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Feasibility and Acceptability of Spanish-language Facebook Group on Latino Parents' COVID-19 Vaccine Beliefs: Case study of the Brigada Digital de Salud

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Abstract

Background

COVID-19 vaccine uptake among U.S. Latino adults has been slower than other groups, and younger Latino children continue to be underrepresented among vaccinated populations. Parental vaccine hesitancy has been an important barrier, often stemming from concerns about safety, effectiveness, side effects, and exposure to social media misinformation. The Brigada Digital de Salud was established in May 2021 to address misinformation by disseminating credible, science-based, and culturally-appropriate COVID-19 information in Spanish on social media platforms.

Methods

We conducted a 5-week randomized controlled trial in August-September, 2022 using two private Facebook groups (n = 55 intervention and n = 65 control) to test intervention feasibility and acceptability of COVID-19 vaccine promotion among Spanish-speaking Latino parents. Also of interest were the effects of Brigada Digital content on vaccine beliefs, intentions, and uptake. Intervention participants received daily COVID-19 prevention and vaccination posts with prompts for interaction. All study participants completed baseline and follow-up surveys. Participant engagement was assessed using Facebook analytics.

Results

Feedback from intervention participants regarding content, moderators, and group experience was positive. Participants agreed that posts were informative (4.3/5), trustworthy (4.2/4), and addressed their COVID-19 vaccine concerns (4.2/5). Participants also agreed that moderators were well-informed (4.3/5) and helpful (4.2/5), and they would recommend the group to a friend (4.4/5). Participants remained engaged in the group for the 5-week period, and had, on average, 36.4 post views, 10.6 post reactions, and 3 post comments per participant. Both intervention and control group participants reported greater COVID-19 vaccine-supportive beliefs for adults and children at follow-up; these beliefs increased more among intervention participants, though differences were not statistically significant. When asked about why parent participants had not yet vaccinated their children across all ages, reasons mirrored those reported nationally, with principal concerns being related to potential side effects, safety, and that the vaccine was developed too quickly

Conclusions

This intervention approach shows considerable promise for Latino parents in terms of feasibility, appeal, and appropriateness, and preliminary evidence suggest potential to improve parent COVID-19 vaccine

beliefs for adults and children. This intervention approach and content should be further tested with groups of parents who express less supportive COVID-19 vaccine views or have unvaccinated children.

Background

Racial/ethnic disparities in COVID-19 morbidity and mortality in the U.S. have become apparent, with Latino adults being 1.5 times more likely to be infected, 2.3 times more likely to be hospitalized, and are 1.8 times more likely to die from COVID-19 (1–5). Studies have also shown that during various periods of the pandemic, Latino children under age 18 have had higher COVID-19 case rates, hospitalization, related multisystem inflammatory syndrome (MISC-C) and deaths than White children (6–11).

Even though COVID-19 vaccines are highly effective at reducing risk of severe disease and mortality for adults and children, vaccine uptake among Latinos adults in the U.S. has been slower compared to other groups, and Latino children continue to be underrepresented among vaccinated populations for some age groups (12–16). As of March 15, 2023, 57.1% of Latino adults had completed a primary vaccine series, and 8.5% had received a bivalent booster dose, which was the lowest booster dose coverage across all racial/ethnic subgroups (noting incomplete data on race/ethnicity for 20.3% of individuals) (17). Among Latino children and adolescents, as of August 31, 2022, coverage with the 2-dose COVID-19 vaccine series was 28.8% for ages 5–11 years, 57.8% for ages 12–15 years; 70.4% for ages 16–17 years (15). Coverage with a booster dose for Latino children was low at 4.6% for ages 5–11 years, 20.7% for ages 12–15, and 32.3% for ages 16–17 (15). The youngest children continue to be the most under-vaccinated, with 10.1% of children aged 6 months–4 years having received at least 1 dose, and 5.1% having completed the primary vaccine series as of December 21, 2022. In this youngest age group, only 19.9% of children who received at least 1 dose were Latino (noting incomplete data on race/ethnicity), despite constituting 25.9% of the population in this age group (16,18).

Studies have shown that vaccine hesitancy has been an important barrier among U.S. Latinos (4,12,14,19–21) and among Latino parents with regards to vaccinating their children (15,16,22–25). Parent intentions to vaccinate younger Latino children have remained low. Data collected during July 1–September 30, 2022 as part of the National Immunization Survey indicated that among U.S. Latino parents with unvaccinated children, the proportion responding that they “definitely wouldn’t” or “probably wouldn’t vaccinate their child” was 31.5% for children ages 5–11, 17.5% for children/adolescents ages 12–15, and 15.2% for adolescents ages (16–17). By comparison, 2 studies in 2022 and 2023 by Fisher and colleagues showed that almost half of U.S. Latino parent participants did not intend to vaccinate their child under age 5, and just over one-fifth were unsure (22,24). Research has shown that parental hesitancy about the pediatric COVID-19 vaccine and lower vaccine intentions predominantly stem from concerns about safety, effectiveness, potential short- and long-term side effects, beliefs its unnecessary for younger children, perception that it was developed too quickly, as well as from government and pharmaceutical company mistrust (15,22,24,26–32).

Exposure to misinformation has fueled parent concerns and has played an important role in vaccine hesitancy among U.S. Latinos. Throughout the pandemic, U.S. Spanish-speaking populations have experienced major gaps in timely, accurate COVID-19 information (12,19,33–35), combined with disproportionate exposure to COVID-19 misinformation, conspiracy theories and hoaxes, and targeted disinformation efforts on social media platforms (22,32,36–38). Studies have documented the link between exposure to COVID-19 vaccine misinformation on social media and negative vaccine attitudes, lower trust in science, confusion about which information sources to trust, and decreased vaccination acceptance and intentions (39–42). A 2021 review study showed that across 13 studies (n = 107,841), vaccination hesitancy was 30.2% among Latinos, and hesitancy was associated with higher levels of medical mistrust and exposure to myths and misinformation (43). A 2022 study by Romer and colleagues also found that among U.S. parents of children ages 5–11, misinformation was a stronger predictor of COVID-19 vaccination than concerns about health effects of COVID-19 on their children (44). With U.S. Latinos increasingly using social media as an important source of health information and as a tool for information sharing (45,46), these platforms have also become a major source of false COVID-19 information that has influenced vaccination intentions. A 2021 nationwide poll found that 49% of Latino participants thought that COVID-19 misinformation was a very serious problem, and 20% said they had wrong or harmful information about the COVID-19 vaccine shared directly with them, most commonly through Facebook (47).

