking cessation app

Participants liked a feature of the MO app, which was a crave/urge button that connected to immediate cessation support on demand. They also liked being able to track their own data on their use behaviors on the app.

"*I also like the urge button where the photo was pulled…when you're kind of struggling in that moment, it gives you immediate assistance.*" [25-year-old, female, Fresno]

Participants found relapse planning features of the app, including tips to modify their environment or rituals to avoid smoking cues that increase cravings (e.g., avoiding the usual route to work where

they buy cigarettes, rearranging furniture) to be helpful.

> *"It changes your route. If you go to the store to buy a cigarette, it'll try to change your route. It's got ways that help you quit smoking. It figures your [routine]. Basically, trying to prevent you from smoking."* [46-year-old, male, Merced]

Some individuals preferred the app because it offered privacy for cessation support which they preferred to interacting over social media.

> "*It kind of reminded me of a journal."* [24-year-old, female, Fresno]

Appealing features of the "Quit the Hit" social media support groups

Participants liked the interactive engaging content and opportunity for social and peer support with people with shared experience:

> *"It's cool, comfortable, and more interactive with other people; it feels more human and more real, sharing the challenge because it feels like a challenge."* [39-year-old, female, Madera]

Other appealing features of Quit The Hit was the availability and accessibility of a peer counselor, similar to other in-person models of substance use treatment like Alcoholics Anonymous or Narcotics Anonymous.

> *"The main thing is that week by week a counselor will talk to us to give us points of view that would be good to help us that week."* [46-year-old, female, Madera]

Participants liked the idea of interacting with other members of their group when they needed it as social support and to hold themselves accountable.

> *"I liked the fact that the other members of the group motivate each other and give you advice. They help you not to get discouraged if you fail, don't stop, start again."* [Age unknown, female, Madera]

Participants also liked that the program was structured over 5 weeks, perceiving the time allotted allowed substantial progress in behavior change at their own pace.

"They give you time, let's say the message you are sending me is that in five weeks I can make a big change." [46-year-old, female, Madera]

Unappealing features of MO and Quit the Hit digital interventions

A few participants expressed dissatisfaction with both interventions, describing practical inconveniences in their daily routines. For instance, a participant highlighted difficulties engaging with interventions while at work.

"*For some people it's functional, but… I couldn't be tracking or marking that kind of stuff because I work with clients."* [57-year-old, female, Madera]

Some participants reported technological-related concerns with an app such as a need for extra storage space on their device, or the need for an internet connection or a charged battery. Other participants were uninterested in social media interventions, preferring *"person to person contact"* [57-year-old, female, Madera]. Others expressed concerns about privacy.

"When you're adding and kind of joining with other people, my personal information is also out there. So, for some people, they like creating that community and making friends. But also, I like to keep my stuff separate." [24-year-old, female, Fresno]

Some participants felt the support should be anonymous to avoid stigma.

"The negative stigma that comes from addiction… Yeah, your business. It's supposed to be anonymous like N[arcotics] A[nonymous]. Nobody talks about it. There's no record of it. So, I would probably go off of social media." [Unknown age, male, Merced]

Other participants who did not currently use social media reported not wanting to join social media simply to access a support group.

Recommendations for culturally-tailored digital interventions

Participants expressed interest in several features that could apply broadly to digital cessation tools. For example, participants expressed interest in a chance to earn prizes, money or other tangible compensation as opposed to points.

> *"Coupons, restaurants that are near them, maybe coupons for the grocery store or free Pepsis, free gum. I don't know, some kind of coupons for something."* [46-year-old, male, Merced]

Participants expressed a need for digital tools to be visually appealing and attention-grabbing. They also suggested materials to discuss tobacco use and vaping within the context of other life stressors, and other addictions including substance use.

