Mammogram perceptions, communication, and gaps in care among individuals with non-English language preference in Oregon and Washington states

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ABSTRACT

This study examined perceptions of and communication about mammography as drivers of gaps in screening among individuals with non-English language preference (NELP). A survey was fielded in fall 2021 in five languages (Cantonese, English, Russian, Spanish, or Vietnamese) to individuals identified using electronic medical records in Oregon and Washington. The analytic sample consisted of 420 respondents with a median age of 61; approximately 45% of respondents identified as Asian, 37% as Hispanic, Latino, or Spanish origin, and 18% as some other race, ethnicity, or origin. Logistic regression models examined associations between screening and perception and communication items. Individuals who believed mammograms are unnecessary when healthy (aRR = 0.72 [0.57, 0.91]) or absent symptoms (aRR = 0.85 [0.72, 1.00]) were less likely to report a mammogram within the past two years (i.e., be current). Having a provider recommend (aRR = 1.27 [1.09, 1.47]) and discuss mammography (aRR = 1.18 [1.05, 1.32]) were associated with a higher likelihood of being current. Few respondents received written or verbal information in their preferred language (35% and 28.3%, respectively). Financial and logistical support, including language services were most frequently identified as types of support needed to obtain a mammogram. Overall, misperceptions about mammography may act as a barrier but communication may act as a facilitator for individuals with NELP. Provider-patient communication could be an effective way to encourage mammography. Culturally-responsive health promotion materials and provider communication, available in patients' preferred language, are needed to combat misperceptions and support ongoing, on-time mammography for NELP patients.

1. Introduction

In the United States, approximately 66 million people (21.5% of the population) report speaking a language other than English at home, (Census Bureau, 2020) indicating they may have a non-English language preference (NELP) in the healthcare setting. While previous research in this area has often used the term "limited English proficiency," this study uses the concept of preference because it more accurately represents how language operates in healthcare; the purpose of language-appropriate care is to meet patients' needs and preferences rather than to assess their language skills. (Ortega et al., 2022).

Language barriers are a well-recognized driver of health inequities. (Timmins, 2002) Individuals with NELP face barriers to accessing care such as difficulty navigating the complex healthcare system and lack of

insurance. (Jacobs et al., 2006; Lu and Myerson, 2020; Gonzales et al., 2012) When receiving care, people with NELP often experience poor communication, unmet informational needs, discrimination, lack of cultural competency, and lower satisfaction and quality of care. (Jacobs et al., 2006; Gonzales et al., 2012; Yeheskel and Rawal, 2019) Thus, it is not surprising that individuals with NELP are less likely to have a regular source of primary care and to receive preventive care than their peers who prefer English. (Jacobs et al., 2006; Woloshin et al., 1997) Unfortunately, the lack of quality healthcare, including access to preventive services, can adversely impact health management and outcomes.

One key area for secondary prevention is breast cancer screening through mammography. Breast cancer is one of the most common types of cancer and a leading cause of cancer death among women, (American Cancer Society, 2022) and early detection is essential to receiving timely

treatment and may increase survival. (Silber et al., 2018) The U.S. Preventive Services Task Force (USPSTF) recommends screening mammograms at least every two years for women between age 50 and 74. (USPSTF, 2016) There is extensive research documenting disparities in access to mammography including by race/ethnicity, age, and rurality. (Peek and Han, 2004; Agency for Healthcare Research and Quality, 2017) While language is often cited as a barrier to mammography and several studies include it as a covariate in their analysis, (Solis et al., 1990; Fiscella et al., 2002) there have been few studies that specifically focus on mammography for individuals with NELP. Including language as a covariate can provide general population-level information on mammography by removing the impact of language preference; on the other hand, a specific focus on mammography among individuals with NELP can help to highlight important within group factors and differences.

There are many known barriers to mammography screening. Beyond logistical barriers that impact accessibility of mammograms (e.g., cost for follow up care, lack of transportation), previous studies have highlighted two additional types of barriers: perceptions based on personal knowledge, beliefs, and attitudes about mammography and cancer (e.g., believing mammograms are not needed if healthy, reporting a fear of positive results); and communication about mammography and cancer (e.g., lack of physician recommendation). (Miller et al., 2019; Alexandraki and Mooradian, 2010) Both perceptions and communication can be linked to language preference. Communication in a preferred language is associated with better satisfaction with care from both the patient and provider perspectives, and lack of communication in a preferred language can undermine trust in providers and result in a patient being less likely to engage in healthcare. (Jacobs et al., 2006; Gonzales et al., 2012; Yeheskel and Rawal, 2019)In addition, language is closely tied to culture, and an individual's knowledge, beliefs, and attitudes are largely shaped by cultural and social norms. (Woloshin et al., 1997).

Given a dearth of evidence regarding the impact of NELP on receipt of a mammogram, this study focuses on understanding drivers of gaps in mammography within an entirely NELP population (spanning multiple non-English languages). We chose to focus exclusively on an NELP population instead of comparing to an English language-preferred population for two reasons. First, drivers of gaps in mammography may not operate the same way in NELP and English-preferred populations, and comparing associations across these two groups implies that they do. Second, we wished to avoid presenting English language preference as the default, and instead focus solely on identifying ways to improve access to mammography for the NELP population.

