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Deaf Women's Health: Adherence to Breast and Cervical Cancer Screening Recommendations

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Abstract

Introduction: No prevalence studies on cancer screening adherence among Deaf women have been conducted in the past decade. Current data on breast and cervical cancer screening are needed from Deaf women who adhered or did not adhere to U.S. Preventative Services Task Force screening guidelines. The study objectives were to assess whether disparities for cancer screening adherence persist for Deaf women compared with the general population and whether racial and ethnic disparities for adherence exist among Deaf women.

Methods: Data for adherence to Pap (n=529 Deaf women, n=1,119 hearing women) and mammogram screening (n=324 Deaf women, n=1,086 hearing women) were drawn from HINTS-ASL (Deaf women; February 2017–August 2017, October 2017–May 2018) and HINTS 5, Cycle 1 data set (hearing women; January–May 2017). Data were analyzed in 2018. Propensity score model of the weighed samples estimated the probability of adherence among the entire sample and within the sample of Deaf women for each screening test.

Results: About 78% (n=415) of age-eligible Deaf women and 85% (n=956) of age-eligible hearing women adhered to Pap screening recommendations (p<0.001). For breast cancer screening, the adherence rates for 245 Deaf and 891 hearing women were 76% and 82%, respectively (p<0.01). After adjusting for correlates, Deaf women remained at disparity for cervical cancer screening but not breast cancer screening. Race and ethnicity were not associated with cancer screening adherence.

Conclusions: This is a call to action for targeted, accessible health promotion interventions for age-eligible Deaf women to increase adherence to cervical cancer screening.

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INTRODUCTION

To screen for breast and cervical cancer, the U.S. Preventative Services Task Force recommends mammogram testing at least once every 2 years for women aged 50–74 years, and Pap testing every 3 years for those aged 21–55 years. According to the Centers for Disease Control and Prevention National Health Interview Survey in 2015,[1] 72% of age-eligible women received a mammogram and 83% of age-eligible women received a Pap test. The Pap screening rate, compared with mammography, varied significantly across racial and ethnic subgroups, with an 80% cervical cancer screening adherence rate among white women, 76% among Hispanic women, and 83% among African American women. Secondary cancer screening data from 2004 to 2005 and 2009 to 2010[2] indicated that African American women were more likely to have a Pap test compared with white women. A large data set from the 2003–2010 Medical Expenditure Panel Survey showed that those with racial and socioeconomic privilege were more likely to have regular cancer screening, particularly if they identified as wealthy, non-Hispanic white, and were better educated, married, and privately insured.[3] Thus, it is possible that the racial and ethnic disparities for cancer screening persists within a subgroup of women with disabilities.

Women with disabilities have been found to have numerous cancer health disparities, including being less likely to undergo cancer screening for a wide range of medical conditions including Pap testing, mammograms,[4–6] and other cancer screening.[7–10] Barriers to health care, underutilization of women's health screening services, and a lack of awareness of the value of cancer, mammography or hormone replacement therapy were mentioned in a handful of Deaf women's health studies that gathered data between 1997 and 2009.[11–14] Compared with Deaf women, hearing women were more likely to attend more prenatal appointments, receive more information at their appointments, and report greater satisfaction with doctor–patient communication as well as overall care.[15] Deaf women would be more likely to use services if tailor-made services for Deaf women were available.[16]

A California-based breast education program study conducted in 2008 and 2009 that consisted of volunteers with lower education levels showed that about 57% of 209 Deaf women who used American Sign Language (ASL) received a mammogram in the past 2 years.[14] Within this sample, 70% of Deaf white women received a mammogram versus only 44% of Deaf women from other racial/ethnic groups. In the past decade, educational programs targeted toward Deaf ASL users have resulted in a significant increase of knowledge about cervical and breast cancers in Deaf women.[13,17,18] With the availability of these accessible cancer education videos in ASL on the Internet, it is possible that the cancer screening adherence rate among Deaf women today has increased compared with the small sample of Deaf women who participated in the 2008–2009 study by Berman et al.[14] However, given current racial/ethnic disparities for cancer screening among female adults in the general population, this could also be the case for Deaf women belonging to a racial or ethnic minority.

