RESEARCH

The association between social media use for health related information and compliance with breast and cervical cancer screenings

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ABSTRACT: There is a need to investigate the impact of social media use on patient compliance with important health screenings due to the inconsistency of research findings on the effect of using social media on cervical cancer screenings. This study assessed associations between social media use and adherence in women at risk for breast and cervical cancer to mammograms and Pap smear screenings. A total of 6695 respondents from the Health Information National Trends Survey (HINTS) 5 Cycle 1 and 2 datasets were used for data analysis. Chi-square tests were used to explore social network activities and cancer screening compliance, and multivariate logistic regressions were used to identify factors associated with cancer screening compliance. Among respondents, 68% of women and 84% of women complied with mammograms and Pap smears, respectively. Women who used the Internet during last 12 months to visit a social networking site, participate in a forum support group for medical issue, or watch a health-related video on YouTube complied with Pap smears more significantly than women who did not use the Internet ($p < .05$, $p < .0001$, and $p < .001$, respectively). Variables associated with mammogram and Pap smear screening compliance were age, health insurance, regular provider, marital status, and internet use. There was no significant association between social network activities and compliance with mammogram screenings. It is critical to use the same and up-to-date guidelines when reporting cancer screening rates to effectively promote adherence to cancer prevention programs and make valid and reliable comparisons across studies.

KEYWORDS: Mammogram, Pap smear, social media, cancer screening.

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INTRODUCTION

In 2020, there will be an estimated 279,100 new cases of breast cancer and 13,800 new cases of cervical cancer – representing 15.4% and 0.8% respectively of all new cancer cases – and an estimated 42,690 and 4,290 deaths from breast and cervical cancer in the US (ACS, 2020b, c). Breast cancer is the first in newly diagnosed cancers and second in leading cause of cancer death among women in the US (ACS, 2020a). Cervical cancer incidence rates dropped by more than half since the mid-1970s, but declines have slowed in recent years, especially among women younger than age 50 (ACS, 2019, 2020a).

Breast cancer mortality rates are significantly higher in blacks than whites (28.4 vs 20.3, 2013-2017), while both cervical cancer incidence and mortality rates are significantly higher in blacks than whites (9.1 vs 7.1, 2012-2017; 3.6 vs 2.1, 2013-2017) (ACS, 2020b, c).

To reduce the burden of breast and cervical cancer, early detection is critical. For example, from 1990 to 2010, breast cancer death rates decreased by 34% in the United States showing a dramatic improvement in survival rates for breast cancer due to both improvements in treatment and early detection (DeSantis et al., 2014; Kaplan et al., 2015). Also, cervical cancer incidence and mortality rates continue to decline in the US since regular cervical cancer screening using Pap smears was introduced (Akinlotan et al., 2017; Scarinci et al., 2010).

The U.S. Preventive Services Task Force (USPSTF) and the American Cancer Society (ACS) recommend routine and age appropriate screening for these cancers (Lee et al., 2014; Wong and Miller, 2019). The National Breast and Cervical Cancer Early Detection Program (NBCCEDP) has provided low-income, uninsured, and underserved women with access to timely breast and cervical cancer screening and diagnostic services as authorized in the Breast and Cervical Cancer Mortality Prevention Act of 1990 (CDC, 2018). However, despite evidence and recommendations, still there are many women who are not being screened. Racial disparities exist in breast and cervical cancer incidence and mortality. In addition, disparities exist in screening test use by race/ethnicity, socioeconomic status, and health care access (White et al., 2017). For example, Hispanic women were less likely than whites to have received recommended screening for breast and cervical cancer (Dominguez, 2015). Getting older, less education, lower income, busy schedules, fear of pain or finding cancer, feeling uncomfortable during the procedure, underestimating the importance of the test, and the provider's gender were reported as barriers to cancer screening (Miranda-Diaz et al., 2015; Plourde et al., 2016). Therefore, it is important to understand what factors influence compliance with breast and cervical cancer screenings among screening-eligible women to increase preventive screening rates.

Prior to the widespread use of the Internet and social media, patient compliance with health care interventions was increased by mail, telephone, physician reminders, orienting patients to the clinic or contracting with patients (Macharia et al., 1992). Nowadays, over 85% of Americans use the Internet regularly, with nearly half of them using at least one social networking site including Facebook, Instagram, Pinterest, LinkedIn, and Twitter (Freedman et al., 2016; Prochaska, Coughlin and Lyons, 2017). Social media is not limited to younger generations any more, especially with smartphones expanding accessibility to social networks in all socioeconomic classes, enabling reach to a greater target audience and sharing similar experiences (Steele et al., 2015). By accessing several social media platforms, individuals can easily find and share necessary information. In their systematic review, Smailhodzic

and associates (2016) reported that social support was the most common type of social media use that empowers patients through enhanced subjective well-being, enhanced psychological well-being, and improved self-management and control (Smailhodzic et al., 2015).