This study seeks to explore the extent to which perceptions and communication contribute to gaps in mammography for individuals with NELP. We also explore reasons why mammograms were skipped and what is needed to support accessing mammography. Using structured and unstructured survey responses, results from this study help define potential barriers and facilitators to mammography for those with NELP and can be used to focus health system efforts to decrease disparities and improve health equity.

2. Materials and methods

2.1. Study participants

Participants were identified using Providence Health System electronic medical records (EMR). Eligible participants were female sex, aged 50 to 74, resided in Washington or Oregon states, had one or more visits with a primary care provider or OB/Gyn within the past 27 months, had no history of bilateral mastectomy or two unilateral mastectomies, and were not in hospice at the time of sample selection. Criteria were based on the Healthcare Effectiveness Data and Information Set (HEDIS) Breast Cancer Screening metric definition, which is used by the health system to identify patients who are up to date on mammography. A stratified random sample was selected from a pool of eligible patients with oversampling to ensure diversity of payer type, language preference, and geography. Individuals who had a documented language preference other than Cantonese, English, Russian, Spanish, or Vietnamese in their medical record were excluded since these were the five languages in which the survey was fielded; these languages represent the five most common language preferences in the health system. All procedures were reviewed and approved by the Providence Institutional Review Board.

2.2. Survey development and fielding

To inform survey development, two online focus groups (one in English, one in Spanish) were held with patients of the health system described above, and an open-ended questionnaire was administered to traditional health workers (known as Promotores) supporting mobile mammography in rural Oregon. Participants were asked about barriers and facilitators to mammography; findings were used along with a review of breast cancer and mammography literature to develop survey domains and questions. The final survey included items related to healthcare insurance and access, mammography and breast cancer, communication, experiences with healthcare, and demographics.

Survey fielding took place between September and December 2021. Paper-based surveys were mailed (and emailed if they had an email address on file) to participants following an initial invitation letter. A link to an online survey was included in all outreach materials. Surveys and outreach materials were provided to participants in Cantonese, English, Russian, Spanish, and Vietnamese; participants were also provided a pre-paid response envelope and a $5 cash incentive. Participants with a language preference other than English documented in their medical record were sent a survey in both English and their documented preferred language. Participants who responded to the online survey were offered the opportunity to complete the survey in any of the five languages. The survey invitation and reminder letters explained the purpose of the study and risks and benefits of participation; respondents were informed that completion and return of the survey would indicate consent to participate in the study.

The survey was mailed to 20,000 participants, of whom 7,473 (37.3%) responded. Among the 2,000 individuals with a language preference other than English, 451 (23%) responded. Response rates among the NELP group were highest among Russian speakers (28%) followed by Cantonese (27%), Vietnamese (27%), and Spanish (19%). After removing responses that could not be properly identified or in which less than 75% of the survey was completed, the final sample of individuals with NELP consisted of 420 respondents.

2.3. Measures

Fifteen breast screening survey statements were used to assess perceptions of breast cancer screening and communication of mammogram information (Table 1). Perceptions statements were adapted from the validated "Pros and Cons of Mammography" scale (Rakowski et al., 1992); minor changes were made to the wording and order of items and additional communications-focused items were added based on findings from the online focus groups discussed above. Each statement was assessed using either a five-point Likert scale ranging from strongly agree to strongly disagree or a simple Yes/No binary. For analysis, strongly agree and agree and "Yes" responses were assigned a value of "1"; all other responses were assigned a value of "0". Respondents who reported having a mammogram within the past 2 years were classified as current, while those who had not were classified as not current. (USPSTF, 2016) We chose to use self-reported mammography in place of EMR data because many respondents reported receiving mammograms in care settings outside of the health system.

Table 1

Breast cancer screening perceptions and communication statements.

Perceptions
1. A mammogram is an effective tool for detecting breast cancer.
2. A mammogram is expensive.
3. A mammogram is painful or uncomfortable.
4. I would be more likely to have a mammogram if my doctor told me how important it was.
5. Having a mammogram every year or two will give me a feeling of control over my health.
6. I have a healthy lifestyle, so I probably do not need to have a mammogram.
7. A mammogram is only necessary if you have some breast symptoms or discomfort.
8. I am concerned about radiation exposure from a mammogram.
9. A mammogram is not the right exam for my body type.
Communication
10. In the last 12 months has a doctor or other health care provider recommended that you have a mammogram?
11. Has your doctor or health care provider discussed the pros and cons of mammograms with you?
12. Have you ever received information about why you need to get a mammogram?
13. Have you ever received information about what to expect when getting a mammogram?
14. Have you ever received information about mammograms in your preferred language? Yes - written materials
15. Have you ever received information about mammograms in your preferred language? Yes - verbal communication/conversations

The survey included demographic questions covering health insurance coverage, race/ethnicity, preferred language, educational attainment, and financial security. Respondents were asked for reasons they had ever missed or skipped a mammogram, and for the kinds of services or supports that would help them get a mammogram, with an option for open-text responses on both questions. Text responses were translated into English by a professional certified translator and then reviewed and coded using emergent codes. Codes were then summarized by collapsing similar codes into categories.

