




# Assessing impact of a community-based screening campaign to address social determinants of cervical cancer

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## Abstract

**Background:** Screening represents a cornerstone of cervical cancer control strategy. However, disparities in social determinants of health have perpetuated gaps in screening among racial and ethnic minorities. Social determinants of health including cultural stigma and lack of insurance have contributed to decreased screening among Hispanic women. To increase cancer screening in this population, community-academic partnerships and culturally tailored media have emerged as promising strategies.

**Methods:** This study assessed the impact of a culturally tailored cervical cancer screening campaign implemented through academic-community-government partnerships. Intercept surveys, conducted from 2015 to 2018 in eastern neighborhoods of Los Angeles, assessed campaign recall, interpretation, and screening intention among Hispanic women aged 21-65 years after exposure to the campaign. Screening intention was evaluated using  $\chi^2$  and logistic regression by participant characteristics, with thematic analysis for campaign interpretation.

**Results:** Of 673 participants, 26.1% were uninsured, and 85.9% primarily spoke Spanish at home. Campaign recall was 25.1%, with 64.5% interpreting the campaign's message as cervical cancer screening or health checkups. The campaign's most liked aspect was emphasis on family (cited by 37.1% of participants). Postcampaign, 89.5% of participants overall were likely or extremely likely to schedule a Pap test, including 83.5% of women who had not had a Pap test in the past 3 years.

**Conclusions:** Our findings underscore several important strategies to reduce cervical cancer disparities: (1) associating positive cultural values with screening to decrease stigma, (2) combining culturally tailored outreach with interventions that target other known screening barriers, (3) facilitating long-term community relationships, and (4) leveraging academic-community-government partnerships.

## Introduction

Prevention and screening represent cornerstones of the public health strategy to combat cervical cancer. However, traditional outreach has often been inadequate to increase screening among underserved populations, including the Hispanic community. Hispanic women experience one of the highest cervical cancer rates across racial and ethnic groups and are more often diagnosed at advanced stages, perpetuating cancer disparities.<sup>1,2</sup> The social determinants of this disparity are multifactorial, including insurance status, limited English proficiency, lack of health education, and sociocultural beliefs.<sup>3,4</sup> As a result, Hispanic women are screened at lower rates,<sup>5</sup> with the latest estimates from the National Cancer Institute (NCI) showing that 67.9% were up-to-date on cervical cancer screening guidelines in 2021 compared with 72.4% of women overall during the same year.<sup>6</sup> These data represent a decline from the 2018 rate of 80.8% among Hispanic women,<sup>6</sup> as US cervical cancer screening rates diminished during

the COVID-19 pandemic.<sup>7,8</sup> Catch-up efforts have not been as effective in Hispanic populations compared with non-Hispanic White populations,<sup>9</sup> highlighting the need to rethink screening outreach in these communities.

In the east area of Los Angeles, where 95% of residents identify as Hispanic or Latino,<sup>10</sup> women experience multiple social barriers to care such as lower education levels (12.6% of women having a bachelor's degree or higher in 2022 vs 36.8% nationally),<sup>11</sup> limited English proficiency (26.6% of adults vs 5.2% nationally), and higher uninsured rates (13.2% of women vs 7.0% nationally).<sup>12,13</sup> Recognizing the impact of social determinants of health, targeted cancer screening efforts are a key priority in this population.<sup>14</sup>

Increasingly, community-academic partnerships and culturally tailored media have emerged as promising strategies to increase cancer screening in underserved communities.<sup>15,16</sup> Thus, this study assesses a culturally tailored cervical cancer screening campaign implemented through academic-community-government partnership in eastern neighborhoods of Los Angeles.