> *"Addictions can be to tobacco, drugs, food, or any other substance, and almost all of them have the same components here in the brain, and they are treated in the same way. Psychologists or psychiatrists treat it in the same way and with very similar medications."* [54-year-old, female, Madera]

Participants reported that linking treatment for tobacco use with other substance use could help prioritize the issue of tobacco use, particularly in SJV counties where counseling and support services are scarce.

> *"Like I said, other chemicals and everything else, because it's not really informative over here, especially in our location where it's at with the behavioral health aspect. You could probably partner up with them and then get professional opinions or have someone on standby, when people have a burning desire or something, if you were to go out with the different aspects of every chemical out there, not just tobacco, because tobacco's really not a priority right now for most of us."* [Unknown age, male, Merced]

They expressed interest in linkages to other related interventions like acupuncture, or games to keep busy and cope with stressors.

> *"I would still add relaxation techniques, breathing techniques. I have been to acupuncture, and it helps a lot with anxiety and stress."* [46-year-old, female, Madera]

Discussion

Principal Findings

Our research highlights the need for tobacco cessation tools for people living in economically challenged rural areas, such as the SJV. Our study indicated that both older and younger predominantly Latino adults who smoked or vaped nicotine were amenable to digital cessation tools, particularly when these interventions were delivered in a culturally affirming way that included not only language concordance but also relevant lived experiences. Consistent with past studies[6, 30], participants smoked or vaped as a coping response to stressors[31], many did not use pharmacotherapy to quit, and most attempted to quit on their own. Latino smokers may hold misperceptions about the addictiveness of NRT[7]. This suggests a need for programs to support evidence-based counseling and education about pharmacotherapy to improve cessation outcomes[32]. For Latinos, the stress of acculturation to United States (US) culture[33] and experiencing discrimination increases the risk of smoking[34, 35]. Digital interventions that address stress as a trigger and that integrate pharmacotherapy may be beneficial.

Older Spanish-speaking participants preferred culturally tailored tobacco cessation services. Participants reported that a major barrier was language, but further noted that offering an intervention in Spanish language alone was not sufficient to demonstrate cultural sensitivity. Participants emphasized the need for counselors or messages to express empathy toward their particular circumstances, as well as needs for relatable peer support, and personalized approaches like individualized text messaging in Spanish to increase engagement among Latinos[36].

To overcome these barriers, evidence-based solutions can be integrated into the design and delivery of digital cessation tools. First, digital health interventions delivered or introduced by trained community health workers (CHWs) or *promotoras/es* (Spanish-speaking CHWs) from the SJV might increase buy-in among older, Spanish-speaking participants[37]. CHWs and promotoras/es, as trusted members of the community who speak the same language and understand cultural practices, can be trained to deliver tobacco cessation interventions supported by digital

tools[37]. In prior work, lay health worker cessation interventions had superior abstinence rates compared to referrals to a Spanish-language Quitline (20.5% versus 8.7%, respectively)[38]. Second, providing culturally tailored, accessible cessation materials (e.g., mailed written material) to adults who prefer Spanish educational material improves quit rates[39]. A pilot study evaluating a culturally and linguistically tailored text message intervention combined with NRT, found moderate to high levels of acceptability, good engagement measured by the number of text messages participants sent during the 12 weeks of program, improvements in self-efficacy; this intervention reported a 30% biochemically verified abstinence rate [40].

While older participants expressed openness to use digital interventions, some lacked the familiarity and comfort with social media to engage with these platforms. In contrast, younger participants were more receptive to social media-based interventions but emphasized the need for attention-grabbing, user-friendly, and easy-to-navigate tools. Younger participants did not emphasize culturally affirming support as much as older participants, but expressed interest in peer supports and lived experience of quitting. Very few existing apps include these features[21]; both the QTH intervention MO app include a chat function, and MO offers greater privacy. To increase the use of digital cessation tools, it is important to account for digital literacy, technological issues (e.g., internet connectivity or memory or battery life), peer support, and age-appropriate messaging.[41, 42] The use of incentives and reminders was appealing to many participants. Overall, we found smartphone apps[43] and social media interventions[44] are acceptable digital health tools that could help Latinos quit smoking if tailored to enhance engagement[44].