To address the proliferation of COVID-19 misinformation and narratives fueling vaccine hesitancy in Spanish social media networks, we established the Brigada Digital de Salud (Digital Health Brigade) in May of 2021 to disseminate credible, science-based, and culturally-appropriate COVID-19 information in Spanish. The Brigada Digital effort includes accounts on Facebook, Instagram, Twitter, and TikTok, and content seeks to communicate COVID-19 risk, prevention, and testing, promote vaccination for adults and children, provide regular news and scientific updates, explain changes in COVID-19 policies, and to correct COVID-19 misinformation. This study examined the feasibility and acceptability of a moderated, private Facebook group aimed at educating U.S. Latino parents about COVID-19 vaccines using Brigada Digital content.

Methods

Study Design. We conducted a 5-week randomized controlled trial (RCT) using two private Facebook (FB) groups to test the feasibility and acceptability, as well as examine secondary outcomes of vaccine beliefs, intentions to vaccinate, and vaccine uptake among Latino parents and their children under age 18.

Participant Recruitment and Enrollment. Between August 12–22, 2022, study participants were recruited through 8 targeted Spanish language FB advertisements seeking participation of U.S.-based parents of children under age 18. Advertisements were placed through the Brigada Digital FB account, and interested individuals were directed to a web link where they could complete an 8-item screener to determine eligibility. The advertisements reached a total of 48,459 people and resulted in 1,382 link clicks. Within 3

weeks of the advertisements, 250 individuals completed the eligibility screener. Eligible participants included Latino adults aged 18 or older who were parents of at least one child under age 18, were partially vaccinated or unvaccinated against COVID-19, spoke fluent Spanish, and reported using FB at least once daily.

A total of 120 people met the criteria for study eligibility, and were automatically provided a link to an informed consent form and the Qualtrics-administered baseline survey. Individuals who completed the baseline survey were randomized by Qualtrics to either the intervention or control FB groups, and were instantly emailed a confirmation message, including a link to request to join their assigned FB group. The groups were named similarly ("Vaccine Conversations 1" and "Vaccine Conversations A"), so it was not evident to which group they had been randomized. Prior to permitting participant entry into groups, baseline survey responses were reviewed and cross-checked with individuals requesting group entry. At this point, it was discovered that the baseline survey had been completed 523 times. With more baseline surveys than individuals screened, the study team reviewed baseline survey data and identified individuals who were ineligible for the study based on their survey responses (i.e., they had likely circumvented the screening process), having not provided a valid zip code or place of residence in the U.S., having completed the survey multiple times with conflicting responses, or having providing a name that did not match the FB account requesting to join the FB groups. Once eligibility was confirmed, participants were permitted entry to their assigned intervention (n = 55) or control (n = 65) FB group, after which they were considered enrolled, and they received a $25 gift card incentive. Once participants had joined, both groups were able to see and react to posts in the group. For intervention group members, they were provided with group rules and expectations of respectful behavior, and once in the group, they were able to comment on posts, but were not able to post directly in the group or share posts outside of the group. For control group participants, commenting on posts was disabled.

Intervention Description.

Participants in the intervention group were welcomed in Spanish by two group moderators. A pre-recorded welcome video was also posted in the intervention group, further explaining the purpose of the group, what to expect, and to familiarize participants with both moderators' training and expertise. Intervention group members were also asked to introduce themselves to the group, say where they lived, and share something they liked to do in their free time in an effort to foster a friendly and more personalized group environment.

Brigada Digital Facebook intervention content was developed to provide science-based, culturally-appropriate COVID-19 information in Spanish to communicate changing levels of COVID-19 risk, promote COVID-19 prevention, testing, vaccination for adults and children, provide important news updates, and correct COVID-19 misinformation.

Post Frequency, Purpose, and Format. At the beginning of the intervention, we shared the first 3 posts upfront so participants had content to view upon entry to the group. Then, over the course of five weeks, intervention group participants received 3–4 FB posts per day, for a total of 101 posts, that were

scheduled to be delivered at the regular times of 10:00am, 3:00pm, 5:00pm, and 7:00pm. As members of the group, participants could also visit the group's page, scroll through posts, and engage with content at any time. At least 2 posts per day had the purpose of being educational, 1 post was intended to boost engagement, and 1 post aimed to counter common COVID-19 misinformation. Intervention content was developed to be accessible to an audience with variability in terms of general literacy and health literacy levels (48–50). Complex scientific concepts were explained in simplified terms, often through the use of visual illustrations, and longer text narratives were audio narrated in Spanish. The format of the group was modeled on prior research by the study team (51).

Content was developed to be delivered in varying formats, ranging from narrated slide carousels and animated images with text to video interviews and tutorials (See Figs. 1–3).

[INSERT FIGURES 1–3]

All video content portrayed Latino individuals, from physicians and community health workers to public health professionals and community leaders (See Fig. 4).

[INSERT FIGURE 4]

Intervention content also included video clips from a series of interviews that were broadcasted on a long-established, Spanish-language radio program, *Consultario Comunitario*, which airs daily on Radio America (1540 AM) and is hosted by a well-known physician in the Latino community, Dr. Elmer Huerta (52). The interviews included discussions with Brigada Digital community health educators and health promoters from our community-based clinical partner organizations, La Clínica del Pueblo and Proyecto Salud, and Mary's Center located in Washington, DC, and Maryland (See Fig. 5).

[INSERT FIGURE 5]

Messages, Framing, and Theoretical Basis.

Intervention content was informed by a culturally-relevant adaptation of Theory of Planned Behavior (TPB), whereby COVID vaccination depends on intention to vaccinate, which is influenced by beliefs about vaccination, social norms, perceived control to vaccinate, and attitudes about vaccination (53). Additionally, TPB was operationalized to include underlying cultural values and culturally normative social norms, including expectations of social closeness (i.e., *personalismo*) and the importance of family relationships (i.e., *familismo*), which have been widely applied in health promotion and communication interventions with Latinos (54–59).

Over the course of the 5-week intervention, content progressed through various themes related to COVID-19, beginning with fundamental scientific concepts behind disease transmission, then covering topics with increasing complexity. Content topic domains included: COVID-19 transmission and prevention; risk and severity of infection in adults and children; COVID-19 vaccine contents, safety and efficacy for adults,

children, and pregnant/breastfeeding individuals; boosters for adults and children; the science behind COVID-19 variants, vaccines, and immunity; the importance of masking and types of masks; when to test and how to obtain free tests; and COVID-19 treatment options. Posts also incorporated humor, easily recognized references from Latino culture, popular Latin music artists and songs, and connections to current events.