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## Methods

### The Es Tiempo outdoor media campaign

From 2015 to 2018, intercept surveys evaluated the recall, interpretation, and impact of Es Tiempo, a public health campaign conducted in predominantly Hispanic neighborhoods in eastern areas of Los Angeles (Boyle Heights, Lincoln Heights, and El Sereno). Impact was operationalized as participants reported intention to call the campaign's 800 number or schedule a Pap test after seeing the campaign.<sup>17</sup>

Es Tiempo was enacted through multidisciplinary partnership of the University of South Carolina Norris Comprehensive Cancer Center, Los Angeles General Medical Center (a large safety net hospital), Clínica Monseñor Oscar Romero (a Federally Qualified Health Center), and the Los Angeles Office of Women's Health at the Los Angeles County Department of Public Health (LADPH). The campaign design has been detailed previously.<sup>18</sup> Relevant to the present study, the outdoor media campaign targeted Hispanic women eligible for cervical cancer screening and was guided by English and Spanish focus groups, community advisory board meetings, and visual culture studies. This work revealed themes of family values and the culturally significant jacaranda tree, which produces abundant purple blossoms each spring in Los Angeles. Imagery of the blooming jacaranda tree was used as a visual cue to pursue screening (see Figure 1A). A second campaign image featuring a Hispanic mother hugging her children was used to convey the importance of family values related to preventive screening (see Figure 1B). Materials were displayed on bus benches, billboards, and light post banners with messaging in Spanish and English ("It's important. It's easy. It's time." "You can prevent cervical cancer."). All materials included a message to call the campaign's 800 number, through which LADPH staff could answer questions about screening and schedule Pap test appointments.

The protocol for this study was approved by the University of South Carolina institutional review board and adhered to the Standards for Reporting Qualitative Research (SRQR) (Table S1).<sup>14</sup>

### Conceptual model and researcher characteristics

This study employed a community-based participatory research conceptual model guided by principles of community empowerment, equitable partnership, and cultural humility (see Figure 2). Under this model, collaboration among academic, government, and community stakeholders was emphasized at all phases of the study. The theory of change involved logical progression from campaign co-creation, which incorporated stakeholder input into design and implementation, to outcomes of increased cervical cancer awareness and screening behavior.

In accordance with SRQR guidelines and in recognition that researcher characteristics influence the study process, we report here characteristics of the investigators. Relevant to the study population and survey methodology, researchers were bicultural and bilingual in Spanish, with lived experience in the geographic area of focus. Interviewers were recruited from the local community to ensure cultural and linguistic congruence with study participants. All interviewers received training on participant recruitment and consent procedures, survey administration, cultural humility, and communication of scientific information in English and Spanish. Training was further augmented through role-play of challenging field scenarios interviewers may encounter during survey administration.

### Inclusion and survey design

Included participants were Hispanic women between ages 21 and 65 years who spoke English or Spanish. Given the study's focus on screening uptake, groups ineligible for cervical cancer screening under current US Preventive Services Taskforce (USPSTF)



**Figure 1.** Es Tiempo outdoor media campaign materials. **A)** Light post banner featuring jacaranda tree imagery. **B)** Billboard featuring Hispanic family and jacaranda tree.



**Figure 2.** Conceptual model of the Es Tiempo outdoor media campaign.

guidelines (biological males, and females younger than 21 years or older than 65 years)<sup>19</sup> were excluded.

Participants reported demographic characteristics of age, primary language spoken at home (English, Spanish, both English and Spanish), and insurance status (insured and uninsured). They additionally reported previous cervical cancer screening behavior, detailed in Table 1. Campaign recall was assessed using close-ended questioning corroborated by open-ended follow-up questions. Campaign interpretation and most liked campaign aspects were assessed using open-ended questions. Screening intention (operationalized as intention to call the campaign's 800 number or schedule a Pap test) was evaluated using Likert-type scales. Survey questions are included verbatim in Tables 1-2.

## Data collection

Intercept surveys were conducted in person from 2015 to 2018 at community locations including parks, bus stops, laundromats, and clinics. This sampling strategy was used to better capture information from local residents, including those who may not participate in either online surveys or organized activities such as health fairs. Written consent was obtained in English or Spanish, and participants received a \$5 gift card for their time.

Each standardized survey was completed on paper in participants' preferred language, with assistance from trained bilingual interviewers.

Data entry was monitored daily by 2 coders who entered survey information and checked for quality and accuracy. Data were further audited by independent reviewers, who randomly sampled 25% of the data collected to verify correct data entry.

De-identified data were then analyzed using Google Sheets, with tabulation of close-ended Likert-type question responses and thematic analysis using keywords identified in both Spanish and English.