No prevalence studies on cancer screening adherence among Deaf women have been conducted in the past decade, and the literature on Deaf women's health disparities is largely

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outdated. Current data are needed from a national sample of Deaf women who adhered to the guidelines for cervical and breast cancer screening. The study objectives were to assess whether disparities for cancer screening adherence persist for this group compared with the general population and whether racial and ethnic disparities continue to exist within the population (or among) Deaf women.

METHODS

Study Sample

The Health Information National Trends survey (HINTS; hints.cancer.gov), which included items about cancer screening, was translated to and linguistically validated in ASL (HINTS-ASL.[19] Following IRB approval, this HINTS-ASL survey was administered to Deaf adults in the U.S. Only those who provided informed consent took the online survey in ASL. The HINTS-ASL secondary data for the current study were drawn from data collected in February 2017–August 2017 and October 2017–May 2018, with a response rate of around 91%. Comparative data for the sample of hearing women was drawn from the HINTS data set (hints.cancer.gov; January 2017–May 2017). Hearing participants were recruited through random sampling whereas Deaf participants were recruited through snowball sampling, which have been reported to be effective for hard-to-reach populations.[20]

Measures

The U.S. Preventive Services Task Force and American Cancer Society both recommend that: (1) women aged 40–49 years with a family history of cancer should consider biannual screening and all women aged 50–74 years receive biannual breast cancer screening, and (2) women aged 21–65 years receive triannual cervical cancer screening. In a review of studies, [21] several have shown that despite the new recommendation changes for women aged 40–49 years, the frequency of mammograms did not decrease. These recommended guidelines were therefore used to determine age-eligible adherence to screening. This study included women aged 21–65 years who answered the Pap question (*When was your last Pap screen?)* and women aged 40–74 years who answered the mammogram question (*When did you have your most recent mammogram to check for breast cancer?).* If a woman met the recommended guidelines, she was given an adherence score of 1; if she did not, she was given an adherence score of 0.

Statistical Analysis

Data analysis was carried out in 2018. Descriptive statistics were calculated to summarize the sociodemographic and health sample characteristics for the following: overall sample adherence versus nonadherence, Deaf women who adhered versus hearing women who adhered, Deaf women who did not adhere versus hearing women who did not adhere, and Deaf women who adhered versus Deaf women who did not adhere. SPSS, version 25 was used for analysis. Multiple imputation on all covariates linked to the outcome was performed to account for missing data. These covariates (age, race, education, income, regular provider, health insurance, personal history of cancer, and family history of cancer) were identified a priori based on known indicators of mammogram and Pap adherence. For Deaf women, language preference was added as a covariate.

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The authors then performed propensity score weighting[22] of the two groups with the goal of reducing bias due to non-random allocation to the Deaf and hearing groups. For each of the five imputed data sets from the previous multiple imputation, propensity scores were calculated using the following covariates: age, race, education, income, regular provider, health insurance, personal history of cancer, and family history of cancer, and hearing status. Propensity scores for each participant were then averaged across the five imputed data sets. Inverses were then calculated, with the predictor of interest calculated as 1/(pscore) and the comparison group calculated as 1/(1 – pscore). This inverse weight was then applied to binary logistic regression analyses for each imputed data set, and the results from the pooled results were used. This determined predictors of adherence in the overall sample and within the Deaf women sample.