Participants reported poly-use of tobacco with other substances, including cannabis and crystal methamphetamine, but neither digital intervention offered treatment for poly-use. For some, decreasing other substances use resulted in decreases in their smoking and vaping, but others found that they substituted cigarettes to cope with quitting other substances. Treatment for tobacco and substance use can be integrated to improve substance use outcomes, and should be investigated

further in this population[45]. Smoking cessation interventions among people with substance use disorders can increase long-term abstinence from all substances by 25%[46]. Participants expressed that there was a dearth of substance use treatment supports in the SJV and suggested tobacco cessation to be integrated with mental health and substance use treatment resources.

Limitations

This study captured the unique voices from people who are often underrepresented in cessation research, particularly Spanish-speaking Latino individuals in the US. Although inclusive of Spanish-speaking Latino participants, these findings are from a small sample (29 participants) from three counties, recruited through community-based organizations, which might not generalize to other California populations, including the remaining five SJV counties. Participants were presented with videos of two protype digital smoking cessation tools rather than directly testing them, and recommendations may differ if the cessation tools were used in real-world settings.

Conclusion

This study provides insights into digital smoking cessation tool preferences among predominantly low income and Latino residents of the San Joaquin Valley, a region with urgent need of cessation services. Using a community-engaged approach, we found participants expressed interest in linguistically appropriate and culturally tailored digital cessation tools featuring empathy toward their circumstances, relatable peer supports, engaging content, easy access to information and support, and social or material rewards. Intervention interests varied by age and digital literacy. Findings can inform strategies to improve access to evidence-based smoking cessation support to address tobacco disparities.

Our findings underscore the importance of customizable, culturally affirming digital health interventions for tobacco cessation. Overall, participants appreciated both the MO app and the Quit the Hit intervention, but expressed additional desires for features meeting their specific preferences and concerns. Future research should explore the real-world application and effectiveness of

culturally informed digital interventions, with a focus on social support and user engagement strategies to support smoking cessation in the SJV.

Acknowledgments

This work was supported by a UCSF Helen Diller Family Comprehensive Cancer Center Intramural grant and the National Institutes of Health (CA-113710 and DA-057216). The content is solely the responsibility of the authors and does not necessarily represent the official views of the funding agencies. The authors are grateful to the participants who participated in the focus groups and interviews. We also thank our community partner, the California Health Collaborative, who provided input to the study materials and led connections with other agencies through which we recruited participants. We would also like to thank Dr. Nancy Burke, Dr. Allison Temourian, and Gisselle Navarro-Lopez for their early input on this project. We would also like to thank our hard-working UC Merced NCPC and UCSF interns, Mary Garcia, Justin Naidu, Erin Matsubara, and Karina Vazquez. Their contributions in either helping with translating materials from English to Spanish, coding, or leading the notetaking and observation notes during focus group sessions and pilot testing was instrumental to the project.

Authors' Contributions

MV served as the principal investigator of the funded project, obtained funding, developed the study methodology, study recruitment, and supervised the study. AD supervised the study, developed the study methodology, study recruitment, moderated focus groups, coded focus groups, coded interviews, and reviewed and edited the iterations of the manuscript. KDL developed the study methodology, study recruitment, moderated focus groups, moderated interviews, coded focus groups, coded interviews, and led the writing of this manuscript. SS coded focus groups, moderated interviews, coded interviews, and reviewed and edited iterations of the manuscript. PML assisted with funding acquisition, study methodology, reviewed, and edited the iterations of the manuscript. PB and AS reviewed, and edited the iterations of the manuscript.

Conflicts of Interest

None declared.