## Statistical analysis

Thematic analysis for open-ended responses was conducted using an iterative coding process to identify emerging themes. Saturation of themes was determined when no new themes emerged from successive coding rounds. Likert-type responses for screening intention were dichotomized as "likely or extremely likely" vs "neutral, unlikely, or extremely unlikely." This approach was chosen for clearer interpretation and improved model stability, given small sample sizes in certain response categories. Dichotomized responses were then analyzed using  $\chi^2$  goodness-of-fit tests. Additionally, logistic regression models were employed to examine differences in dichotomized screening intention by participant characteristics. These models were fitted for age, primary language spoken at home, insurance status, human papillomavirus (HPV) vaccination status, and adherence to USPSTF cervical cancer screening guidelines. Missing data were excluded at item level using available case analysis, with sample size for each question excluding nonrespondents. Subgroup analyses were performed to ascertain interpretation among those who recalled seeing the campaign prior to survey and screening intention among those with no Pap test in the last 3 years.

## Results

The study included 673 participants, with a mean age of 45.4 years (Table 1). The majority of participants primarily spoke Spanish at home (85.9%), and 26.1% were uninsured. In the past year, 57.7% of participants reported asking their health provider about getting a Pap test, and 22.4% reported asking their provider about cervical cancer. In the last 3 years, 87.2% of participants had undergone a Pap test.

Among all participants, 25.1% recalled seeing the campaign prior to survey administration (Table 2). Among those who had seen the campaign prior, the main message was interpreted as prevention and early detection of cancer by 64.5% of participants, followed by health and regular checkups (14.2%) and protecting family and loved ones (7.7%). When asked what they liked most about the campaign, participants most commonly cited the emphasis on family (37.1%), followed by the campaign's message and information provided (29.7%) and the jacaranda tree and/or nature imagery (22.6%). Exemplar responses can be seen in Table S2.

After seeing the campaign, 83.7% of participants were likely or extremely likely to call the 800 number provided. Additionally, 89.5% were likely or extremely likely to schedule a Pap test. In subgroup analysis among participants who had not had a Pap test in the last 3 years, 78.9% and 83.5% were likely or extremely

likely to call the 800 number or schedule a Pap test, respectively. In Table 3, Pap test intention did not differ by age, primary language spoken at home, insurance status, HPV vaccination status, or Pap test in the last 3 years. However, participants who were older, had received the HPV vaccine, and primarily spoke Spanish at home were more likely to call the 800 number.

## Discussion

Compared with national statistics over the same period, a greater proportion of our sample was uninsured (25.2% vs 8.3% of women nationally).<sup>20</sup> Additionally, compared with 2018 American Community Survey estimates for East Los Angeles, our sample was older (sample, 29.1% aged 55-65 years, vs American Community Survey, 10.7% aged 55-64 years),<sup>21</sup> and a greater proportion primarily spoke Spanish at home (88.7% vs 82.6%).<sup>21</sup>

Despite this, the proportion of participants who reported a Pap test in the last 3 years (87.2%) was higher than NCI estimates among Hispanic women over the same time period (2018: 80.8%),<sup>6</sup> which may reflect our inclusion of clinics as survey locations or action taken in response to the campaign prior to survey date.

The results reveal the impact of community-academic partnerships and culturally tailored outreach on social determinants of cervical cancer. Specifically, this campaign improved screening awareness and integrated culturally significant values<sup>22,23</sup> to increase screening intention in majority Hispanic neighborhoods. The 25.1% recall rate among survey participants indicates greater recall than other health campaigns in the United States, with a previous large sample survey by Goodman et al.,<sup>24</sup> which assessed government healthy eating campaigns using similar survey methods, finding US campaign awareness of only 13.0% (n=4612). Our campaign recall is even more unusual when considering our study setting and target population, as Goodman and colleagues<sup>24</sup> also found that females and those with low education levels were less likely to recall having seen a campaign (campaign awareness in both groups: 10.5%). With our campaign recall being approximately double that of other US health campaigns, these findings underscore the potential to improve outreach efficacy through community-based participatory research.