RESULTS

A total of 529 Deaf age-eligible women and 1,119 hearing age-eligible women who took the HINTS-ASL or HINTS survey recently answered the Pap screening adherence question, whereas 324 Deaf age-eligible women and 1,086 hearing age-eligible women answered the mammogram question. Without controlling for other contributing factors, chi-square analyses showed significant group differences in the adherence rates between the sampled Deaf and hearing women. About 78% (n=415) of Deaf women adhered to Pap screening recommendations versus 85% (n=956) of hearing women (X^2 =12.53, p<0.001). Similarly, only 76% (n=245) of Deaf women adhered to the recommended guidelines for mammograms whereas 82% (n=891) of hearing women did (X^2 =6.58, p<0.01). Overall, a significantly higher percentage of younger, white, and college-educated Deaf women adhered to screening guidelines and recommendations compared with hearing women who adhered (Table 1). However, Deaf women were less likely to see a provider regularly (X^2 =15.04, p<0.001 for Pap; X^2 =22.34, p<0.001 for mammogram). Although having a family history of cancer did not differ across hearing status, personal history of cancer was significantly associated with mammogram adherence for Deaf women (X^2 =6.17, p<0.02) but not for hearing women. Some of these predictors also emerged for nonadherence in Deaf women such as younger age, being single, self-identifying as white, and having a college education (Table 2).

When all imputed covariates weighed by the inverse propensity scores were entered in a logistic regression model (Table 3), Deaf age-eligible women remained at disparity for Pap screening adherence compared with hearing age-eligible women (AOR=0.71, 95% CI=0.56, 0.86). Both Deaf and hearing women had similar positive predictors for Pap adherence: younger age, self-identification as black, having a higher level of education, being in a current or previous partnership, having health insurance, and having a regular provider.

For mammogram adherence, when the same covariates were entered in a separate binary logistic regression model, it was found that there was no disparity for mammogram screening in Deaf age-eligible women compared to hearing age-eligible women. For both Deaf and hearing samples, positive predictors included older age, self-identification as black or Hispanic, higher education, being in a current partnership, having a regular provider, and having a family history of cancer. Income and personal history of cancer were not significant

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predictors for breast or cervical cancer screening adherence in both samples of women (Table 3).

As shown in Table 4, race, education, income, cancer history, and Deaf-specific variables did not vary for Pap screening adherence among Deaf women. Being in a current or previous partnership was significantly associated with Pap screenings. Pap screening nonadherence was more common among those who did not have insurance. After controlling for all other factors and using pooled imputed data, being in a current or former partnership was the only positive predictor for Pap adherence within the Deaf sample (Appendix Table 1).

As shown in Table 4, mammogram screening adherence increased with age. A majority of Deaf age-eligible women who adhered to mammogram screening guidelines preferred using both ASL and English versus ASL alone. When all imputed covariates were entered in a logistic regression model (Appendix Table 1), older age and identifying as black/African American were found to be positive predictors for mammogram adherence. However, women who preferred to use ASL over English were found to be less likely to have adhered to mammogram screening guidelines (AOR=0.57, 95% CI=0.33, 0.99).

The overall Pap and mammogram adherence for the total sample was 83% (n=1,371 of 1,648) and 81% (n=1,136 of 1,410), respectively. According to chi-square analysis (Appendix Table 2), there was a higher proportion of age-eligible hearing women who adhered to the recommended cancer screening guidelines compared with nonadherent hearing women. By contrast, Deaf women made up a higher proportion of nonadherence than adherence for both Pap screening (41% vs 30%, X^2=12.53, p<0.001) and mammogram screening (29% vs 22%, X^2=6.58, p<0.01). Sociodemographic differences for adherence to Pap and mammogram screening included education, income, marital status, health insurance, and having a regular provider. After adjusting for these covariates along with age and personal/family cancer history in a regression analysis that compared adherence rates between Deaf and hearing women who were age-eligible for screening (Table 3), Deaf women remained at disparity for Pap screening but not mammogram screening.

DISCUSSION

This study is groundbreaking as the first of its kind analyzing the prevalence of Deaf women's cervical cancer screening adherence through Pap testing. After controlling for sociodemographic and health indicators, results indicate disparity in cervical cancer screening for Deaf women relative to their hearing counterparts. Deaf women were still significantly less likely to adhere to Pap screening compared with hearing women.