Social media can be used for cancer prevention, treatment, and survivorship by providing a unique connection with others who have direct personal experience, which enables developing supportive social networks and encouraging adherence with cancer care (Prochaska, Coughlin and Lyons, 2017). In a study that investigated the effect of a weight loss intervention to reduce breast cancer risk on technology-based self-monitoring tools using a smartphone app with individualized phone calls, significant weight loss was found in the intervention group compared to the control group (Hartman et al., 2016). Therefore, it would be interesting to investigate the effectiveness of different types of social media on different health issues or specific intervention components.

So far, many studies have focused on the analysis of data collected from social media, not its effect on compliance with mammograms (Klippert and Schaper, 2019; Thackeray, 2013). Also, research findings on the effect of using social media on cervical cancer screening were not consistent. For example, one study reported that women who seek Internet information about health in general or cancer were more likely to report receiving a Pap smear within the last 3 years (Shneyderman, 2012), while another study reported that use of social networking websites did not increase getting Pap tests (Drayton, 2016). Thus, there is a need to investigate the impact of social media and internet use on patient compliance with important health screenings.

The purpose of this study was to determine the association between social network activities on the Internet and compliance with mammograms and Pap smears, and to explore potential factors that may influence compliance with mammogram screenings and Pap smears.

MATERIALS AND METHODS

This study analyzed the dataset of US-based Health Information National Trends Survey (HINTS). HINTS regularly collects nationally representative data about the American public's knowledge of, attitudes toward, and use of cancer- and health-related information (NIH-NCI, 2019c). The current study analyzed HINTS 5 Cycle 1 and 2 datasets, which were collected between January 2017 and April 2018. A stratified sample of addresses was initially selected from a database of random samples of addresses (Westat, 2017, 2018). The final HINTS 5 Cycle 1 and Cycle 2 sample consisted of 6695 respondents. The data were weighted to be nationally representative, and minorities were oversampled to adequately represent minority populations. As this study focused on social media use for health related information and breast (N=2657) and cervical (N=3364) cancer screening compliance, only individuals who responded to these questions were included in the analysis.

To define compliance with screening, the American Cancer Society's screening guidelines for women were used (ACS, 2020). For mammograms, women who were aged 45 to 54 and had mammograms every year and women who were aged 55 and older and had mammograms every year or every 2 years were classified as compliant. For Pap smears, women who were aged 29 and younger and had a Pap smear every year and up to 3 years ago and women who were aged 30 years and older and had a Pap smear up to 5 years ago were classified as compliant.

Demographics and health-related variables were controlled to adjust for possible confounding effects. Variables included a categorized age group (<40, 40-49, 50-59, 60+), race (non-Hispanic white or others), marriage status (Yes, No), employment (employed, unemployed, other),

education (Less than High School, High School Graduate, Some College, College Graduate or More), household income (Less than $20,000, $20,000 to < $35,000, $35,000 to < $50,000, $50,000 to < $75,000, $75,000 or More), health insurance coverage (Yes, No), perceived health status (Excellent/Very good, Good, Fair/Poor), regular health care provider (Yes, No), family with cancer (Yes, No), census region (Northeast, Midwest, South, West) and compliance with mammograms and Pap smears (Yes, No).

For the variables related to social media and internet use for health related information, the following four measures were used: In the past 12 months, have you used the Internet for any of the following reasons? 1) to visit a social networking site such as Facebook or LinkedIn; 2) to share health information on social networking site, such as Facebook or Twitter; 3) to participate in an online forum or support group for people with a similar health or medical issue; or 4) to watch a health-related video on YouTube.

Data were analyzed using SAS 9.4 complex survey module to take into account the complex sampling design and adjust for population sampling weight in the HINTS dataset. Descriptive statistics for the demographic characteristics, social media and internet use for health related information, and other factors were presented. All data were reported in percentages after adjusting for weighting. P values from chi-square analyses were used to compare differences between social media use for health related information and cancer screening compliances. Multivariate logistic regression analyses were conducted to identify factors that predict cancer screening compliances and assess the independent association of each aspect of social media use for health related information with cancer screening compliances. The Wald test, odds ratios and 95% confidence intervals are reported. Missing and unknown values for each independent variable were set to missing. Significance was determined at the $p < 0.05$ level.