Among participants who recalled seeing the campaign, the majority identified its message to be health oriented. Additionally, 7.7% of participants interpreted the main message to be centered around family and protecting loved ones, with family values also shown to be the campaign's most liked element. These findings are in line with our group's previous work on cervical cancer screening, which found a narrative film featuring a Hispanic family to significantly increase supportive attitudes around Pap tests among Hispanic women compared with a nonnarrative film, which used more traditional public health campaign approaches ( $P=.05$ ).<sup>23</sup> Recognition of these values may help combat sociocultural drivers of cancer disparities. In numerous studies on cervical cancer perceptions,<sup>22,25,26</sup> participants reported feeling that cervical cancer carried with it stigma around sexual activity, with a study among immigrant Latinas finding that a major barrier to Pap tests was fear that pursuing screening would label them as sexually promiscuous.<sup>22</sup> The same study showed that family support was an important facilitator for screening, corroborating findings from the present work.<sup>22</sup> Thus, a culturally tailored approach may present a strategy to improve social determinants of cervical cancer screening by replacing negative cultural associations around sexual activity with positive associations of protecting family and loved ones.

**Table 1.** Demographics and cervical cancer screening behavior of participants

Participant responses	No. of participants (%)
Total participants	673 (100)
Demographics	
Mean age, y	45.4
Primary language spoken at home: Spanish	578 (85.9)
Primary language spoken at home: English	63 (9.4)
Primary language spoken at home: both English and Spanish	32 (4.8)
Insurance status: uninsured	168 (26.1)
In the last year, have you asked your doctor or other provider about getting a Pap test?	
Yes	388 (57.7)
No	280 (41.6)
Unknown <sup>a</sup>	5 (0.7)
In the last year, have you asked your doctor or other provider about cervical cancer?	
Yes	151 (22.4)
No	500 (74.3)
Unknown <sup>a</sup>	22 (3)
Have you had a Pap test in the last 3 years?	
Yes	587 (87.2)
No	80 (11.9)
Not sure	1 (0.1)
Unknown <sup>a</sup>	5 (0.7)
If yes, what was the result of your last Pap test?	
Normal	546 (81.1)
Abnormal	29 (4.3)
I'd rather not say	5 (0.7)
Don't remember	5 (0.7)
Unknown <sup>a</sup>	88 (13.1)
If abnormal (not normal), did you follow up on your Pap test?	
Yes	35 (74.5)
No	12 (25.5)
Unknown <sup>a</sup>	2

<sup>a</sup> Unknown reflects the number and percent of missing responses of the total sample (673 participants). For questions with no missing responses, Unknown is omitted.



**Table 2.** Cervical cancer campaign recall, interpretation, and intention to pursue screening

Participant responses	No. of participants (%)	P <sup>a</sup>
Total participants	673 (100)	
Do you recall seeing this campaign?		
Yes	169 (25.1)	<.001***
No	482 (71.6)	
Not sure	0 (0)	
Unknown <sup>b</sup>	22 (3.3)	
What did you like most about the campaign? <sup>c</sup>		
Emphasis on family	250 (37.1)	
Campaign's message and/or information provided	200 (29.7)	
Jacaranda tree and/or nature imagery	153 (22.6)	
Color scheme	54 (8.0)	
Other	88 (13.0)	
Unknown <sup>b</sup>	6 (0.9)	
After seeing the campaign, how likely are you to call the 800 number?		
Extremely likely	282 (41.9)	<.001***
Likely	281 (41.8)	
Neutral	33 (4.9)	
Unlikely	48 (7.1)	
Extremely unlikely	21 (3.1)	
Unknown <sup>b</sup>	8 (1.2)	
After seeing the campaign, how likely are you to make an appointment to get a Pap test?		
Extremely likely	393 (58.4)	<.001***
Likely	209 (31.1)	
Neutral	52 (7.7)	
Unlikely	10 (1.5)	
Extremely unlikely	7 (1.0)	
Unknown <sup>b</sup>	2 (0.3)	
Sample of participants who recall seeing campaign prior to survey	169	
In your opinion, what is the main message of the campaign?		
Prevention and/or early detection of cancer	109 (64.5)	
Health and regular checkups	24 (14.2)	
Family and protecting loved ones	13 (7.7)	
Other	23 (13.6)	
Sample of participants with no Pap test in last 3 years	80	
After seeing the campaign, how likely are you to call the 800 number?		
Extremely likely	31 (36.5)	<.001***
Likely	36 (42.4)	
Neutral	3 (3.5)	
Unlikely	8 (9.4)	
Extremely unlikely	1 (1.2)	
Unknown <sup>b</sup>	6 (7.1)	
After seeing the campaign, how likely are you to make an appointment to get a Pap test?		
Extremely likely	41 (48.2)	<.001***
Likely	30 (35.3)	
Neutral	5 (5.9)	
Unlikely	2 (2.4)	
Extremely unlikely	2 (2.4)	
Unknown <sup>b</sup>	5 (5.9)	

<sup>a</sup> P value for  $\chi^2$  goodness-of-fit test for dichotomized Likert responses (likely or extremely likely vs not) comparing observed distribution of responses to null hypothesis of no difference in distribution.