Contrary to the racial/ethnic disparities found in the general population, the current sample of Deaf women did not differ by race or ethnicity for Pap screening adherence. After controlling for sociodemographic factors, the only significant contributor to Pap screening was marital status. A significantly higher number of Deaf women in a current or previous partnership adhered to Pap screenings compared with Deaf women who were single. Marital status has been found to be an independent positive predictor for cancer screening in the general population.[23] The mechanism by which companionship could promote cancer

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screening in Deaf women could include the beneficial role of educational outreach programs targeting spouses or partners. Though social support plays a role in Pap screening adherence in the general population,[24] engagement in health-related discussions with health-literate peers can have a significant impact on Deaf women's adherence to Pap screening.

Furthermore, for Deaf women, Pap adherence was strongly associated with being younger, white, and educated, which has also been found in the general population.[25] However, the significance of these characteristics disappeared after controlling for other covariates in regression analyses.

Among 324 Deaf women nationwide, the current breast cancer screening adherence rate is 76%. This is the first study that gathered data from a large sample in U.S. In the present large U.S. sample with a more robust sample size, 74% of white Deaf women, 87% of black Deaf women, and 75% of Hispanic Deaf women adhered to mammogram screening. Although black women were significantly more likely to adhere to mammogram screening compared with white women in this study, caution should be taken in interpreting the adherence rates from black and Hispanic Deaf women; the sample sizes for both groups are small (n=39 for black women, n=32 for Hispanic women). Yet, it is critical to recognize that black women are more likely to be diagnosed with breast cancer at a later stage and face higher mortality rates.[2,26] Given this circumstance, it is especially encouraging that Deaf women identifying as black had a higher rate of mammogram screening than other Deaf women.

After adjusting for sociodemographic and health indicators, Deaf women's adherence rate for mammograms did not differ significantly from the rate found in the general population of women. Even though Deaf women who prefer using only ASL may still experience a slight disparity, it is important to reiterate that the majority of the Deaf sample adhere to mammogram screening today. This could be due to the widespread availability of accessible health information in ASL on the Internet and social network sites.[27,28] Recent studies of Deaf U.S. samples showed that active engagement in social network sites is associated with greater electronic communication with healthcare providers and greater perception that pre-exposure prophylaxis is effective for preventing HIV.[29,30] Thus, it is possible that the increase in cancer screening adherence rate among Deaf women today is partly influenced by Internet use and engagement in social network sites compared with the small sample of Deaf women who participated in the 2008–2009 breast education study reported by Berman and colleagues.[14] Yet, the current study found that significantly more Deaf older women adhered to mammogram screening guidelines, indicating that targeted breast cancer screening efforts aimed at younger, age-eligible, technology-using Deaf women could promote increased adherence and monitoring among Deaf women overall.

After adjusting for covariates, Deaf women were significantly less likely to see providers regularly compared with their hearing counterparts. When comparing Deaf women who adhered and did not adhere in this sample, both groups were similar for having a regular provider. This suggests that having a regular provider alone is not sufficient for Deaf women to adhere to cancer screening recommendations. It is possible that Deaf women need more support beyond a positive physician–patient relationship to adhere to screening, such as

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accessing health information in ASL on the Internet, participating in discussions with health-literate peers in person or online (e.g., on Facebook), or having social support networks.

Limitations

A limitation is the nature of self-reported cancer adherence screening data, a method which generally has low sensitivity among individuals at risk. Another limitation is the difference in recruitment approaches with nonrandom snowball sampling for hard-to-reach Deaf women and probability-based random sampling for hearing women. However, Deaf and hearing women respondents are likely to be representative of any sample who would agree to self-report cancer screening.

CONCLUSIONS

Although the rate of Deaf women's adherence to breast cancer screening is similar to the adherence rate in the general population of hearing women, disparity in cervical cancer screening for Deaf women persists compared with their hearing counterparts. This disparity is a call to action for screening measures and to promote targeted, accessible health promotion interventions for age-eligible Deaf women to increase cancer screening adherence. Given the success of accessible information for breast cancer education, similar interventions in ASL for Pap screening are needed. This is especially critical given the finding that Deaf women are less likely to see a provider regularly compared with their hearing counterparts.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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PK designed the research, gathered data, analyzed the data, and wrote the paper; AE provided intellectual content and wrote the paper; AS performed statistical analyses and assisted with data interpretation; PK had primary responsibility for the final content. All authors read and approved the final manuscript.