2.4. Statistical analysis

Prevalence estimates of self-reported up-to-date mammography screenings were calculated overall.. Bivariate analysis of these prevalence estimates by demographics, perceptions of mammograms, perceived barriers and facilitators to screening, and experiences with the healthcare system, were conducted using Pearson's Chi-square and Wilcoxon Rank Sum statistics. For cross-tabulations with expected cell sizes of less than five, Fisher's exact test was used.

Bivariate and multivariable logistic regression models were used to determine adjusted associations between mammogram screening and each perception and communication question. Adjusted relative risks were estimated using a modified Poisson regression with log link and robust standard errors. (Zou, 2004) All multivariable regression analyses controlled for EMR-based age, payor type, urban or rural residence, and survey-based educational attainment and financial difficulties.

All statistical analysis was performed using R version 4.1.3. Statistical significance was estimated with two-sided p-values ($p < 0.05$) and regression results are presented with 95% confidence intervals (CIs).

3. Results

3.1. Sample characteristics

The sample included 420 women, of whom 338 (80.4%) were current on their mammography screening (Table 2). There were significantly more women with commercial insurance in the current group compared with the not current group (51.2% vs 39.0%; P = 0.043). Spanish (36.9%) and Vietnamese (24.3%) were the most common preferred languages reported by respondents. Overall, 98.5% of respondents reported a preferred language that matched the language preference documented within the EMR (data not shown); because this

Table 2

Demographics of adult female survey participants, Oregon and Washington, 2021.

	Overall N = 420 n (%)	Not Current N = 82 n (%)	Current N = 338 n (%)	p-value
Median Age (IQR)	61 (56, 66)	61 (57, 67)	60 (56, 66)	0.188
Payor Type				0.043
Commercial	205 (48.8)	32 (39.0)	173 (51.2)	
Medicaid	105 (25.0)	25 (30.5)	80 (23.7)	
Medicare	75 (17.9)	14 (17.1)	61 (18.0)	
Other	12 (2.9)	6 (7.3)	6 (1.8)	
Other Government	23 (5.5)	5 (6.1)	18 (5.3)	
Race and Ethnicity				0.125
Asian	186 (44.8)	31 (38.3)	155 (46.4)	
Hispanic, Latino, or Spanish origin	154 (37.1)	38 (46.9)	116 (34.7)	
Some other race, ethnicity, or origin	75 (18.1)	12 (14.8)	63 (18.9)	
English Proficiency				0.241
Not well or not at all	304 (72.6)	63 (77.8)	241 (71.3)	
Well or very well	115 (27.4)	18 (22.2)	97 (28.7)	
Preferred language				0.394
Cantonese	62 (14.8)	10 (12.2)	52 (15.4)	
Spanish	155 (36.9)	38 (46.3)	117 (34.6)	
Russian	47 (11.2)	8 (9.8)	39 (11.5)	
Vietnamese	102 (24.3)	16 (19.5)	86 (25.4)	
Other	54 (12.9)	10 (12.2)	44 (13.0)	
Urban/Rural				0.699
Rural	56 (13.3)	12 (14.6)	44 (13.0)	
Urban	364 (86.7)	70 (85.4)	294 (87.0)	
Difficulty paying for food, housing, medical care, and utilities				0.218
Very hard	40 (9.9)	12 (15.2)	28 (8.6)	
Somewhat hard	201 (49.9)	37 (46.8)	164 (50.6)	
Not hard at all	162 (40.2)	30 (38.0)	132 (40.7)	
Highest level of education				0.166
Less than high school	150 (36.5)	33 (41.8)	117 (35.2)	
High school diploma or GED	114 (27.7)	25 (31.6)	89 (26.8)	
College degree or some college	147 (35.8)	21 (26.6)	126 (38.0)	

Wilcoxon rank sum test; Pearson's Chi-squared test; Fisher's exact test.

concordance was not 100%, there were some self-reports of "other" languages besides those which were the focus of our analyses. The majority of respondents resided within an urban area (86.7%). There were no significant differences between the current and not current groups by race/ethnicity, English proficiency, preferred language, geography (i.e., urban or rural residence), financial difficulties, or education level.

3.2. Perceptions

Most respondents agreed that a mammogram is an effective tool for detecting breast cancer (93.0%), that they would be more likely to have one if a doctor told them it was important (81.4%), and that having a mammogram would give them a feeling of control over their health (93.5%; Table 3). Over half of respondents (53.8%) believed mammograms are expensive and painful or uncomfortable. A smaller, but sizable, proportion of respondents (44.0%) reported concerns about radiation exposure during mammography. Perceptions that mammograms are unnecessary for those who live a healthy lifestyle or in the absence of symptoms were relatively uncommon, with 14.0% and 18.7% of respondents agreeing with these statements, respectively.

For most perception statements, there was no significant difference between those who were current and not current on mammography screening (Table 4). However, in the adjusted model those who believed they did not need a mammogram due to having a healthy lifestyle were 28% less likely (P = 0.006), and those who believed mammograms were only necessary if they had breast symptoms were 15% less likely (P = 0.050), to be current on breast cancer screening. These associations were statistically significant in the unadjusted analyses as well.