RESULTS

Table 1 presents the respective associations between demographic, health, and social network usage information and screening with both mammograms and Pap smears. About 68% and 84% of women complied with mammogram and Pap smear respectively. The average age was 55.2 years for breast cancer and 47.7 years for cervical cancer compliance question respondents.

Women who answered breast cancer and cervical cancer compliance shared similar demographic and health characteristics such as most women were white (79.2%, 78.9%), married (61.3%, 55.8%), employed (56.3%, 58.3%), had some college education and more (69.7%, 73.1%), had the income more than $75,000 (40.3%, 38.8%), had health insurance (94.6%, 93.3%), had excellent/very good health (48.5%, 51.3%), had a regular provider (73.4%, 68.5%), had family history of cancer (77.5%, 77.5%) and lived in the South (40%, 38.4%). Also, a similar pattern was observed in using social networks, such as using the Internet during the last 12 months to visit a social networking site (71% and 76.9% respectively), followed by watching a health-related video on YouTube, sharing health information on social networking site, and participating in a forum support group for medical issue.

Table 1. Demographic, health, and social network usage characteristics of HINTS 5 cycle 1 and 2 participants.

Variables		Mammogram			Pap smear		
		%	95% CI		%	95% CI	
Age group	<40	-	-	-	29.93	27.77	32.09
	40-49	32.43	30.17	34.69	22.72	20.75	24.69

	50-59	34.08	32.21	35.95	23.88	22.42	25.34
	60+	33.49	32.38	34.60	23.47	22.89	24.04
White	Yes	79.19	77.33	81.06	78.85	77.32	80.38
	No	20.81	18.94	22.67	21.15	19.62	22.68
Married	Yes	61.32	58.96	63.67	55.75	54.30	57.19
	No	38.68	36.33	41.04	44.25	42.81	45.70
Employment	Yes	56.32	53.72	58.91	58.29	55.67	60.92
	No	43.68	41.09	46.28	41.71	39.08	44.33
Education	Less than High School	6.40	5.11	7.69	5.99	4.86	7.13
	High School Graduate	23.92	21.64	26.19	20.89	19.47	22.31
	Some College	38.99	36.87	41.12	36.35	35.01	37.68
	College Graduate or More	30.69	28.88	32.51	36.77	35.95	37.59
Household income	Less than $20,000	16.25	14.27	18.23	18.02	15.50	20.53
	$20,000 to < $35,000	12.04	9.49	14.58	12.17	10.12	14.21
	$35,000 to < $50,000	13.75	11.63	15.87	13.35	11.48	15.22
	$50,000 to < $75,000	17.62	15.61	19.63	17.66	15.68	19.64
	$75,000 or More	40.34	37.64	43.05	38.81	36.38	41.25
Health Insurance	Yes	94.57	93.08	96.07	93.28	91.59	94.98
	No	5.43	3.94	6.92	6.72	5.02	8.41
General Health	Excellent/Very good	48.46	45.66	51.26	51.26	48.66	53.86
	Good	34.78	31.84	37.72	32.92	30.21	35.64
	Fair/Poor	16.76	14.88	18.63	15.82	14.12	17.52
Regular Provider	Yes	73.35	71.26	75.45	68.53	66.43	70.64
	No	26.65	24.55	28.74	31.47	29.36	33.57
Family with cancer	Yes	77.47	74.97	79.98	77.52	75.40	79.65
	No	22.53	20.02	25.03	22.48	20.35	24.60
Census region	Northeast	18.90	16.31	21.49	18.79	16.90	20.67
	Midwest	20.12	17.87	22.38	19.99	17.91	22.07
	South	39.94	36.96	42.92	38.36	36.12	40.61
	West	21.03	18.40	23.67	22.86	20.84	24.87

Compliance with pap smear screening	Yes	-	-	-	84.21	82.33	86.10
	No	-	-	-	15.79	13.90	17.67
Compliance with mammogram screening	Yes	67.56	65.13	69.98	-	-	-
	No	32.44	30.02	34.87	-	-	-
During last 12 months							
Used internet to visit a social networking site	Yes	71.09	68.23	73.95	76.90	74.69	79.12
	No	28.91	26.05	31.77	23.10	20.88	25.31
Used internet to share health information on social networking site	Yes	17.46	14.97	19.95	20.29	18.17	22.41
	No	82.54	80.05	85.03	79.71	77.59	81.83
Used internet to participate in a forum support group for medical issue	Yes	8.07	6.48	9.66	9.41	8.21	10.62
	No	91.93	90.34	93.52	90.59	89.38	91.79
Used internet to watch a health-related video on YouTube	Yes	30.85	28.09	33.62	36.44	34.11	38.78
	No	69.15	66.38	71.91	63.56	61.22	65.89

There was no significant association between social network activity and compliance with mammogram screenings (Table 2; $p > 0.05$).