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Table 1.

Sociodemographic Characteristics of Age-eligible Deaf Women and Hearing Women Who Adhered to Cancer Screening[a]

Variable	Adhered to Pap smear screening recommendations (n=1,371)		χ^2 (*p*-value)	Adhered to mammogram screening recommendations (n=1,136)		χ^2 (*p*-value)
	Deaf (n=415) n (%)	Hearing (n=956) n (%)		Deaf (n=245) n (%)	Hearing (n=891) n (%)	
Age, years, mean (SD)	41 (13)	47 (12)	**−9.52**[b] **(<0.001)**	56 (9)	58 (9)	**−2.64**[b] **(<0.01)**
BMI, mean (SD)	28 (7)	28 (7)	−0.28[b] (0.78)	29 (7)	29 (7)	0.82[b] (0.41)
Race/Ethnicity			**10.28 (<0.01)**			**10.49 (<0.01)**
White	281 (68)	585 (64)		185 (76)	547 (66)	
Black	62 (15)	205 (22)		34 (14)	191 (23)	
Hispanic	69 (17)	125 (14)		24 (10)	93 (11)	
Education			**24.17 (<0.001)**			**13.66 (<0.001)**
High school graduate	129 (32)	438 (46)		98 (41)	477 (54)	
College graduate	278 (68)	513 (54)		144 (59)	408 (46)	
Income			**56.60 (<0.001)**			**12.84 (<0.01)**
Low SES	173 (43)	282 (30)		97 (41)	289 (33)	
Middle SES	190 (47)	397 (42)		108 (45)	376 (43)	
Upper SES	42 (10)	271 (28)		34 (14)	218 (24)	
Marital status			**72.53 (<0.001)**			**6.63 (<0.04)**
Single	158 (39)	166 (18)		42 (18)	109 (12)	
Previously in partnership, now single	70 (17)	220 (23)		64 (27)	297 (34)	
In partnership	176 (44)	562 (59)		132 (55)	478 (54)	
Health insurance			**3.74 (0.05)**			1.57 (0.21)
Yes	369 (97)	899 (95)		213 (95)	853 (97)	
No/not sure	11 (3)	51 (5)		11 (5)	28 (3)	
Regular provider			**15.04 (<0.001)**			**22.34 (<0.001)**
Yes	227 (60)	670 (71)		141 (63)	690 (78)	
No	154 (40)	279 (29)		83 (37)	192 (22)	
Personal history of cancer			1.73 (0.19)			**6.17 (<0.02)**
Yes	53 (13)	101 (11)		61 (25)	162 (18)	
No	353 (87)	853 (89)		179 (75)	727 (82)	
Family history of cancer			0.35 (0.56)			0.09 (0.77)
Yes	307 (76)	705 (74)		178 (75)	670 (76)	
No/Not sure	98 (24)	244 (26)		60 (25)	215 (24)	

[a] Percentages are determined by total number of responses (in parentheses) to each question.

[b] *t*-test

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Table 2.

Sociodemographic Characteristics of Age-eligible Deaf Women and Hearing Women Who Did Not Adhere to Cancer Screening[a]