3.3. Communication

Although approximately three-quarters of respondents (74.1%) reported that a doctor or other health care provider had recommended they have a mammogram, only 59.2% reported that the doctor or other health care provider had discussed the pros and cons of mammograms with them (Table 3). While 75.7% of respondents reported receiving information on why they need a mammogram, only 53.3% reported receiving information on what to expect when getting a mammogram, and even fewer received written materials or verbal information in their preferred language (35.0% and 28.3%, respectively).

Respondents whose doctors discussed the pros and cons of mammograms with them were 18% more likely to be current on

mammograms in the adjusted model (Table 4). Having a doctor or other healthcare provider recommend a mammogram was also associated with a significant increase in the likelihood of being current on breast cancer screenings in the adjusted model (RR = 1.27; P = 0.002). These associations were also statistically significant in the unadjusted analyses, along with two other associations that did not retain statistical significance after adjusting for age, payor, geography, financial difficulties, and education: respondents who received information from their provider about why a mammogram was needed and what to expect when getting a mammogram were more likely to be current on breast cancer screenings.

3.4. Reasons for missing mammograms and supports needed

When asked for the reasons that they had ever missed a mammogram, respondents most commonly mentioned having no symptoms or concerns (14.7%), the COVID-19 pandemic (14.3%), and not getting around to it (9.7%). Additional responses written in text fields mentioned pain, fear, or previous bad experiences; personal choices and beliefs about the health system; and forgetting or being too busy (Table 5). In terms of the support needed to get a mammogram, respondents most commonly identified no cost for mammograms (41.6%), financial support for additional tests or treatment (30.8%), and mammograms offered during a provider visit (30.1%). Text responses also mentioned wanting more information, language support, financial or logistical support, and other options beyond mammography (Table 5).

4. Discussion

This study focused on understanding key drivers of gaps in mammography among individuals with NELP spanning four languages (Cantonese, Russian, Spanish, and Vietnamese) and two states (Oregon and Washington). Approximately 20% of the population had a self-reported gap in mammography. There were no demographic differences between study participants who were current on their mammography versus those who were not; however, there were significant differences in insurance coverage with more commercially insured respondents being current, highlighting potential financial or logistical barriers to accessing mammography. There were key differences in perceptions and communication associated with mammography status; individuals who believed that mammograms are not needed for those who are healthy or not experiencing symptoms or discomfort were

Table 3
Descriptive statistics for breast cancer screening perceptions and communication among adult female survey participants, Oregon and Washington, 2021.

	Overall N = 420 n (%)	Not Current N = 82 n (%)	Current N = 338 n (%)	p-value[b]
Perceptions[a]				
1. Mammogram effective	372 (93.0)	67 (87.0)	305 (94.4)	0.022
2. Mammogram expensive	150 (53.8)	31 (60.8)	119 (52.2)	0.266
3. Mammogram painful or uncomfortable.	183 (53.8)	41 (61.2)	142 (52.0)	0.177
4. More likely to have one if doctor recommends	285 (81.4)	45 (71.4)	240 (83.6)	0.024
5. Regular mammograms give feeling of control	361 (93.5)	65 (86.7)	296 (95.2)	0.015
6. Mammogram not needed if healthy	49 (14.0)	20 (31.2)	29 (10.1)	<0.001
7. Mammogram only necessary if symptomatic	73 (18.7)	22 (29.7)	51 (16.1)	0.007
8. Concerned about radiation exposure	136 (44.0)	30 (49.2)	106 (42.7)	0.364
9. Mammogram not right exam for me	27 (8.1)	6 (9.7)	21 (7.7)	0.61
Communication[b]				
10. Provider recommended mammogram	309 (74.1)	46 (56.1)	263 (78.5)	<0.001
11. Provider discussed pros/cons of mammogram	247 (59.2)	34 (41.5)	213 (63.6)	<0.001
12. Received information about why mammogram is needed	314 (75.7)	54 (65.9)	260 (78.1)	0.021
13. Received information about what to expect when getting mammogram	217 (53.3)	32 (40.5)	185 (56.4)	0.011
14. Received written information about mammograms in preferred language	147 (35.0)	24 (29.3)	123 (36.4)	0.225
15. Received verbal information about mammograms in preferred language	119 (28.3)	19 (23.2)	100 (29.6)	0.247

[a] Percentages refer to the proportion of respondents who agree or endorse each item.
[b] Pearson's Chi-squared test.

Table 4

Association between perceptions and communication to self-reported breast cancer screening status among adult female survey participants, Oregon and Washington, 2021.