Abbreviations

MO: smoking cessation app abbreviated from the words “mobile” and “motivation”

QTH: Quit the Hit intervention

SJV: San Joaquin Valley

Data Availability

Our data set is small and primarily qualitative. It may include personal information, even after it has been de-identified. A limited data set generated and analyzed during this study will be available upon request from the corresponding author and after signing a data-sharing agreement to protect the confidentiality of participants.

References

1. California Department of Public Health. California Tobacco Facts and Figures 2024. Sacramento, CA: California Department of Public Health; 2024 [7/29/2024]; Available from: https://www.cdph.ca.gov/Programs/CCDPHP/DCDIC/CTCB/CDPH%20Document%20Library/ResearchandEvaluation/FactsandFigures/CaliforniaTobaccoFactsAndFigures2024.pdf.
2. California Department of Public Health. California Tobacco Facts and Figures 2021. Sacramento, CA: California Department of Public Health; 2022 [10/16/2023]; Available from: https://www.cdph.ca.gov/Programs/CCDPHP/DCDIC/CTCB/CDPH%20Document%20Library/ResearchandEvaluation/FactsandFigures/CaliforniaTobaccoFactsAndFigures2021-V3A.pdf.
3. United States Census Bureau. QuickFacts San Joaquin County, California. . 2021 [10/17/2023]; Available from: https://www.census.gov/quickfacts/sanjoaquincountycalifornia.
4. Kissam E, Mines R, Quezada C, Intili JA, Wadsworth G. San Joaquin Valley Latino Immigrants: Implications of Survey Findings for Census 2020. San Joaquin Valley Health Fund. 2019.
5. Prevention USCfDCa. Hispanic and Latino People Experience a Health Burden From Commercial Tobacco. 2024; Available from: https://www.cdc.gov/tobacco-health-equity/collection/hispanic-latino-health-burden.html.
6. Babb S, Malarcher A, Schauer G, Asman K, Jamal A. Quitting smoking among adults—United States, 2000–2015. Morbidity and Mortality Weekly Report. 2017;65(52):1457-64.
7. Santiago-Torres M, Mull KE, Sullivan BM, Cupertino AP, Salloum RG, Triplette M, et al. Evaluating the Impact of Pharmacotherapy in Augmenting Quit Rates Among Hispanic Adults in an App-Delivered Smoking Cessation Intervention: Secondary Analysis of a Randomized Controlled Trial. JMIR Formative Research. 2025;9:e69311.
8. Carpenter MJ, Ford ME, Cartmell K, Alberg AJ. Misperceptions of nicotine replacement therapy within racially and ethnically diverse smokers. Journal of the National Medical Association. 2011;103(9-10):885-96.
9. Mayer M, Reyes-Guzman C, Grana R, Choi K, Freedman ND. Demographic characteristics, cigarette smoking, and e-cigarette use among US adults. JAMA network open. 2020;3(10):e2020694-e.
10. Barufaldi LA, Guerra RL, Rita de Cássia R, Nascimento A, Chança RD, de Souza MC, et al. Risk of smoking relapse with the use of electronic cigarettes: a systematic review with meta-analysis of longitudinal studies. Tobacco prevention & cessation. 2021;29:29.
11. Pew Research Center. Mobile Fact Sheet. 2024; Available from: https://www.pewresearch.org/internet/fact-sheet/mobile/.
12. Pew Research Center. Americans' Use of Mobile Technology and Home Broadband. 2024; Available from: https://www.pewresearch.org/internet/2024/01/31/americans-use-of-mobile-technology-and-home-broadband/.
13. Pew Research Center. Social Media Use in 2021
A majority of Americans say they use YouTube and Facebook,
while use of Instagram, Snapchat and TikTok is especially
common among adults under 30. . 2021; Available from:

https://www.pewresearch.org/internet/wp-content/uploads/sites/9/2021/04/PI_2021.04.07_Social-Media-Use_FINAL.pdf.
14. Chen YF, Madan J, Welton N, Yahaya I, Aveyard P, Bauld L, et al. Effectiveness and cost-effectiveness of computer and other electronic aids for smoking cessation: a systematic review and network meta-analysis. Health Technol Assess. 2012;16(38):1-205, iii-v. PMID: 23046909. doi: 10.3310/hta16380.
15. Ramo DE, Thrul J, Chavez K, Delucchi KL, Prochaska JJ. Feasibility and quit rates of the tobacco status project: a Facebook smoking cessation intervention for young adults. Journal of medical Internet research. 2015;17(12):e291.
16. Thrul J, Tormohlen KN, Meacham MC. Social media for tobacco smoking cessation intervention: a review of the literature. Current addiction reports. 2019;6:126-38.
17. Ramo DE, Thrul J, Delucchi KL, Hall S, Ling PM, Belohlavek A, et al. A randomized controlled evaluation of the tobacco status project, a Facebook intervention for young adults. Addiction. 2018;113(9):1683-95.
18. Luo T, Li MS, Williams D, Phillippi S, Yu Q, Kantrow S, et al. Using social media for smoking cessation interventions: a systematic review. Perspectives in Public Health. 2021;141(1):50-63.
19. Guo Y-Q, Chen Y, Dabbs AD, Wu Y. The effectiveness of smartphone app–based interventions for assisting smoking cessation: systematic review and meta-analysis. Journal of medical Internet research. 2023;25:e43242.
20. Zhou X, Wei X, Cheng A, Liu Z, Su Z, Li J, et al. Mobile Phone–Based Interventions for Smoking Cessation Among Young People: Systematic Review and Meta-Analysis. JMIR mHealth and uHealth. 2023;11(1):e48253.
21. Bold KW, Garrison KA, DeLucia A, Horvath M, Nguyen M, Camacho E, et al. Smartphone apps for smoking cessation: systematic framework for app review and analysis. Journal of Medical Internet Research. 2023;25:e45183.
22. Micalizzi L, Mattingly DT, Hart JL, Jensen JK, Mahabee-Gittens EM, Garrison KA, et al. Smartphone Apps Targeting Youth Tobacco Use Prevention and Cessation: an Assessment of credibility and quality. Current Addiction Reports. 2023;10(4):649-63.
23. Fagerstrom K. Time to first cigarette; the best single indicator of tobacco dependence? Monaldi Archives for Chest Disease. 2003;59(1):91-4.
24. Zhou S, Brunetta P, Silvasstar J, Feldman G, Oromi N, Bull S. A Smartphone App (MO) to Provide Tailored and Comprehensive Support for Smoking Cessation: A Pilot Multi-Cohort Study to Evaluate Acceptability, Usability, and Effectiveness Journal of Medical Internet Research. 2023. doi: 10.2196/preprints.55239.
25. Lyu JC, Olson SS, Ramo DE, Ling PM. Delivering vaping cessation interventions to adolescents and young adults on Instagram: protocol for a randomized controlled trial. BMC Public Health. 2022;22(1):1-10.
26. Zhou S, Brunetta P, Silvasstar J, Feldman G, Oromi N, Bull S. Initial evaluation of acceptability, engagement, and effectiveness of the MO app to provide tailored and comprehensive support for smoking cessation: Development and usability study. JMIR mHealth and uHealth. 2024;12:e55239.
27. Lyu JC, Meacham MC, Nguyen N, Ramo D, Ling PM. Factors Associated With Abstinence Among Young Adult Smokers Enrolled in a Real-World Social Media Smoking Cessation Program.