<sup>b</sup> Unknown reflects the number and percent of missing responses of the total sample (673 participants). For questions with no missing responses, Unknown is omitted.

<sup>c</sup> Responses were iteratively coded for predominant theme in the event that participants cited multiple aspects.

\*\*\* P less than or equal to .001.

**Table 3.** Logistic regression models for differences in screening intent by participant characteristics

Participant responses	OR (95% CI)	P
Likelihood of seeking out Pap test by demographic variable		
Age	1.00 (0.98 to 1.03)	.82
Received human papillomavirus vaccine	1.63 (0.54 to 4.89)	.39
Spanish primary language spoken at home	1.72 (0.80 to 3.70)	.16
Has insurance	0.74 (0.40 to 1.40)	.36
Pap test in the last 3 years	1.19 (0.56 to 2.55)	.65
Likelihood of calling 800 number by demographic variable		
Age	1.03 (1.01 to 1.05)	.004**
Received human papillomavirus vaccine	2.71 (1.05 to 6.98)	.04*
Spanish primary language spoken at home	2.76 (1.48 to 5.16)	.001***
Has insurance	0.67 (0.39 to 1.16)	.16
Pap test in the last 3 years	0.89 (0.44 to 1.80)	.75

Abbreviations: CI = confidence interval; OR = odds ratio.

\* P less than or equal to .05.

\*\* P less than or equal to .01.

\*\*\* P less than or equal to .001.

Participants exhibited high intention to pursue screening after campaign exposure. The observed differences in intention to call the 800 number—with participants who were older, HPV-vaccinated, and speaking Spanish as the primary language more likely to call—may indicate increased efficacy among the intended target audience for Es Tiempo. For Pap test scheduling intent, rates were similar among women who reported not having a Pap test in the last 3 years, a clinically important subgroup given current USPSTF guidelines.<sup>27</sup> Based on the screening intention rates observed in this subgroup, culturally tailored outreach appears to be similarly effective in general, but additional facilitators may be necessary to drive specific actions such as calling the 800 number. Besides addressing cultural stigma, facilitators identified in prior research to increase Pap tests among Hispanic women include increasing insurance rates, reducing language barriers, and addressing fears regarding the pelvic exam and prospect of finding cancer.<sup>28-30</sup> These facilitators are consistent with our study demographics, as our Los Angeles-based participants were disproportionately primarily Spanish-speaking and uninsured.<sup>31</sup> To mitigate insurance barriers in this population, California's 2024 Medicaid expansion to all low-income adults, regardless of immigration status,<sup>32</sup> represents an important policy change. It must be matched with community-based outreach to effectively close gaps in screening.

High campaign awareness and screening intention in our sample may reflect the intended effects of our multidisciplinary partnership. Led by our Office of Community Outreach and Education (COE),<sup>33</sup> our NCI-designated comprehensive cancer center has fostered bidirectional relationships with community stakeholders.<sup>34</sup> Recognizing that many cancer centers have established COE offices<sup>35</sup> and all communities may benefit from them, we highlight key factors that have enabled our program to better address social determinants of health.

Internally, our COE office has strong representation of East Los Angeles natives among our staff, including in leadership roles.<sup>33</sup> Further, to operationalize the principles outlined in our community-based participatory research conceptual model,<sup>36-38</sup> we continually adapt programming to meet community needs.