Development of Brigada Digital intervention social media posts acknowledged the multiple structural, socioeconomic and political factors that shape options for diverse Latino communities with respect to implementing COVID-19 prevention and mitigation recommendations. Standard messages, even when translated into Spanish, do not always take such factors into account, thus diminishing their potential impact. Messages were developed to be realistic given potential contextual barriers and focused on feasible behavior changes within these contexts.

Group Moderation and Participant Engagement. This model was designed to create a safe space to explore vaccine questions and improve overall support for vaccination for adults and children. Throughout the trial, moderators sought to engage group members in discussion about the posts by posing questions about the content, eliciting their opinions, and encouraging them to share their relevant experiences. As bilingual and bicultural individuals, moderators were highly experienced at adhering to culturally-appropriate expectations of respect and kindness in their interpersonal interactions with study participants (58–60). Furthermore, group activity was monitored on a daily basis to respond promptly to comments, and any engagement by participants was always acknowledged and praised by group moderators to encourage continued involvement. Additionally, we administered 5 weekly FB polls during the trial to inquire about group members' risk perceptions, attitudes, and vaccine intentions, which further guided moderators' engagement approach. Poll questions included: 1) "What is your biggest concern about the COVID-19 vaccine?"; 2) "What is your biggest concern that would prevent you from vaccinating your child against COVID-19?"; 3) "How do you feel about sending your children back to school with COVID-19 still circulating in our communities?"; 4) "How likely is it that you will vaccinate or boost your child in the next month?"; and 5) "What has been the biggest challenge to finding quality COVID-19 and vaccine information?".

Group moderators had expertise in the latest science around COVID-19 prevention, testing, treatment, masking, and vaccination for adults and children, and were experienced in responding to comments and questions about the COVID-19 virus and associated health risks from similar audiences. Facilitators acknowledged and validated all concerns of parent participants with empathy, regardless of its basis in science, and connect with participants through a shared concern for the wellbeing of our children. Moderators were also experienced in navigating conversations about COVID-19 that may include questions about misinformation and require a thoughtful, respectful examination of the evidence, correction of information, and provision of factual support. Finally, group activity and comments were monitored daily to ensure that participant comments did not violate group rules and expectations. At no point during the 5-week intervention did moderators need censor participant comments or remove individuals for violating group rules and standards of conduct.

The control FB group only received a link to the Centers for Disease Control and Prevention (CDC) COVID-19 information in Spanish (standard of care) at the beginning of the 5-week timepoint, and moderators did not further engage control participants during the trial, apart from outreach and reminders for follow-up survey data collection.

Data Collection. The online survey was self-administered through Qualtrics in Spanish, which took about 15 minutes to complete. The survey was conducted at baseline and at 5 weeks, immediately following intervention completion. The response rates at follow-up were 90.76% for the control group and 100% for the intervention group. At each time point, participants were emailed a one-time link to access the survey, and were then emailed an Amazon gift card incentive upon completion of each survey.

Measures.

The survey instrument collected information on sociodemographic variables, including age, race/ethnicity, sex, state of residence and zip code, household composition and presence of children in different age groups, education level, employment status, household income, English and Spanish proficiency (on a 5-point scale from “Very well” to “Not at all well”), diagnosis with a chronic health condition, health insurance coverage, and political views (on a 6-point scale from “Very conservative to “Very liberal”). In addition to these variables, the survey also included questions about preferred news sources and level of trust in various sources for COVID-19 information (i.e., healthcare provider, faith leader, news outlet, social media, federal government) on a 3-point Likert scale from “Not at all” to “A lot.”

Measures for primary outcomes included measures of intervention feasibility and acceptability. To assess feasibility, we examined whether all content was delivered to intervention group members as planned, what proportion of members were exposed to intervention content, and whether participants remained in the group for the 5-week duration. To assess acceptability, we examined participant engagement using FB group analytics, including post views, reactions, comments, and poll votes. Acceptability was also assessed through participants’ self-reported rating of their experience being in the intervention at 5 weeks (i.e., post-intervention follow-up). These items explored participants’ opinions about the content, timing, quantity, and frequency of posts, their level of trust in the information, their views about the group dynamics, moderators, and overall group experience, and whether they would recommend the group to a friend. These items were assessed by asking about participants’ level of agreement with a series of statements, using a 5-point Likert scale from “Strongly disagree” to “Strongly agree.”

Secondary outcome measures included COVID-19 vaccine beliefs for adults and children. As in Quinn et al. (61), beliefs were assessed across 4 domains on a scale from “Not at all” to “Completely:” 1) Confidence - two items on how much they thought the COVID-19 vaccine was safe and effective; 2) Complacency - two items on how much they thought the COVID-19 vaccine was necessary and important; 3) Convenience - two items on how much they thought the COVID-19 vaccine was convenient and affordable; and 4) Trust - one item on how much they trusted the COVID-19 vaccine.

Self-reported COVID-19 vaccine intentions and uptake were also measured for both adults and children. For all survey items regarding children, questions were asked for the specific age groups of under 5 years of age, ages 5–11, and ages 12–17. For vaccine uptake, participants were given response options of “I received 1 dose of a 2-dose series;” “I received both doses of a 2-dose series;” “I received a one-dose vaccine (for adults only);” and “I have not been vaccinated against COVID-19.” Adults and children indicating that they had received ≥ 1 dose(s) were coded as vaccinated. Adult participants were also asked whether they had been required to vaccinate. Intention to vaccinate was measured on a 4-point Likert scale from “Not at all likely” to “Very likely,” with adult participants rating their likelihood of getting a COVID-19 vaccine in the next 3 months. A question regarding reasons for not vaccinating children across the 3 age groups was also included.

Data Analysis.

For the intervention group only, we examined intervention acceptability and participant engagement. We examined the means (M) and standard deviations (SD) for survey items related to intervention acceptability. Additionally, FB analytics were used to track views, reactions, and comments for each post, and the number of times each participant engaged with the content was summed. The total average participant engagement sum was then calculated, as well as the average participant post views, reactions, and comments.