Nicotine & Tobacco Research. 2023. doi: DOI: 10.1093/ntr/ntad170.
28. Braun V, Clarke V. Using thematic analysis in psychology. Qualitative research in psychology. 2006;3(2):77-101.
29. Braun V, Clarke V. Reflecting on reflexive thematic analysis. Qualitative research in sport, exercise and health. 2019;11(4):589-97.
30. Levinson AH, Pérez-Stable EJ, Espinoza P, Flores ET, Byers TE. Latinos report less use of pharmaceutical aids when trying to quit smoking. American journal of preventive medicine. 2004;26(2):105-11.
31. Nguyen N, Islam S, Llanes KD, Koester K, Ling PM. Classification of patterns of tobacco and cannabis co-use based on temporal proximity: a qualitative study among young adults. Addictive Behaviors. 2024:107971.
32. Stead LF, Koilpillai P, Fanshawe TR, Lancaster T. Combined pharmacotherapy and behavioural interventions for smoking cessation. Cochrane database of systematic reviews. 2016 (3).
33. Lorenzo-Blanco EI, Unger JB, Ritt-Olson A, Soto D, Baezconde-Garbanati L. Acculturation, gender, depression, and cigarette smoking among US Hispanic youth: The mediating role of perceived discrimination. Journal of youth and adolescence. 2011;40:1519-33.
34. Dawson DB, Fletcher TL. The influence of racial/ethnic discrimination experiences on cigarette craving for African American and Hispanic smokers. Journal of Racial and Ethnic Health Disparities. 2021;8:1047-53.
35. Lorenzo-Blanco EI, Unger JB. Ethnic discrimination, acculturative stress, and family conflict as predictors of depressive symptoms and cigarette smoking among Latina/o youth: The mediating role of perceived stress. Journal of youth and adolescence. 2015;44:1984-97.
36. El-Toukhy S, Kamke K. Intervention targeting and retention, engagement and abstinence outcomes among Latino and White users of Smokefree. gov text messaging programmes: a cross-sectional study. BMJ public health. 2023;1(1).
37. Woodruff SI, Candelaria JI, Elder JP. Recruitment, training outcomes, retention, and performance of community health advisors in two tobacco control interventions for Latinos. Journal of community health. 2010;35:124-34.
38. Woodruff SI, Talavera GA, Elder JP. Evaluation of a culturally appropriate smoking cessation intervention for Latinos. Tobacco Control. 2002;11(4):361-7.
39. Simmons VN, Sutton SK, Medina-Ramirez P, Martinez U, Brandon KO, Byrne MM, et al. Self-help smoking cessation intervention for spanish-speaking Hispanics/Latinxs in the United States: A randomized controlled trial. Cancer. 2022;128(5):984-94.
40. Cartujano-Barrera F, Sanderson Cox L, Arana-Chicas E, Ramírez M, Perales-Puchalt J, Valera P, et al. Feasibility and acceptability of a culturally-and linguistically-adapted smoking cessation text messaging intervention for Latino smokers. Frontiers in Public Health. 2020;8:269.
41. Crane D, Garnett C, Brown J, West R, Michie S. Factors influencing usability of a smartphone app to reduce excessive alcohol consumption: think aloud and interview studies. Frontiers in public health. 2017;5:240357.
42. Guan M, So J. Influence of social identity on self-efficacy beliefs through perceived social support: A social identity theory perspective. Communication Studies. 2016;67(5):588-604.
43. Santiago-Torres M, Mull KE, Sullivan BM, Zvolensky MJ, Bricker JB. Can a smartphone application help Hispanic/Latinx adults quit smoking? A randomized trial secondary analysis.

Journal of contextual behavioral science. 2022;26:261-70.
44. Naslund JA, Kim SJ, Aschbrenner KA, McCulloch LJ, Brunette MF, Dallery J, et al. Systematic review of social media interventions for smoking cessation. Addictive behaviors. 2017;73:81-93.
45. McKelvey K, Thrul J, Ramo D. Impact of quitting smoking and smoking cessation treatment on substance use outcomes: An updated and narrative review. Addictive behaviors. 2017;65:161-70.
46. Prochaska JJ, Delucchi K, Hall SM. A meta-analysis of smoking cessation interventions with individuals in substance abuse treatment or recovery. Journal of consulting and clinical psychology. 2004;72(6):1144.