Table 2. Univariate association between social networking activity and compliance with mammogram screening.

During last 12 months	Values	Compliance with mammogram screening	Percent	95% CI	
Used internet to visit a social networking site	Yes	Yes	67.12	64.37	69.87
		No	32.88	30.13	35.63
	No	Yes	68.46	63.76	73.17
		No	31.54	26.83	36.24
Used internet to share health information on social networking site	Yes	Yes	62.76	56.72	68.81
		No	37.24	31.19	43.28
	No	Yes	68.49	65.50	71.48
		No	31.51	28.52	34.50
Used internet to participate in a forum support group for medical issue	Yes	Yes	67.86	5.06	57.70
		No	32.14	5.06	21.97
	No	Yes	67.36	1.36	64.64
		No	32.64	1.36	29.91
Used internet to watch a health-related video on YouTube	Yes	Yes	65.08	2.09	60.88
		No	34.92	2.09	30.72
	No	Yes	68.51	1.61	65.27
		No	31.49	1.61	28.25

Table 3 presents the association between social network activity and compliance with Pap smears. Women who used the Internet during last 12 months to visit a social networking site, to participate in a forum support group for medical issue, and to watch a health-related video on YouTube complied with Pap smear screenings more than women who did not use the Internet (*p <.05, **p <.0001, and ***p <.001, respectively).

Table 3. Univariate association between social networking activity and compliance with Pap smear screening.

During last 12 months	Values	Compliance with Pap smear	Percent	95% CI	
Used internet to visit a social networking site *	Yes	Yes	85.27	82.81	87.73
		No	14.73	12.27	17.19
	No	Yes	80.39	76.72	84.06
		No	19.61	15.94	23.28
Used internet to share health information on social networking site	Yes	Yes	87.57	83.53	91.61
		No	12.43	8.39	16.47
	No	Yes	83.26	81.00	85.52
		No	16.74	14.48	19.00
Used internet to participate in a forum support group for medical issue ***	Yes	Yes	94.36	91.14	97.59
		No	5.64	2.41	8.86
	No	Yes	83.17	81.19	85.16
		No	16.83	14.84	18.81
Used internet to watch a health-related video on YouTube **	Yes	Yes	88.14	85.27	91.01
		No	11.86	8.99	14.73
	No	Yes	81.88	79.64	84.11
		No	18.12	15.89	20.36

Table 4 presents the results of the multivariate logistic regression on compliance with mammograms and Pap smears. There were differences in compliance with mammograms and Pap smears. For breast cancer screenings, women with health insurance and a regular healthcare provider were more likely to comply with mammograms compared to the reference groups. Women aged 40-49 and 50-59 years were less likely to comply with mammograms compared to the reference group (60 and older). For cervical cancer screening, women who used the Internet during last 12 months to participate in a forum support group for medical issues, women aged 40 years and younger, 40-49, and 50-59, and women who were married and had a regular provider were more likely to comply with Pap smears compared to the reference groups.

Table 4. Multivariate logistic model predicting the compliance with mammogram and Pap smear.						
	Mammogram			Pap smear		
During last 12 months	OR	95% CI		OR	95% CI	
Used internet to visit a social networking site						
No	1			1		
Yes	1.10	0.74	1.65	0.76	0.50	1.15
Used internet to share health information on social networking site						
No	1			1		
Yes	0.99	0.59	1.66	0.87	0.46	1.65
Used internet to participate in a forum support group for medical issue						
No	1			1		
Yes	1.31	0.63	2.73	3.69	1.25	10.9
Used internet to watch a health-related video on YouTube						
No	1			1		
Yes	0.79	0.55	1.13	1.16	0.81	1.65
Age Group						
60+	1			1		
<40	-	-	-	3.68	2.05	6.60
40-49	0.19	0.12	0.31	2.65	1.54	4.57
50-59	0.50	0.29	0.88	2.22	1.47	3.35
White						
No	1			1		
Yes	0.91	0.60	1.38	1.09	0.68	1.75
Married						
No	1			1		
Yes	1.27	0.89	1.81	1.66	1.13	2.44
Employment						
No	1			1		
Yes	0.91	0.58	1.42	1.20	0.74	1.94
Education						
Less than High School	1			1		
High School Graduate	0.72	0.33	1.55	1.50	0.70	3.25
Some College	0.81	0.39	1.71	1.07	0.48	2.40
College Graduate or More	0.95	0.44	2.09	1.45	0.67	3.17
House income						