For intervention and comparison groups, we compared group characteristics at baseline and assessed changes in vaccine beliefs, intentions, and uptake at follow-up. We conducted descriptive analyses (e.g., means (M) and standard deviations (SD) for continuous variables; frequencies and percentages for categorical variables). Bivariate analyses were then conducted to compare those in the intervention and control groups in relation to socio-demographics, political views, preferred media sources, trusted COVID-19 information sources, and baseline adult and child/adolescent vaccination status using chi-squares and t-tests, as appropriate. T-tests were conducted to determine baseline and follow-up means and standard deviations for adult vaccine beliefs and child vaccine beliefs for the intervention and control groups. One-way ANOVAs were used to test whether these mean differences between groups were statistically significant from baseline to follow-up. Furthermore, data were imputed to assess changes in adult and child/adolescent vaccination and booster status at follow-up for intervention and control participants. Analyses were conducted in Stata SE v17, and alpha was set at 0.05.

Results

A total of 120 individuals were enrolled, with 55 people in the intervention group and 65 people in the control group. As seen in Table 1, both groups were very similar with regards to baseline sociodemographic characteristics, language competency, health insurance coverage, political views, preferred news media sources. With regards to self-reported levels of trust in different COVID-19 information sources, both groups were similar at baseline, with the exception of the intervention group being statistically significantly less likely to trust social media as a source of COVID-19 information (M = 1.96 vs M = 2.22; p = .008).

Table 1
Baseline Demographics and Sample Characteristics

	Overall N = 120*	Control N = 65	Intervention N = 55	
Variables	**N (%) or M (SD)**	**N (%) or M (SD)**	**N (%) or M (SD)**	**p-value**
Sociodemographics				
Age (M, SD)	38.4 (7.08)	38.40 (6.76)	38.40 (7.48)	.996
Male	8 (7.0)	5 (8.5)	3 (5.5)	
Female	104 (91.2)	54 (91.5)	50 (90.9)	.284
Race/Ethnicity				.191
White, Hispanic	92 (76.6)	48 (73.8)	44 (80.0)	
Black, Hispanic	8 (6.6)	5 (8.5)	3 (5.4)	
Other, Hispanic	14 (11.6)	6 (10.2)	8 (14.5)	
Education ≥ Bachelor's degree	36 (30.0)	18 (27.7)	18 (32.7)	.408
Household Composition				
Adults in household, M (SD)	2.33 (0.91)	2.25 (0.94)	2.44 (0.88)	.256
Children 0–4 yrs present	75 (62.5)	41 (63)	35 (63.6)	.110
Children 5–11 yrs present	66 (55.0)	31 (54.6)	35 (63.6)	.648
Children 12–17 yrs present	66 (55.0)	29 (47.7)	27 (49.0)	.501
Employment status				.877
Working for pay (< 35 hours)	26 (21.7)	15 (23.1)	11 (20.0)	
Working for pay (35 hours+)	29 (24.2)	16 (24.6)	13 (23.6)	
Unemployed	18 (15.0)	10 (15.4)	8 (14.6)	
Staying at home	41 (34.2)	22 (33.9)	19 (34.6)	
Other	6 (5.0)	2 (3.1)	4 (7.3)	
U.S.-born	10 (8.3)	5 (7.7)	5 (9.1)	.782
Household Income (2021) .251				
<$15,000/year	21 (17.5)	13 (20.0)	8 (14.5)	

	Overall N = 120*	Control N = 65	Intervention N = 55	
Variables	**N (%) or M (SD)**	**N (%) or M (SD)**	**N (%) or M (SD)**	**p-value**
Sociodemographics				
$15,000–19,999	10 (8.3)	8 (12.3)	2 (3.6)	
$20,000–24,999	19 (15.8)	12 (18.4)	7 (12.7)	
$25,000–34,999	31 (25.8)	16 (24.6)	15 (27.3)	
$35,000+	32 (26.6)	13 (20.0)	19 (34.5)	
Language Competency, M (SD)^				
Speak English well, M (SD)	3.48 (1.05)	3.57 (1.02)	3.36 (1.09)	.288
Speak Spanish well, M (SD)	1.43 (0.67)	1.48 (0.78)	1.38 (0.53)	.441
Political Views				.548
Very conservative	10 (8.3)	5 (7.7)	5 (9.1)	
Conservative	20 (16.7)	10 (15.4)	10 (18.2)	
Slightly conservative	22 (18.3)	9 (13.9)	13 (23.6)	
Moderate	48 (40.0)	30 (46.2)	18 (32.7)	
Slightly liberal	9 (7.5)	6 (9.2)	3 (5.5)	
Very liberal	11 (9.2)	5 (7.7)	6 (10.9)	
Health Insurance & Health Status				
Have health insurance	76 (63.3)	39 (51.3)	37 (48.7)	.505
Have chronic health condition	24 (20.0)	13 (20.0)	11 (20.0)	.808
Preferred News Media Sources				.365
Univision	20 (16.7)	9 (13.9)	11 (20.0)	
Telemundo	41 (34.2)	22 (33.9)	19 (34.6)	
Google news	23 (19.2)	12 (18.5)	11 (20.0)	
Other	36 (30.0)	22 (33.84)	14 (25.45)	
Trust in COVID info sources, M (SD)~+				
Doctor	2.71 (0.51)	2.72 (0.48)	2.70 (0.54)	.837

	Overall N = 120*	Control N = 65	Intervention N = 55	
Variables	**N (%) or M (SD)**	**N (%) or M (SD)**	**N (%) or M (SD)**	**p-value**
Sociodemographics				
Faith leader	2.06 (0.78)	2.14 (0.71)	1.94 (0.87)	.250
News	2.28 (0.54)	2.26 (0.54)	2.30 (0.54)	.726
Social media	2.10 (0.53)	2.22 (0.54)	1.96 (0.47)	.008
Federal government	2.34 (0.53)	2.36 (0.52)	2.33 (0.55)	.744
Local government	2.32 (0.57)	2.34 (0.57)	2.29 (0.58)	.645
CDC	2.63 (0.52)	2.70 (0.46)	2.56 (0.57)	.138
Community organization	2.33 (0.56)	2.39 (0.61)	2.25 (0.48)	.193
Vax Status - Adult				.299
0 doses	11 (9.2)	5 (7.7)	6 (10.9)	
1 dose	9 (7.5)	7 (10.8)	2 (3.6)	
Fully vaccinated	100 (83.3)	53 (81.5)	47 (85.5)	
Was required to vaccinate	39 (35.8)	25 (41.7)	14 (28.6)	.156
Vax Status - Children 0–4 yrs	**(n = 76)**	**(n = 41)**	**(n = 35)**	.772
0 doses	58 (76.3)	31 (75.6)	27 (77.1)	
1 dose	7 (9.2)	3 (7.3)	4 (11.4)	
Fully vaccinated	3 (3.9)	2 (4.9)	1 (2.8)	
Vax Status - Children 5–11 yrs	**(n = 66)**	**(n = 31)**	**(n = 35)**	.060
0 doses	31 (46.9)	11 (35.5)	20 (57.1)	
1 dose	4 (6.0)	1 (3.2)	3 (8.6)	
Fully vaccinated	30 (45.4)	19 (61.3)	11 (31.4)	
Vax Status - Adolesc. 12–17 yrs	**(n = 56)**	**(n = 29)**	**(n = 27)**	.968
0 doses	14 (25.0)	7 (24.1)	7 (25.9)	
1 dose	0 (0.0)	0 (0.0)	0 (0.0)	
Fully vaccinated	40 (71.4)	21 (72.4)	19 (70.4)	