	Bivariate			Multivariable[b]		
	RR[a]	95% CI	p-value	aRR	95% CI	p-value
Perceptions						
1. Mammogram effective	1.28	0.95, 1.71	0.101	1.16	0.87, 1.55	0.312
2. Mammogram expensive	0.94	0.84, 1.05	0.266	0.93	0.82, 1.06	0.296
3. Mammogram painful or uncomfortable.	0.93	0.84, 1.03	0.177	0.92	0.82, 1.02	0.122
4. More likely to have one if doctor recommends	1.16	0.99, 1.37	0.064	1.14	0.96, 1.35	0.128
5. Regular mammograms give feeling of control	1.37	0.97, 1.92	0.070	1.09	0.81, 1.47	0.577
6. Mammogram not needed if healthy	0.69	0.54, 0.88	0.003	0.72	0.57, 0.91	0.006
7. Mammogram only necessary if symptomatic	0.84	0.71, 0.98	0.029	0.85	0.72, 1.00	0.050
8. Concerned about radiation exposure	0.95	0.85, 1.06	0.375	0.94	0.84, 1.06	0.341
9. Mammogram not right exam for me	0.95	0.77, 1.18	0.651	0.93	0.74, 1.16	0.519
Communication						
10. Provider recommended mammogram	1.28	1.11, 1.47	<0.001	1.27	1.09, 1.47	0.002
11. Provider discussed pros/cons of mammogram	1.2	1.08, 1.34	<0.001	1.18	1.05, 1.32	0.004
12. Received information about why mammogram is needed	1.15	1.00, 1.31	0.044	1.09	0.95, 1.24	0.223
13. Received information about what to expect when getting mammogram	1.13	1.03, 1.25	0.014	1.09	0.99, 1.21	0.088
14. Received written information about mammograms in preferred language	1.06	0.97, 1.17	0.211	1.06	0.95, 1.17	0.284
15. Received verbal information about mammograms in preferred language	1.06	0.96, 1.17	0.225	1.07	0.96, 1.18	0.209

[a] RR = Relative Risk, CI = Confidence Interval.
[b] Controlling for age (continuous), payor type, urban/rural, financial difficulties, and education.

Table 5

Reasons missed mammograms and supports needed among adult female survey participants, Oregon and Washington, 2021.

	N (%)	Example Text Responses
Reasons ever missed or skipped a mammogram		
I have NOT missed a mammogram	243 (55.0)	Pain, fear, or previous bad experience: *"I am afraid of getting a mammogram" "They squeezed so hard it ruptured a cyst"* Personal choices and beliefs: *"[I] choose not to have a mammogram" "[I] don't believe they are as safe or valuable as told" "Current medical system is out of touch regarding this issue"* Other reasons *"I forgot the appointment" "Too busy"*
I haven't had any breast issues or concerns	65 (14.7)	
I did not go because of COVID-19	63 (14.3)	
I did not get around to it	43 (9.7)	
Other reason	29 (6.6)	
It was too expensive	18 (4.1)	
My doctor did not tell me I needed it	14 (3.2)	
I was afraid it would hurt	11 (2.5)	
I did not know where to go	9 (2.0)	
I was focused on other things, like getting housing, food, or paying utility bills	8 (1.8)	
I did not have transportation to get to the appointment	6 (1.4)	
I could not take time off work	4 (0.9)	
I was afraid of bad results	3 (0.7)	
I did not have childcare available	1 (0.2)	
Supports needed for getting a mammogram		
No charge or cost for mammograms	184 (41.6)	Information *"More honesty about [false] positives and unnecessary biopsies" "If there are no symptoms it is not necessary"* Language support *"Interpretation during appointments" "Attention in Spanish" "Translation and interpretation for transportation and for appointments" "Bilingual staff"* Financial and logistical support *"Medical insurance for everyone" "Give us faster appointments"* Other options *"Find a better, easier way to detect" "Ultrasound option for dense breast"*
Financial support for any additional tests or treatment	136 (30.8)	
Mammograms offered during my visit with a health care provider	133 (30.1)	
Appointments available on evenings and weekends	99 (22.4)	
Materials in my preferred language about available services	94 (21.3)	
Transportation to mammogram appointments	78 (17.6)	
Having access to a provider with my same cultural background or gender	68 (15.4)	
More information about the procedure	43 (9.7)	
More information on how to make an appointment	38 (8.6)	
Access to mobile mammogram services	36 (8.1)	
Other	34 (7.7)	
Access to a health navigator, peer support specialist, or other culturally specific guide	30 (6.8)	
Other accessibility accommodations	20 (4.5)	
Access to childcare	3 (0.7)	

significantly less likely to be current on their mammography. Having a provider recommend and discuss the pros and cons of mammography were each associated with a significantly higher likelihood of being current on mammography. Together, these findings demonstrate how misperceptions can drive gaps, while provider communication can act as a facilitator to mammography for individuals with NELP.

Within our study population, 20% self-reported a gap in mammography, similar to the overall population rate gap of 21.7% reported in the 2020 BRFSS. (CDC, 2022) It is important to note that surveys often do not reach those individuals most in need and therefore the results frequently underrepresent actual gaps in care. Nonetheless, recent analysis has shown that the proportions of individuals with gaps in mammography have decreased for Black, Hispanic, and Asian populations. (Peek and Han, 2004) Increasing rates of mammography have also been documented among immigrants. (Breen et al., 2011) Given that individuals with NELP are more likely to be people of color and recent immigrants (85% of this study sample are people of color), these trends are promising for closing gaps in care among individuals with NELP. At the same time, research on cancer outcomes has found that those with NELP receive diagnosis at more advanced stages. (Skube et al., 2019) Mammography is not a one-time behavior, and efforts should continue to ensure that systemic barriers to ongoing, on-time screenings remain removed. Because early detection of breast cancer is essential for more favorable prognosis, gaps in care must be addressed by the health system to improve disparities in cancer outcomes.