Less than $20,000	1			1		
$20,000 to < $35,000	1.00	0.61	1.66	0.77	0.42	1.40
$35,000 to < $50,000	0.94	0.54	1.62	1.24	0.75	2.03
$50,000 to < $75,000	1.36	0.72	2.55	1.06	0.49	2.27
$75,000 or More	1.38	0.77	2.50	1.22	0.58	2.61
Health Insurance						
No	1			1		
Yes	2.60	1.30	5.18	1.66	0.85	3.26
General Health						
Fair/Poor	1			1		
Excellent/Very good	1.64	0.99	2.71	1.80	0.94	3.42
Good	1.46	0.85	2.49	1.15	0.62	2.12
Regular Provider						
No	1			1		
Yes	1.77	1.21	2.59	1.60	1.00	2.53
Census region						
South	1			1		
Midwest	0.75	0.50	1.12	1.20	0.69	2.10
Northeast	0.86	0.53	1.41	1.54	0.91	2.58
West	0.93	0.56	1.56	0.94	0.58	1.53
Family even had cancer						
No	1			1		
Yes	1.06	0.77	1.46	0.93	0.63	1.37

DISCUSSION

Social media has become a popular channel to seek out cancer-related information due to an increase in the availability of and access to public health information, which enables users actively to find and share necessary information to make health-related decisions (Himelboim and Han, 2014). By choosing proper social media platforms, prevention efforts can be successfully promoted, as seen in a recent study on raising awareness about cervical cancer that presented how well Twitter was suited for appointment campaigns (Lenoir et al., 2017). Twitter has become a public forum that provides sources of real-life experiences related to having mammograms and Pap smears (Lyles et al., 2013). Facebook has also been used to act as a forum to share information, request disease-specific guidance and feedback, receive interpersonal support, and recruit participants, including those who were hard to reach (Greene et al., 2011; Whitaker, Stevelink and Fear, 2017). Depending on the characteristics of the target population, the pattern of health-related communication needs to be investigated to effectively promote adherence to cancer prevention programs and screen at-risk populations by choosing the proper social media platforms (Lenoir et al., 2017).

Our study results, which indicate that compliance with mammograms and Pap smear screenings was 68% and 84% respectively, differed slightly from other study results. Using the National Health Interview Survey (NHIS) 2015 data to estimate prevalence of cancer screening, Halls and associates (2018) reported compliance with mammograms and Pap smear screenings as 72% and 81%. However, their definitions of screenings were different from ACS guidelines (Hall et al., 2018). For example, recent breast cancer screening was defined as having received a mammogram within 2 years and recent cervical cancer screening as having a Pap test within 3 years (among women without hysterectomy). Another study using the HINTS 5 cycle 1 data presented prevalence of mammography within the past year and a Pap test within the past 3 years as 63.8% and 85.2% respectively, while reporting 68.1% of the women aged 40–64 years at average risk received regular screenings for both breast and cervical cancers as recommended (Han et al., 2018). Therefore, for valid and reliable comparisons across studies, it is necessary to verify if reported screening rates were computed based on the same guidelines in order to estimate a true picture of compliance with screening tests.

Our results reveals that screening rates for cervical and breast cancer fall quite short of Healthy People 2020 targets, 93% for Pap tests and 81% for mammography (Rosenberg, 2018). Further studies are needed to identify actual screening rates for both cervical and breast cancer by considering not only the type of dataset to analyze, but a consistent definition of screenings for analysis in reporting screening rates.

In our analysis, we did not find a significant association between social network activities and compliance with mammogram screenings (Table 2). Considering an increasing role of social media in access to health information, it is valuable to investigate critical factors that influence the use of social media among the target population in order to improve screening compliance.

Further research is also necessary to identify possible confounding variables and verify the association between social network activities and compliance with mammogram screening by targeting more and diverse populations, considering that previous studies have expressed the potential of using social media to improve screening rates and, patient care and outcomes among breast cancer patients (Charlie, Gao and Heller, 2018; Freedman et al., 2016).