Variable	Did not adhere to Pap smear screening recommendations (n=277)		χ^2 (*p*-value)	Did not adhere to mammogram screening recommendations (n=274)		χ^2 (*p*-value)
	Deaf (n=114) n (%)	Hearing (n=163) n (%)		Deaf (n=79) n (%)	Hearing (n=195) n (%)	
Age, years, mean (SD)	39 (14)	51 (13)	**−7.63[b] (<0.001)**	51 (9)	56 (10)	**−4.09[b] (<0.001)**
BMI, mean (SD)	29 (8)	29 (8)	−0.23[b] (0.82)	30 (7)	30 (8)	0.54[b] (0.59)
Race/Ethnicity			**7.36 (<0.03)**			**8.70 (<0.02)**
White	85 (75)	91 (59)		66 (84)	122 (67)	
Black	15 (13)	35 (23)		5 (6)	36 (20)	
Hispanic	14 (12)	29 (19)		8 (10)	23 (13)	
Education			**19.35 (<0.001)**			**21.30 (<0.001)**
High school graduate	39 (36)	102 (63)		28 (36)	130 (67)	
College graduate	71 (64)	61 (37)		49 (64)	64 (33)	
Income			0.19 (0.91)			0.14 (0.94)
Low SES	49 (44)	70 (43)		30 (40)	75 (39)	
Middle SES	48 (44)	70 (43)		34 (45)	88 (45)	
Upper SES	13 (12)	22 (14)		11 (15)	32 (16)	
Marital status			**18.47 (<0.001)**			**9.86 (<0.01)**
Single	60 (55)	51 (32)		21 (28)	29 (15)	
Previously in partnership, now single	12 (11)	46 (28)		18 (24)	81 (42)	
In partnership	38 (34)	65 (40)		36 (48)	84 (43)	
Health insurance			1.42 (0.23)			2.89 (0.09)
Yes	102 (93)	144 (88)		70 (96)	174 (89)	
No/not sure	8 (7)	19 (12)		3 (4)	21 (11)	
Regular provider			3.36 (0.07)			0.65 (0.42)
Yes	55 (49)	99 (61)		41 (55)	118 (61)	
No	56 (51)	64 (39)		33 (45)	76 (39)	
Personal history of cancer			**4.35 (<0.04)**			0.28 (0.60)
Yes	9 (8)	27 (17)		13 (17)	28 (14)	
No	104 (92)	136 (83)		64 (83)	167 (86)	
Family history of cancer			0.74 (0.39)			0.01 (0.96)
Yes	87 (77)	118 (72)		53 (71)	137 (71)	
No/Not sure	26 (23)	45 (28)		22 (29)	56 (29)	

[a] Percentages are determined by total number of responses (in parentheses) to each question.

[b] *t*-test.

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Table 3.

Summary of Binary Logistic Analysis for Adherence in All Women (Deaf and Hearing) on Pooled Data via Multiple Imputation and Weighted by the Inverse Propensity Score

Variable	Pap smear adherence[a] (n=1,648) AOR (95% CI)	Mammogram adherence[a] (n=1,410) AOR (95% CI)
Age[b]	**0.979***** (0.971, 0.988)	**1.042***** (1.031, 1.054)
Race/ethnicity[c]		
Black	**1.545**** (1.184, 2.016)	**3.171***** (2.302, 4.368)
Hispanic	1.189 (0.898, 1.575)	**1.407*** (1.035, 1.912)
College graduate[c]	**1.268*** (1.029, 1.562)	**1.313*** (1.052, 1.638)
Income[c]		
Middle SES	1.011 (0.805, 1.269)	0.933 (0.738, 1.180)
Upper SES	1.338 (0.947, 1.889)	1.372 (0.957, 1.967)
Marital status[c]		
In partnership	**2.853***** (2.245, 3.627)	**1.679***** (1.255, 2.248)
Previously in partnership, now single	**2.492***** (1.832, 3.390)	1.128 (0.829, 1.535)
Health insurance[c]	**1.680**** (1.174, 2.405)	1.444 (0.930, 2.243)
Regular provider[c]	**1.465**** (1.164, 1.844)	**1.770***** (1.360, 2.304)
Personal history of cancer[c]	0.956 (0.701, 1.304)	1.119 (0.840, 1.489)
Family history of cancer[c]	1.103 (0.888, 1.371)	**1.414**** (1.127, 1.774)
Deaf[c]	**0.709***** (0.585, 0.859)	0.939 (0.767, 1.148)

Notes: Boldface indicates statistical significance

$^{*}p<0.05$;

$^{**}p<0.01$;

$^{***}p<0.001$.

[a] Nonadherence used as a reference category.

[b] Age is a continuous variable.

[c] Reference categories were: white, high school graduate, lower SES, single, no health insurance, no regular provider, no personal history of cancer, no family history of cancer, and hearing.