This study specifically focused on exploring gaps in mammography within an entirely NELP population. The only significant demographic difference between the NELP population with gaps and without gaps in mammography was insurance. Among those who were current on their mammography screening, a greater proportion had commercial insurance and a lower proportion had Medicaid and other coverage. The Affordable Care Act passed in 2010 not only expanded Medicaid eligibility, allowing millions of Americans to access health insurance, it also required most insurers and Medicaid and Medicare to eliminate cost sharing for preventive screenings, meaning there should be no out-of-pocket costs for screening mammography (Trivedi et al., 2018) Financial barriers should therefore not be driving the difference in access; however, 41.6% of respondents in our study cited having "no cost" for a mammogram as a major way to facilitate increased access, highlighting a potential lack of awareness among individuals with NELP of the free screening benefit provided by insurance. Regardless of language, there are many known barriers to understanding and using medical insurance that have led to recommendations of increased support for new enrollees, educational materials, and health navigators (McCullough and Dalstrom, 2018; McAlearney et al., 2005); our data further suggests that this support should be provided in the individual's preferred language.

Patient perceptions, including their beliefs, knowledge, and attitudes about breast cancer screening are a known driver of mammography. (Peek and Han, 2004) In this study, while concerns about costs, effectiveness, discomfort, and radiation were all higher among those with gaps in mammography, the only perceptions that were significantly associated with gaps were beliefs around the need for mammography. Individuals with gaps in mammography were significantly more likely to think a mammogram is not needed if you are healthy or if you do not have any symptoms. These commonly cited "breast cancer myths" represent a key opportunity for the health system and broader public health campaigns to communicate about the need and potential benefits of mammography to the NELP population. In addition, the rapidly changing health information environment in the wake of the COVID-19 pandemic has facilitated the spread of misinformation, further emphasizing the importance of clear and culturally- and linguistically-specific messaging from trusted sources.

While perceptions represented a barrier to screening, we found that communication facilitated mammography for individuals with NELP. Provider communication, including recommending a mammogram and discussing the pros and cons, was significantly associated with a higher

likelihood of having a mammogram. This is supported by findings in multiple studies where provider-patient communication is considered a major driver of mammogram use across multiple patient populations and racial groups. (Fox and Stein, 1991; Grady et al., 1992; Mandelblatt and Yabroff, 1999) Additionally, a *meta*-analysis that examined interventions focused on provider behavior change (such as reminders and prompts) and cognitive change (such as attitudes about screening) showed that both significantly increased patient screening rates. (Mandelblatt and Yabroff, 1999) The study also notes that interventions that targeted providers and patients were not more effective than targeting providers alone. (Mandelblatt and Yabroff, 1999) This strongly supports the powerful role providers play in encouraging patients to get screening mammography, and provider interventions should incorporate practices to ensure patients with NELP also receive these critical communications.

Surprisingly, there was not a statistically significant difference in receiving communication (written and verbal) in their preferred language between those with and without gaps in mammography. It is notable that overall the receipt of written or verbal communication in a preferred language was low in our study population (35% and 28.3%, respectively), and while our statistical analysis did not identify it as a facilitator, 21.3% of our NELP study participants cited materials in a preferred language as a key support needed to access mammography. The need for interpretation, translation, and bilingual staff also surfaced in our unstructured responses. Thus, these services and supports should be considered as part of a strategy to increase use of mammography and these recommendations align with other research that shows language concordant and culturally appropriate care as key for improving access and outcomes. (Diamond et al., 2019).

While language is important for provider-patient communication, NELP can also be a proxy for specific social factors (e.g., housing stability) that lead to decreased access to preventive healthcare.0.8 This is partially supported by our analysis that found that some types of provider communication (e.g., receiving information about why a mammogram is needed) were significant in the unadjusted model but not the model adjusted for factors such as financial difficulties. However, provider recommendation and discussing pros and cons remained significant, independent of social factors.

Research has also shown that differences in healthcare utilization by language preference can signify cultural differences in norms, values, and perceptions related to health.8 Language and culture are inextricably connected; thus, cultural competency is critical to supporting NELP patients. Increasing diversity of providers, including by providing more supports earlier in education to increase access to the medical field, is an essential goal for healthcare systems. (Stanford, 2020) Additionally, to support more culturally competent care, many health systems are embedding Community Health Workers –frontline public health workers who are trusted members of the community they serve (Pinto et al., 2020) – into their healthcare teams. Healthcare systems can also partner with community-based organizations focused on providing culturally competent support, many of which specifically serve NELP populations.