For example, in a recent effort that built on the culturally tailored design and multidisciplinary partnerships of the present work, Stay Connected Los Angeles collaborated with local artists to increase COVID-19 vaccination and mitigation behaviors in the eastern part of Los Angeles.<sup>39</sup> Such adaptation has been highlighted by other chronic disease-focused community-academic partnerships as a key factor for maintaining their partnerships throughout the pandemic.<sup>40</sup> Especially in the historical context of research involving ethnic minorities,<sup>41</sup> responsiveness to community needs is necessary to foster and maintain trust.<sup>37,40,42</sup> Previous research has further highlighted how meeting the distinct needs of each community strengthens the quality of community partnerships.<sup>43</sup>

Our center's role in the present work included contributing expertise and resources for funding acquisition, study design, and implementation. Likewise, the LADPH contributed expertise in large-scale care coordination and integration with public services. LADPH staffed the campaign's 800 number, answering callers' questions about cervical cancer and connecting them to Pap test appointments. Such follow-through was only possible thanks to the department's expertise navigating the public health-care system. We posit that leveraging stakeholders' unique strengths through academic-community-government partnerships can enhance the impact of public health campaigns, with present findings supporting its efficacy for enhanced recall and screening intention.

Though this study was conducted annually over 4 years in diverse community settings, its intercept survey design limits generalizability. Women with limited mobility or time constraints or those unavailable during daytime hours may be underrepresented. However, in-person survey administration and bilingual interviewers may have captured additional participants who would otherwise not participate.

The study assessed participants' self-reported screening intention, which may not always reflect actual behavior. Meta-analysis on concordance between self-reported behavioral intention and behavioral change has shown that medium-to-large changes in intention lead to small-to-medium changes in behavior.<sup>44</sup> Additionally, querying specific intentions, as done here, has been shown to improve predictive value.<sup>45</sup> Further, previous work has found that in a sample of Hispanic women in East Los Angeles ( $n = 1428$ ), completion of Pap tests was 46% among those who received Es Tiempo campaign materials vs 33% among those who did not ( $P < .01$ ).<sup>46</sup>

Missing data can bias findings, with previous research highlighting that bias is more likely to be present when there is more than 10% missing data.<sup>47</sup> The proportion of missing responses for our study endpoints, as seen in Table 2, was 1.1%-3.5%. As data were mostly complete, missing responses were handled using a standard approach of available case analysis, with missing values excluded at item level.

Finally, the cross-sectional nature of the survey limits our ability to infer causality between campaign exposure and screening intentions. Future research should include pre- and postcampaign assessment to strengthen the evidence for campaign impact and incorporation of electronic medical records to evaluate changes in screening rates.

In a sample of Hispanic women who were disproportionately uninsured and primarily Spanish speaking, we observed campaign recall rates double that of other US health campaigns and high intention among participants to engage in cancer screening after viewing the campaign. Intention was high even among those who had not undergone screening in the last 3 years,

highlighting the potential of community-based interventions. Future studies should adapt these approaches to different populations and comprehensive packages of preventive services.

Our findings underscore several important strategies to reduce cervical cancer disparities: (1) identifying positive cultural values with screening to decrease stigma, (2) combining culturally tailored outreach with interventions that target other known screening barriers, (3) facilitating long-term relationships that are responsive to community needs, and (4) leveraging the unique strengths of academic-community-government partnerships.

In conclusion, this study provides evidence that culturally tailored outreach and partnerships can improve social determinants of cervical cancer. By deepening stakeholder collaboration, gaps in cervical cancer screening can be narrowed and ultimately eliminated in historically underserved communities.

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## Author contributions

Justine Po, BS (Conceptualization; Data curation; Investigation; Writing—original draft; Writing—review & editing), Arthur Bookstein, MPH (Data curation; Formal analysis; Investigation; Methodology; Writing—review & editing), Woori Lee, BS (Writing—original draft; Writing—review & editing), Rosa Barahona, BA (Funding acquisition; Project administration; Resources; Writing—review & editing), and Lourdes Baezconde-Garbanati, PhD, MPH (Conceptualization; Funding acquisition; Methodology; Project administration; Resources; Supervision; Writing—review & editing).

## Supplementary material

Supplementary material is available at JNCI Cancer Spectrum online.

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## Conflicts of interest

The authors declare no potential conflicts of interest.

## Data availability

The data underlying this article cannot be shared for ethical or privacy reasons as the participants did not consent to open access permissions. The safeguarded data are available to users with approved access per the study's institutional review board protocol.

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