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Table 4.

Sociodemographic and Health Characteristics of Deaf Women Who Answered Cancer Screening Questions by Adherence[a]

Variable	Pap smear (n=529)			Mammogram (n=324)		
	Adhered (n=415) n (%)	Did not adhere (n=114) n (%)	χ^2 (*p*-value)	Adhered (n=245) n (%)	Did not adhere (n=79) n (%)	χ^2 (*p*-value)
Age, years, mean (SD)	41 (13)	39 (14)	0.92[b] (0.36)	56 (9)	51 (9)	**4.60 (<0.001)**
BMI, mean (SD)	28 (7)	29 (8)	−1.03[b] (0.31)	29 (7)	30 (7)	−0.86 (0.39)
Race/Ethnicity			1.87 (0.39)			3.31 (0.19)
Non-Hispanic white	281 (68)	85 (75)		185 (76)	66 (84)	
Non-Hispanic black	62 (15)	15 (13)		34 (14)	5 (6)	
Hispanic	69 (17)	14 (12)		24 (10)	8 (10)	
Education			0.56 (0.46)			0.42 (0.52)
High school graduate	129 (32)	39 (35)		98 (40)	28 (36)	
College graduate	278 (68)	71 (65)		144 (60)	49 (64)	
Income			0.44 (0.80)			0.01 (0.99)
Low SES	173 (43)	49 (44)		97 (41)	30 (40)	
Middle SES	190 (47)	48 (44)		108 (45)	34 (45)	
Upper SES	42 (10)	13 (12)		34 (14)	11 (15)	
Marital status			**8.78 (<0.02)**			3.81 (0.15)
Single	158 (39)	60 (55)		42 (18)	21 (28)	
Previously in partnership, now single	70 (17)	12 (11)		64 (27)	18 (24)	
In partnership	176 (44)	38 (34)		132 (55)	36 (48)	
Health insurance			**4.39 (<0.04)**			0.08 (0.78)
Yes	369 (97)	102 (93)		213 (95)	70 (96)	
No/Not sure	11 (3)	8 (7)		11 (5)	3 (4)	
Regular provider			3.54 (0.06)			1.33 (0.25)
Yes	227 (60)	55 (49)		141 (63)	41 (55)	
No	154 (40)	56 (51)		83 (37)	33 (45)	
Personal history of cancer			3.35 (0.07)			2.37 (0.12)
Yes	53 (13)	9 (7)		61 (25)	13 (17)	
No	353 (87)	104 (93)		179 (75)	64 (83)	
Family history of cancer			0.07 (0.79)			0.50 (0.48)
Yes	307 (76)	87 (77)		178 (75)	53 (71)	
No/Not sure	98 (24)	26 (23)		60 (25)	22 (29)	
Use hearing device			0.30 (0.58)			1.51 (0.22)
Yes	149 (51)	42 (47)		73 (51)	22 (42)	
No	146 (49)	47 (53)		69 (49)	31 (58)	
Language preference			1.60 (0.21)			**4.69 (<0.03)**

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Variable	Pap smear (n=529)		χ^2 (*p*-value)	Mammogram (n=324)		χ^2 (*p*-value)
	Adhered (n=415) n (%)	Did not adhere (n=114) n (%)		Adhered (n=245) n (%)	Did not adhere (n=79) n (%)	
ASL only	179 (43)	42 (37)		104 (43)	45 (57)	
ASL and English	233 (57)	72 (63)		138 (57)	34 (43)	
Communication modality with doctor			1.76 (0.18)			0.21 (0.65)
ASL (direct or interpreter)	261 (64)	62 (57)		154 (66)	54 (68)	
English (spoken or written)	148 (36)	47 (43)		81 (35)	25 (32)	
Parents are deaf			0.81 (0.40)			0.03 (0.86)
Yes	107 (29)	36 (33)		52 (24)	16 (23)	
No	264 (71)	72 (67)		166 (76)	54 (77)	

[a] Percentages are determined by total number of responses (in parentheses) to each question

[b] *t*-test.

ASL, American Sign Language.