4.1. Limitations

This study has several limitations. Our study population was selected using EMR across two states in a large health system, which biased our sample to a population that accessed health care. We know that access to healthcare is closely tied to income, race and ethnicity, and language preferences, and interpretation of findings should keep this limitation in mind. In addition, the overall response rate of the survey was low, with approximately 37% of the sample overall and 23% of individuals with NELP responding to the survey. Further, a high proportion of respondents were current on mammograms, only approximately 20% of the analytic sample was not current. The low response rate and small sample of "non-compliers" could limit the generalizability of our

findings and may have implications for internal validity. Because the analysis relies on self-reported mammogram status, we are unable to make comparisons between non-responders who are current and not current on mammography. The relatively smaller number of individuals who were not current on mammography may also have reduced statistical power. Our survey was subject to response, recall, and social desirability bias. While our survey was offered in the five most common languages in our study population, our findings may not be generalizable to populations with other language preferences. Further, it is unlikely that drivers of gaps in mammography operate in the same way across different non-English language groups, but they were studied as a group in this analysis. In addition, while multiple language options were available, survey items were originally developed in English, and non-English open-ended responses were translated into English for analysis, which may have impacted interpretation. Lastly, our survey was fielded in September 2021 which was during the COVID-19 pandemic when healthcare delivery and access had dramatically changed, and these factors may have impacted survey responses.

4.2. Conclusion

Our study identifies misperceptions about the need for mammography as a barrier and communication as a facilitator to care for individuals with NELP. All of our findings point to the importance of communication with the NELP population. Our study also reinforces that provider-patient communication is a highly effective way to encourage screening mammography. Across all forms of communication, measures should be taken to ensure appropriate language services, cultural competency, and supports are in place for patients with NELP.

4.3. Practice implications

Communication is a key facilitator to accessing mammography, particularly for individuals with NELP. While support and health promotion materials should be made available in patients' preferred languages, direct translation of existing materials is insufficient; communication efforts must also be culturally relevant and specific. Because mammography is not a one-time behavior, these types of communication must be ongoing to counteract prevalent misperceptions about the need for screening. Culturally- and linguistically-specific information shared by a healthcare provider may be a promising way to increase screening, as it was identified as a preferred method of communication in the current study.

CRediT authorship contribution statement

Monique Gill: Conceptualization, Methodology, Writing – original draft. **Hannah Cohen-Cline:** Conceptualization, Methodology, Writing – original draft. **Megan Holtorf:** Methodology, Formal analysis, Visualization. **Keri Vartanian:** Conceptualization, Methodology, Writing – original draft, Supervision.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

References

Agency for Healthcare Research and Quality. *2017 National Healthcare Quality and Disparities Report.*; 2018. Accessed July 6, 2022. https://www.ahrq.gov/sites/default/files/wysiwyg/research/findings/nhqdr/2017nhqdr.pdf.

Alexandraki, I., Mooradian, A.D., 2010. Barriers related to mammography use for breast cancer screening among minority women. J Natl Med Assoc. 102 (3), 206–218. https://doi.org/10.1016/S0027-9684(15)30527-7.

American Cancer Society. Key Statistics for Breast Cancer. Published January 12, 2022. Accessed June 7, 2022. https://www.cancer.org/cancer/breast-cancer/about/how-common-is-breast-cancer.html.

Breen, N., Gentleman, J.F., Schiller, J.S., 2011. Update on mammography trends. Cancer 117 (10), 2209–2218. https://doi.org/10.1002/cncr.25679.

Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Published 2020. Accessed July 6, 2022. https://nccd.cdc.gov/brfssprevalence/rdPage.aspx?rdReport=DPH_BRFSS.ExploreByLocation&rdProcessAction=&SaveFileGenerated=1&irbLocationType=States&islLocation=98&islState=&islCounty=&islClass=CLASS18&islTopic=TOPIC37&islYear=2020&hidLocationType=States&hidLocation=98&hidClass=CLASS18&hidTopic=TOPIC37&hidTopicName=Mammogram&hidYear=2020&irbShowFootnotes=Show&rdICL-iclIndicators=_MAM5023%2C_RFMAM22&iclIndicators_rdExpandedCollapsedHistory=&iclIndicators=_MAM5023%2C_RFMAM22&hidPreviouslySelectedIndicators=&DashboardColumnCount=2&rdShowElementHistory=&rdScrollX=0&rdScrollY=0&rdRnd=31854.

U.S. Census Bureau. 2020: ACS 5-Year Estimates Data Profiles. Published 202Accessed June 7, 2022. https://data.census.gov/cedsci/table?tid=ACSDP5Y2020.DP02&hidePreview=true.

Diamond, L., Izquierdo, K., Canfield, D., Matsoukas, K., Gany, F., 2019. A systematic review of the impact of patient-physician non-english language concordance on quality of care and outcomes. J Gen Intern Med. 34 (8), 1591–1606. https://doi.org/10.1007/s11606-019-04847-5.

Fiscella, K., Franks, P., Doescher, M.P., Saver, B.G., 2002. Disparities in health care by race, ethnicity, and language among the insured: findings from a national sample. Med Care. 40 (1), 52–59. https://doi.org/10.1097/00005650-200201000-00007.

Fox, S.A., Stein, J.A., 1991. The Effect of Physician-Patient Communication on Mammography Utilization by Different Ethnic Groups. Med Care. 29 (11), 1065–1082. http://www.jstor.org/stable/3765739.

Gonzales, A.A., Garroutte, E., Ton, T.G.N., Goldberg, J., Buchwald, D., 2012. Effect of tribal language use on colorectal cancer screening among American Indians. J Immigr Minor Heal. 14 (6), 975–982. https://doi.org/10.1007/s10903-012-9598-2.