	Overall N = 120*	Control N = 65	Intervention N = 55	
Variables	**N (%) or M (SD)**	**N (%) or M (SD)**	**N (%) or M (SD)**	**p-value**
Sociodemographics				

Notes: *Numbers that do not add up to the total indicate missing values; ^Scale of 1 = Very well to 5 = Not at all well; ~Scale of 1 = Not at all, 2 = A little, 3 = A lot; +Select all that apply

[INSERT Table 1]

Study participants had an average age of 38.0 (SD = 7.1), and the majority were female (91.2%), had less than a college education (70.0%), and were Spanish-language dominant (M = 1.4; SD = 0.67) and foreign-born (91.7%). Approximately half of participants worked full- or part-time (45.9), had health insurance (63.3), and preferred a Spanish-language news media source (50.9%), such as Telemundo or Univision. One-fifth of participants reported having a chronic health condition, and 67.5% of participants reported an annual household income of $35,000 or less. Regarding political views, the intervention group was relatively evenly split between individuals who reported holding more conservative or liberal views, while the control group held slightly more liberal views, but these differences were not statistically significant.

When asked about trusted sources of COVID-19 information, study participants identified their doctor (M = 2.7; SD = 0.5) and the CDC (M = 2.6; SD = 0.5) as most trusted, followed by the federal (M = 2.3; SD = 0.5) and local governments (M = 2.3; SD = 0.6) and community organizations (M = 2.3; SD = 0.6). Social media sources and faith leaders were the least trusted COVID-19 information sources, (M = 2.1; SD = 0,5 and M = 2.1; SD = 0.8, respectively).

At baseline, 9.2% of parent participants were unvaccinated against COVID-19, and 7.5% had received 1 dose of an initial 2-dose series. About one-third of parent participants indicated that they had been required to get the COVID-19 vaccine. Baseline vaccination status for children and adolescents differed from that of their parents, with vaccination being least likely among the youngest children. While 71.4% of adolescents ages 12–17 were reported as having completed the initial 2-dose series, only 46.1% of children ages 5–11 and 4.4% of children under age 5 had completed the vaccine series at baseline. Across all child/adolescent age groups, intervention group parent participants reported slightly lower levels of child vaccination with the 2-dose series.

Brigada Digital Intervention Feasibility and Acceptability.

A total of 101 posts were delivered to the intervention group, with 2–4 posts being delivered every day during 5-week period. During the study, no participants withdrew from the intervention FB group of 55 members, for a group member retention rate of 100%. Participants did engage with all posts, with overall

cumulative totals of 2,004 post views, 584 reactions, and 163 comments. On average, each participant had 36.4 post views, 10.6 reactions, and 3 comments. The average number of times that a participant engaged with the intervention during the 5 weeks was 50 times (See Table 2). When asked their opinions about the quantity of posts received in the group, 89.1% thought that they had received the right amount of posts and 10.9% thought that they had not received enough posts, but no respondents thought that they had received too many posts.

Table 2
Feasibility of Intervention: FB Group Engagement Metrics

Variables	Total	Average per Participant
Post views	2,004	36.4
Post reactions	584	10.6
Post comments	163	3
Total engagement (views, reactions, comments)	2751	50

[INSERT Table 2]

When asked to provide feedback about the Brigada Digital content, group moderators, and the group experience at follow-up, overall participants reported positive reactions. Intervention participants tended to agree or strongly agree that the group's posts were informative (M = 4.3; SD = 1.0), trustworthy (M = 4.2; SD = 0.8), delivered in a way that kept their attention (M = 4.2; SD = 0.8), addressed their concerns about the COVID-19 vaccine (M = 4.0; SD = 1.0), and came at the right time of day (M = 4.1; SD = 0.9) (See Table 3).

Table 3
Intervention Acceptability

Variables	M (SD)
Participant Ratings - Content^	
Posts in the group were informative	4.31 (1.08)
I trust the information received in this group	4.22 (0.87)
Posts addressed my vaccine concerns	4.05 (1.0)
The way information was delivered kept me interested	4.22 (0.85)
Posts came at the right time of day	4.13 (0.92)
Participant Ratings - Moderators^	
I felt safe to discuss thoughts about COVID vaccine	4.07 (0.95)
Moderators were well-informed	4.31 (0.67)
Moderators were helpful	4.24 (0.91)
Participant Ratings – Overall Experience^	
Group experience was helpful	4.42 (0.77)
I would recommend this group to a friend	4.39 (0.85)
Notes: ^Scale of 1 = Strongly disagree to 5 = Strongly agree	

[INSERT Table 3]

With regards to their opinions about the moderators and group experience, participants tended to agree or strongly agree that the moderators were well-informed (M = 4.3; SD = 0.6) and helpful (M = 4.2; SD = 0.9), that they found the group experience to be helpful overall (M = 4.4; SD = 0.7), and that they would recommend the group to a friend (M = 4.3; SD = 0.8). Parent participants were slightly less likely to agree that they felt safe discussing their thoughts about the COVID-19 vaccine in the group (M = 4.07; SD = 0.9).

Parent COVID-19 Vaccine Beliefs for Adults and Children

When parent participants were asked about their beliefs regarding the COVID-19 vaccine for adults, both intervention and control group participants reported more trust, as well as greater beliefs that the vaccine was safe, effective, and convenient at follow-up; these increases were greater among intervention group participants, though the differences were not statistically significant. Study participants from both groups reported greater beliefs that the vaccine for adults was necessary and important at follow-up, yet these beliefs increased less so among intervention participants and the differences were not statistically significant (See Table 4).