There were significant associations between compliance with Pap smear screenings and social network activities using the Internet during last 12 months to visit a social networking site, to participate in a forum support group for medical issue and to watch a health-related video on YouTube. These results seem to make sense considering women who were at risk for cervical cancer were younger than the women who answered the breast cancer screening question. We tested for the interaction of age and status of participating in social networking in the cancer screening question and found there was no significant interaction. From multiple logistic regression models stratified by age, there was no significant difference in associations of participating in social networking and the cancer screening question by age group.

Considering how social media is embedded in the everyday lives of young adults, it can be used to effectively increase cervical cancer screening through developing effective communication strategies for young adults (Sarkar et al., 2018). These results also suggest the necessity of further research on individual communication preferences and traits that may influence their health-related decisions to develop effective social media strategies.

We observed slight differences in predicting the compliance of mammograms and Pap tests (Table 4). Having health insurance and a regular provider were important predictors of compliance with mammograms in our analysis, which is consistent

with previous studies. For example, the lack of knowledge on mammography coverage was identified as a barrier to mammography, explaining why mammography mandates significantly increased mammography screenings (Bitler and Carpenter, 2016; McAlearney et al., 2005; Ramjan et al., 2016). Also, physician involvement in providing breast examination instructions and mammography recommendations was reported to be significantly associated with mammography adherence (González and Borrayo, 2011; Katz et al., 2018).

As another predictor, our result that women aged 40-49 and 50-59 years were less likely to comply with mammograms compared to women aged 60 years and older is consistent with prior work reporting that older age is associated with improved adherence (Narayan et al., 2017).

The strongest predictor of compliance with Pap smears was using the Internet to participate in a forum/support group for medical issues (OR=3.69, 95%CI=1.25-10.9). Considering a positive association between social support and breast and cervical cancer screening compliance, social media can be effectively used to develop online communities as support groups, where individuals can share and obtain disease-specific guidance and feedback, emotional support, and coping and management strategies (De Choudhury and Kiciman, 2017; Documet et al., 2015; Gough et al., 2017; Huh and Ackerman, 2012). We also found that age was a strong predictor of compliance with Pap smears and marital status was significantly associated with adherence to cervical cancer screening. Unlike mammograms, compliance with Pap smears decreased with age, which is also in agreement with previous studies (Limmer, LoBiondo-Wood and Dains, 2014; Ostbye et al., 2003; Vakfari et al., 2011).

Considering the underutilization of breast and cervical cancer screening, it is imperative to identify critical determinants that influence adherence to screening and how to impact them to elicit positive changes in order to improve compliance with important health screenings. Our results support the positive impact of social media on cervical cancer screening compliance, which addresses the importance of social support to increase cancer screening behaviors (Documet et al., 2015). The strength of our study was verifying the promising effect of social network activities on cervical cancer screening compliance, which provides practical directions or approaches to modify or develop cancer prevention programs. Additionally, we identified inconsistent breast and cervical cancer screening rates across studies. For valid and reliable comparisons across studies, we recommend referring to the same and up-to-date guidelines to report cancer screening rates. Our study also has several limitations. First, as explained above, cancer screening rates for both mammograms and Pap smears in this study may not be comparable to those reported in other studies as there was inconsistency in reporting screening rates across studies. We defined compliance with screening by following the American Cancer Society's screening guidelines for women and strictly applied them in analysis. Second, our analysis was limited by the variables collected and the number of individuals in HINTS. For examples, the lack of responses on social network activity questions limited the power of our analysis. Therefore, we could not further investigate possible reasons for the lack of association between social network activities and breast cancer screening compliance. Further studies are needed with a larger and proper study population to identify additional variables that may explain the associations between social network activities and screening behaviors, better understand how to use social media in improving screening compliance, and expand and generalize study results. Finally, as the HINTS study was cross-sectional in its design, our results can explain the association between variables, not causation.

This study added to the current knowledge base on the association between social network

activities and compliance with mammograms and Pap smears: Compliance with Pap smears was significantly associated with several social network activities. Also, several factors predicting compliance with mammograms and Pap smears were identified, including age, health insurance, regular provider, marital status, and internet use, although the predictions of compliance with mammogram and Pap smear differed.

It is critical to use the same and up-to-date guidelines when reporting cancer screening rates to effectively promote adherence to cancer prevention programs and to make valid and reliable comparisons across studies.

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Conflict of interest statement

Warner K. Huh is the Chair Inovio DSMB and Consultant of Zilco and Antiva.

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