Grady, K.E., Lemkau, J.P., McVay, J.M., Reisine, S.T., 1992. The importance of physician encouragement in breast cancer screening of older women. Prev Med (Baltim). 21 (6), 766–780. https://doi.org/10.1016/0091-7435(92)90083-T.

Jacobs, E., Chen, A.H., Karliner, L.S., Agger-Gupta, N., Mutha, S., 2006. The need for more research on language barriers in health care: a proposed research agenda. Milbank Q. 84 (1), 111–133.

Lu, T., Myerson, R., 2020. Disparities in health insurance coverage and access to care by english language proficiency in the USA, 2006–2016. J Gen Intern Med. 35 (5), 1490–1497. https://doi.org/10.1007/s11606-019-05609-z.

Mandelblatt, J.S., Yabroff, K.R., 1999. Effectiveness of interventions designed to increase mammography use: a meta-analysis of provider-targeted strategies1. Cancer Epidemiol Biomarkers Prev. 8 (9), 759–767.

McAlearney, A.S., Reeves, K.W., Tatum, C., Paskett, E.D., 2005. Perceptions of insurance coverage for screening mammography among women in need of screening. Cancer 103 (12), 2473–2480. https://doi.org/10.1002/cncr.21068.

McCullough, K., Dalstrom, M., 2018. I am insured but how do I use my coverage: lessons from the front lines of medicaid reform. Public Health Nurs. 35 (6), 568–573. https://doi.org/10.1111/phn.12525.

Miller, B.C., Bowers, J.M., Payne, J.B., Moyer, A., 2019. Barriers to mammography screening among racial and ethnic minority women. Soc Sci Med. 239. https://doi.org/10.1016/j.socscimed.2019.112494.

Ortega, P., Shin, T.M., Martínez, G.A., 2022. Rethinking the term "limited english proficiency" to improve language-appropriate healthcare for all. J Immigr Minor Heal. 24 (3), 799–805. https://doi.org/10.1007/s10903-021-01257-w.

Peek, M.E., Han, J.H., 2004. Disparities in screening mammography. J Gen Intern Med. 19 (2), 184–194. https://doi.org/10.1111/j.1525-1497.2004.30254.x.

Pinto, D., Carroll-Scott, A., Christmas, T., Heidig, M., Turchi, R., 2020. Community health workers: improving population health through integration into healthcare systems. Curr Opin Pediatr. 32 (5), 674–682. https://doi.org/10.1097/MOP.0000000000000940.

Rakowski, W., Dube, C.E., Marcus, B.H., Prochaska, J.O., Velicer, W.F., Abrams, D.B., 1992. Assessing elements of women's decisions about mammography. Heal Psychol. 11 (2), 111–118. https://doi.org/10.1037/0278-6133.11.2.111.

Silber, J.H., Rosenbaum, P.R., Ross, R.N., Reiter, J.G., Niknam, B.A., Hill, A.S., Bongiorno, D.M., Shah, S.A., Hochman, L.L., Even-shoshan, ORIT, Fox, K.R., 2018. Disparities in breast cancer survival by socioeconomic status despite medicare and medicaid insurance. Milbank Q. 96 (4), 706–754.

Skube ME, Alexander BH, Beilman GJ, Tuttle TM. Impact of patients' primary language on stage of cancer at diagnosis. *Minn Med*. Published online 2019:41-45.

Solis, J.M., Marks, G., Garcia, M., Shelton, D., 1990. Acculturation, access to care, and use of preventive services by Hispanics: findings from HHANES 1982–84. Am J Public Health. 80 (Suppl), 11–19. https://doi.org/10.2105/AJPH.80.Suppl.11.

Stanford, F.C., 2020. The Importance of diversity and inclusion in the healthcare workforce. J Natl Med Assoc. 112 (3), 247–249. https://doi.org/10.1016/j.jnma.2020.03.014.

Timmins, C.L., 2002. The impact of language barriers on the health care of Latinos in the United States: a review of the literature and guidelines for practice. J Midwifery Womens Health. 47 (2), 80–96.

Trivedi, A.N., Leyva, B., Lee, Y., Panagiotou, O.A., Dahabreh, I.J., 2018. Elimination of cost sharing for screening mammography in medicare advantage plans. N Engl J Med. 378 (3), 262–269. https://doi.org/10.1056/NEJMsa1706808.

U.S. Preventive Services Task Force (USPSTF). *U.S. Preventive Services Task Force (USPSTF) Guidelines*. U.S. Department of Health & Human Services, Agency for Healthcare Research and Quality; 2016.

Woloshin, S., Schwartz, L.M., Katz, S.J., Welch, H.G., 1997. Is language a barrier to the use of preventive services? J Gen Intern Med. 12 (8), 472–477.

Yeheskel, A., Rawal, S., 2019. Exploring the 'patient experience' of individuals with limited english proficiency: a scoping review. J Immigr Minor Heal. 21 (4), 853–878. https://doi.org/10.1007/s10903-018-0816-4.

Zou, G., 2004. A modified poisson regression approach to prospective studies with binary data. Am J Epidemiol. 159 (7), 702–706. https://doi.org/10.1093/aje/kwh090.