Table 4
Adult and Child COVID-19 Vaccine Beliefs

Adult	**Control group**			**Intervention group**			
	Baseline M (SD)	FU M (SD)	Diff. M (SD)	Baseline M (SD)	FU M (SD)	Diff. M (SD)	p
Vax trust	3.69 (1.32)	3.76 (1.45)	.07	3.84 (1.00)	3.98 (1.10)	.15	.735
Vax necessary	3.85 (1.32)	4.03 (1.34)	.19	3.91 (0.97)	3.96 (1.09)	.05	.575
Vax important	3.86 (1.34)	4.08 (1.19)	.22	3.85 (0.95)	4.04 (1.02)	.18	.865
Vax safe	3.69 (1.26)	3.85 (1.31)	.15	3.60 (1.01)	3.93 (1.02)	.33	.385
Vax effective	3.61 (1.27)	3.90 (1.30)	.29	3.56 (1.08)	3.95 (0.93)	.38	.664
Vax convenient	3.88 (1.15)	3.95 (1.14)	.07	3.75 (1.02)	4.02 (0.85)	.27	.274
Vax affordable	4.17 (1.21)	4.27 (1.22)	.10	4.02 (1.08)	4.25 (0.91)	.24	.530
Child	**Control group**			**Intervention group**			
	Baseline M (SD)	FU M (SD)	Diff. M (SD)	Baseline M (SD)	FU M (SD)	Diff. M (SD)	p
Vax trust	3.75 (1.34)	3.86 (1.30)	.11	3.42 (1.23)	3.71 (1.17)	.29	.302
Vax necessary	3.84 (1.28)	3.95 (1.22)	.11	3.47 (1.27)	3.78 (1.18)	.31	.233
Vax important	3.78 (1.28)	3.98 (1.18)	.21	3.45 (1.21)	3.78 (1.13)	.33	.513
Vax safe	3.84 (1.24)	3.93 (1.18)	.09	3.36 (1.19)	3.71 (1.18)	.35	.181
Vax effective	3.74(1.25)	3.95 (1.16)	.21	3.42 (1.13)	3.69 (1.15)	.27	.727
Vax convenient	3.71 (1.34)	3.98 (1.18)	.28	3.40 (1.16)	3.71 (1.15)	.31	.858
Vax affordable	4.04 (1.21)	4.46 (1.04)	.42	3.91 (1.27)	4.15 (0.91)	.24	.422

[INSERT Table 4]

When parent participants were asked about their beliefs regarding the COVID-19 vaccine for children, both intervention and control group participants reported more trust in the vaccine and greater beliefs that the vaccine was necessary, important, safe, and effective for children at follow-up; these beliefs increased more among intervention group participants, but the differences were not statistically significant.

Parent COVID-19 Vaccination Intentions and Uptake for Adults and Children

After the 5-week time period, 2 of 5 unvaccinated intervention group adults reported getting the first COVID-19 vaccine dose and 2 of 2 reported getting the second dose, none of whom had been required to do so. In the control group, none of the 3 unvaccinated adults reported having gotten the first dose and 5 of 7 reported getting the second dose, 4 of whom had been required to vaccinate. Approximately half of study participants reported having received at least 1 booster dose at follow-up (50.9% of intervention and 49.2% of control group), and almost 6 out of 10 adults (58.3% intervention, 57.1% control) said they were likely to receive a booster dose in the next 3 months.

When asked about COVID-19 vaccine uptake for their children at follow-up, 14 additional intervention group and 7 additional control group participants indicated that their child/adolescent had completed the initial 2-dose series compared to baseline. Furthermore, 16 intervention group and 10 control group participants indicated that they had plans to vaccinate their child in the next 3 months. For parents of children ages 5–11, 62.5% of intervention and 52.6% of control group parents said their child had received a booster at follow-up, and about one-third of parents across both groups said they had plans to boost their child. For parents of adolescents ages 12–17, over three-fourths of parents said that their adolescent had either received or planned to receive a booster (85% intervention, 86.1% control).

Among all parent participants who had not vaccinated their child/adolescent in at least one of these age groups at follow-up (n = 56), the most common reasons included concerns about side effects (76.8%), concerns about safety (37.5%), and the perception that the vaccine was developed too quickly (33.9%).

Discussion

This study examined the feasibility and acceptability of a 5-week RCT delivered via a private, moderated FB group to educate U.S. Latino parents about COVID-19 vaccines for adults and children. We tested the feasibility of delivering this intervention model, and also explored parent engagement and reactions to the culturally-specific, Spanish-language Brigada Digital content. Study results suggest that this intervention approach shows considerable promise for Latino parents in terms of feasibility, appeal, and appropriateness. The number and frequency of posts were not only feasible, but were also acceptable to participants, with many participants even expressing a desire to receive more content. Intervention group participants remained in the FB group for the duration of the 5-week period, engaged with intervention content, and were willing to discuss topics through post comments. As in any group, some participants were more engaged than others, but on average parent participants engaged with the intervention content and moderators 50 times during the 5 weeks, or about 5 times per week. Additional strategies can be explored in future research to further increase engagement, such as, for example, having live sessions with moderators, contests, or other incentives.

When asked about post content, moderators, and the overall group experience, participant reactions were overwhelmingly positive. Despite indicating that social media was the least trusted source of COVID-19 information at baseline, intervention participants expressed trust in the Brigada Digital source and content. This may be explained by the sustained, interactive nature of the intervention and the availability

of trained health expert moderators to answer questions, thus facilitating a more personalized experience and building rapport. This intervention model was also designed to create a safe space where parents could explore vaccine questions. Nevertheless, some parent participants were slightly less likely to agree that they felt safe discussing their views about COVID-19 vaccination. Given that many parents in the group were generally supportive of COVID-19 vaccination, this hesitance may be a factor of the highly politicized nature of this topic. Future studies should explore participant viewpoints on intervention acceptability with parents who hold less favorable perspectives towards vaccination and individuals with high levels of engagement with vaccine misinformation on social media.

This study also examined secondary outcomes of parent COVID-19 vaccine beliefs, intentions to vaccinate, and vaccine uptake for adults and children. When examining secondary outcomes, it is important to note that when compared to the U.S. Latino adult population nationally, a substantially higher proportion of study participants in both groups reported having completed the initial COVID-19 vaccine series at baseline (83.3% compared to 57.1% nationally), and about one-third of study participants said they had been required to vaccinate (28.6% intervention group and 41.7% control group). Interestingly, among a group of Latino parent participants with relatively high levels of COVID-19 vaccination, their children were less likely to be vaccinated, especially among the youngest children. However, parent participants still reported higher rates of child vaccination compared to Latino children nationally, with 45.4% of children ages 5–11 and 71.4% of adolescents ages 12–17 having completed the initial 2-dose series at baseline; by comparison, series completion rates for Latino children nationally are 28.8% for ages 5–11, 57.8% for ages 12–15, and 70.4% for ages 16–17 (15). Children under age 5 had the lowest vaccine series completion rate of 3.9%, compared to 5.1% nationally (16). Vaccines had only been approved for this age group for 2 months at the time of the study, likely explaining the lower vaccination rates. However, national data through the end of 2022 continued to suggest slower vaccine uptake among this youngest group.

Regarding vaccine beliefs, despite holding beliefs that were generally supportive of COVID-19 vaccination at baseline, beliefs about both adult and child vaccines improved more over time among intervention parent participants than control parents, though not statistically significant. This may signal promise of intervention content to improve adult vaccine beliefs among a sample of parents who are already generally supportive of vaccination. When asked about why parent participants had not yet vaccinated their children across all ages, reasons mirrored those reported nationally, with principal concerns being related to the side effects, safety, and that the vaccine was developed too quickly (15,22,24,26–32). Future and continued efforts aimed at increasing COVID-19 vaccine uptake among children should focus messaging on these topics. Future research should also assess the effects of this intervention model on parent engagement and vaccination outcomes among groups of parents who hold less unfavorable beliefs of COVID-19 vaccination.

Limitations. There are limitations to consider when interpreting study results. At the time of the trial, COVID-19 case counts and hospitalizations were relatively low compared to prior waves that had occurred within the preceding year, and the virus strain that was circulating at the time was deemed as

relatively less virulent. These trends may have influenced study participants in terms of their perceived risk of infection and perceptions regarding the urgency of vaccinating their children. Furthermore, given the recruitment strategy used, selection bias may have been introduced, with individuals who are more interested in the topic of COVID-19 or who are more supportive of vaccination generally being overrepresented among study participants. Moreover, due to a glitch in the Qualtrics-administered eligibility screening protocol, some participants who had completed the initial vaccine series were enrolled in the study, potentially resulting in a sample of parent participants that may have held generally favorable vaccination views. Finally, while a randomized trial design was used, it is possible that the smaller sample size, brief study duration, and high vaccination rates at baseline limited our ability to detect statistically significant changes in vaccine beliefs, intentions, and uptake. However, this study provides insight into the receptivity of Latino parents to the Brigada Digital intervention content and group intervention model.

Conclusions

This intervention approach shows considerable promise for Latino parents in terms of feasibility, appeal, and appropriateness, and preliminary evidence suggests potential to improve parent COVID-19 vaccine beliefs for adults and children. This intervention approach and content should be further tested with groups of parents who express less supportive COVID-19 vaccine views, those who are vaccine hesitant, or have unvaccinated children

Abbreviations

RCT – randomized controlled trial

FB - Facebook

TPB – Theory of Planned Behavior

Declarations

Ethics approval and consent to participate. All study protocols were reviewed and approved by the George Washington University Committee on Human Research (FWA00005645) - Institutional Review Board (IRB), study #NCR213842. All participants provided informed consent prior to participation, and all study procedures were performed in accordance with IRB guidelines for the protection of human subjects and ethical principles outlined in the Declaration of Helsinki.

Consent for publication. Informed consent for publication of images was obtained from Dr. Elmer Huerta and Ms. Anna Gonzalez.

Availability of data and materials. The datasets generated and analyzed in this current study are not publicly available to protect participant privacy, but are available from the corresponding author on

reasonable request.

Competing interests. The authors declare that they have no competing interests.

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Authors' contributions.

EA designed the study, instrument and protocols; oversaw ethical review; developed intervention content; recruited study participants; facilitated the intervention; collected, analyzed, and interpreted data; and drafted the manuscript.

AG developed intervention content; recruited study participants; facilitated the intervention; analyzed data; and revised the manuscript.

CW designed the instrument; collected, analyzed, and interpreted data; and revised the manuscript.

CF developed intervention content; analyzed data; and revised the manuscript.

KG designed the instrument; recruited and enrolled study participants; collected and analyzed data; and revised the manuscript.

DB designed the study, instrument, and protocols; and revised the manuscript.

LA designed the study, instrument, and protocols; oversaw ethical review; collected, analyzed, and interpreted data; and revised the manuscript.

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Figures

Figure 1

Narrated Carousel

Figure 2

Animated Image with Music

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Admin · August 26, 2022 ·

Este tutorial demuestra el proceso de hacer una cita de vacunación usando el sitio web:
vacunas.gov

Para el video original lo puede encontrar en nuestra página de TikTok:
https://www.tiktok.com/@brig.../video/7085479500502355243

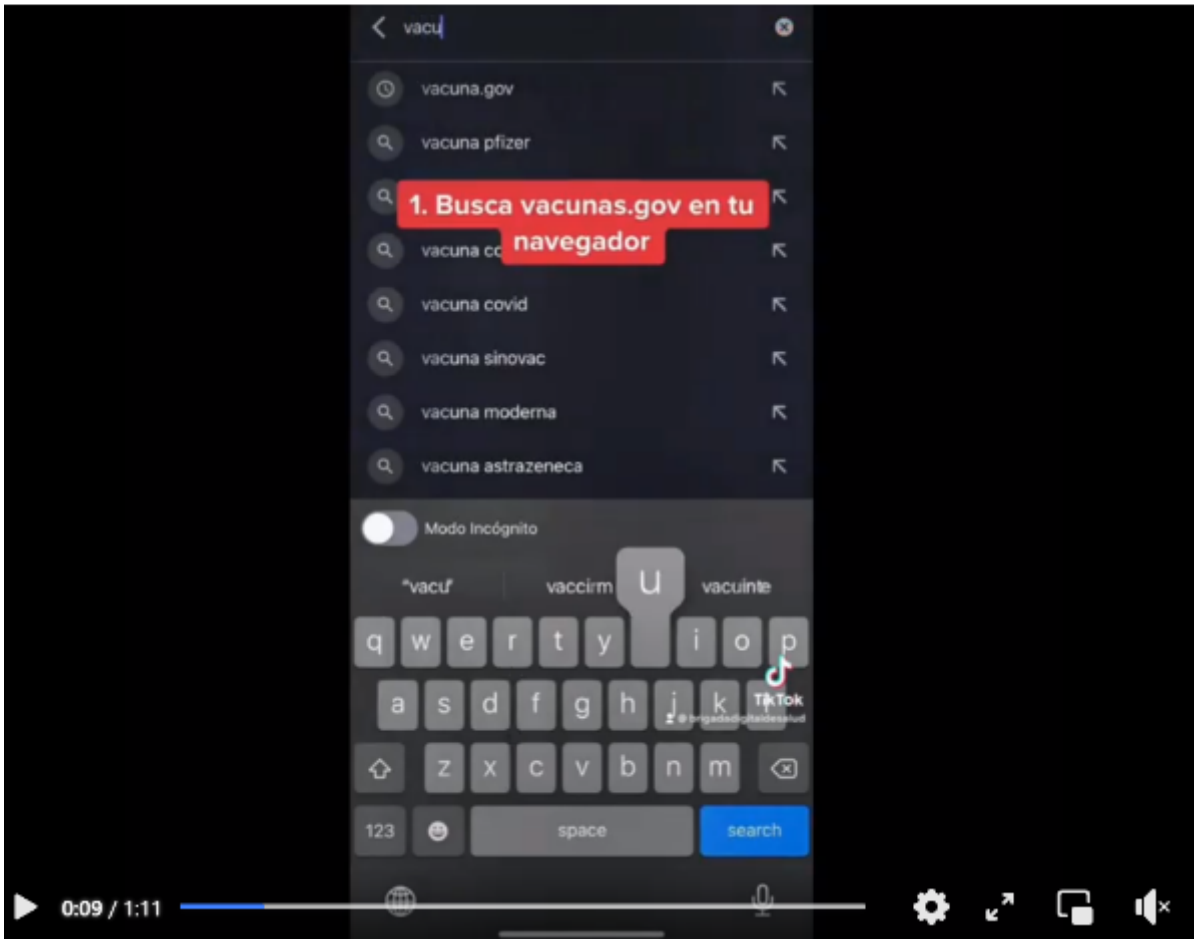

Figure 3

Online Vaccine Finder Tutorial

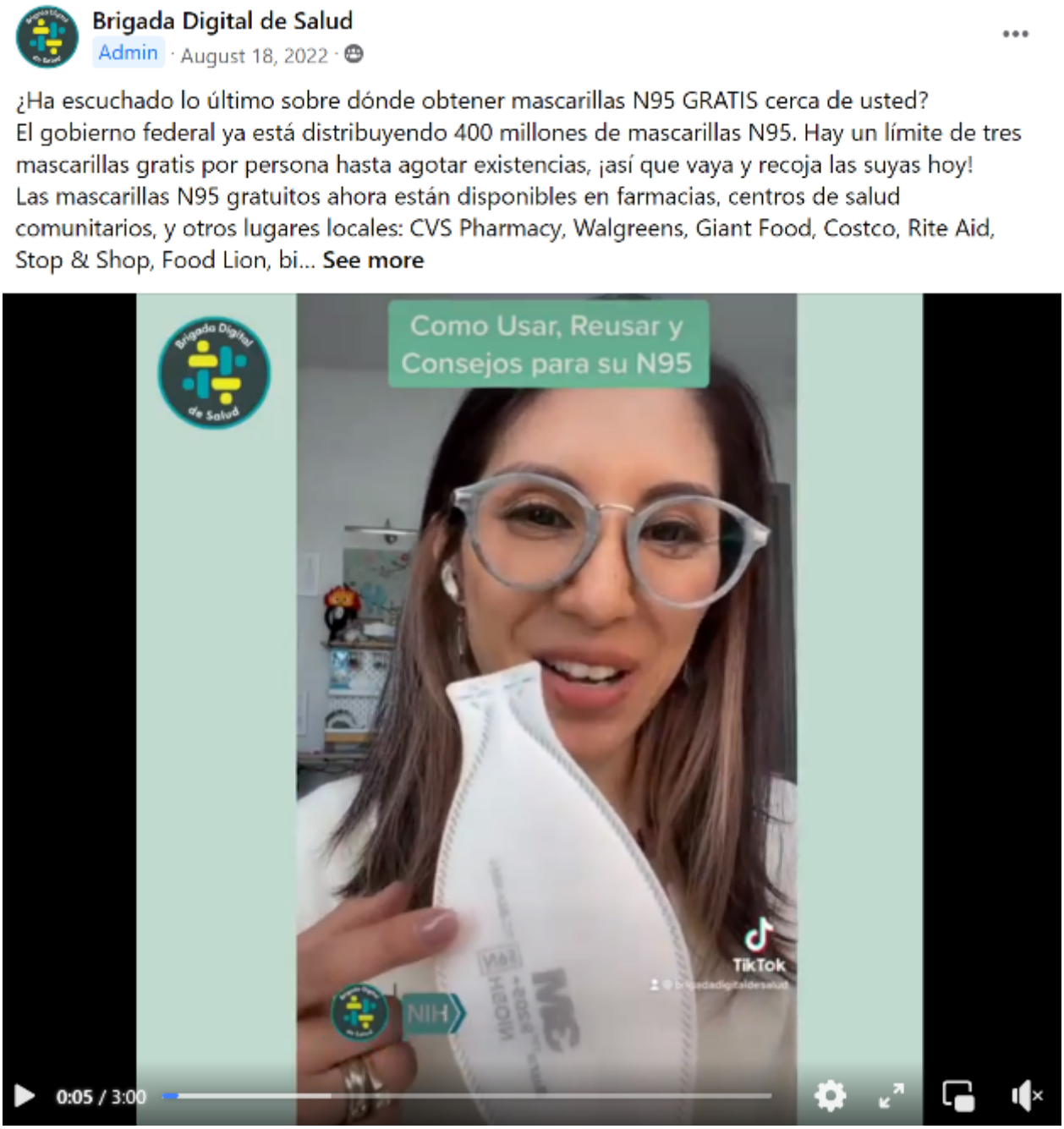

Figure 4

Video with Latina Health Expert

Figure 5

Radio Show Interview Clip with Latino Pediatrician