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REPEAT MAMMOGRAPHY SCREENING AMONG UNMARRIED WOMEN WITH AND WITHOUT A DISABILITY

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Abstract

Objectives—Unmarried women with disabilities may be a particularly vulnerable group for underutilization of repeat mammography screening. Our goal was to compare the breast cancer screening experiences of unmarried women with disabilities (WWD) versus women with no disabilities (WND), and determine whether these experiences are associated with adherence to repeat screening.

Methods—We conducted a matched cohort study of 93 WWD and 93 WND to compare mammography experiences by disability status, examine rates of repeat mammography by disability status, and identify factors that are associated with repeat mammography.

Results—WWD were less likely to be on-schedule than WND in univariable (54.8% vs. 71.0%; relative risk = 0.77, 95% CL = 0.61, 0.97), but not multivariable, analyses. In multivariable analyses, there was a significant interaction between disability status and positive experiences as the reasons for returning to the same mammography facility. Among WND, repeat screening ranged from 59% to 86%, depending on the number of positive experiences endorsed (range=1–5). In contrast, among WWD, screening rates were only 37% among those who did not report any positive experiences and increased to a maximum of 60% regardless of whether women endorsed one to four or all five positive experiences. Severity and type of disability were not associated with repeat screening.

Conclusions—WWD may be less likely than WND to remain on-schedule for mammography. WWD who do not report any positive experiences as reasons for returning to a mammography facility may be at particularly high risk of underutilization of screening.

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mammography; disabled persons; breast neoplasm; women's health

INTRODUCTION

Mammography is the most efficacious screening tool for breast cancer currently available to women in the United States. The majority of studies about mammography screening rates have focused on ever-had and most recent screenings. Population-wide ever-had and recent screening rates for women age 40 to 75 have reached high levels in the past two decades. Fewer studies have focused on regular or repeat screening. However, the sustained performance of screening will have the largest impact on cancer morbidity and mortality reduction (Blanchard et al., 2004; Humphrey, Helfand, Chan, & Woolf, 2002; Michaelson, Kopans, & Cady, 2000).

High rates of mammography are necessary across all sectors of the age-eligible female population in order to achieve the greatest population-wide morbidity and mortality benefits. Therefore, it is important to identify groups who are at risk for low rates of utilization. Women with disabilities may be one such at-risk group. Approximately 26 million women in the US have a disability (Waldrop & Stern, 2003). According to the Americans with Disabilities Act (ADA), disability is defined as the presence of, "(a) a physical or mental impairment that substantially limits one or more of the major life activities; (b) a record of such a limitation; or (c) being regarded as having such an impairment." (U.S. Equal Employment Opportunity Commission, U.S. Department of Justice, & Civil Rights Division, 2008). Prior studies indicate that women with disabilities are vulnerable to later-stage breast cancer diagnoses, larger tumor sizes at diagnosis, and higher mortality (Caban, Kuo, Mahnken, Nosek, & Freeman, 2007; McCarthy et al., 2006; Roetzheim & Chirikos, 2002). This may be due to lower screening, and therefore, higher risk of later-stage detection.

There have been mixed results among the few studies that have compared mammography utilization between women with a disability (WWD) and women with no disability (WND). While some studies have suggested that WWD have lower mammography rates than WND (Blustein & Weiss, 1998; Chan et al., 1999; Chevarley, Thierry, Gill, Ryerson, & Nosek, 2006; Iezzoni, McCarthy, Davis, & Siebens, 2000; Legg, Clement, & White, 2004; M.A. Nosek & Gill, 1998; Schootman & Jeffe, 2003; Wei, Findley, & Sambamoorthi, 2006), some have found small or no differences by disability status (Diab & Johnston, 2004; Iezzoni, McCarthy, Davis, Harris-David, & O'Day, 2001; M. A. Nosek & Howland, 1997; Ramirez, Farmer, Grant, & Papachristou, 2005; Schootman & Fuortes, 1999), or mixed results (Ahmed, Smith, Haber, & Belcon, 2009). Although several of these previous studies used large population-based samples, the majority were cross-sectional, and as a result, the authors were unable to determine the temporal relationship between disability and mammography status. In addition, several studies used data collected in the mid to late 1990s, and it is unclear whether reported findings are still relevant. Finally, most of these prior studies assessed ever-had or recent mammography rather than repeat screening. Therefore, there is limited information to compare repeat screening rates by disability status.

An important aspect of intervention targeting is to combine more than one characteristic to provide greater specificity of an at-risk group. Being unmarried is a potential characteristic to combine with disability status. Some studies have shown that unmarried women are less likely to obtain routine breast cancer screenings than married women (Ahmed, Smith, Haber, & Belcon, 2009; King et al., 1993; King, Rimer, Seay, Balshem, & Engstrom, 1994; Martin, Calle, Wingo, & Heath, 1996). Unmarried women may be less likely to obtain routine

screenings because they experience more barriers to care. These barriers may be due to lower social and financial capital (Hirschl, Altobelli, & Rank, 2003; Oppenheimer, 1988; Oropesa, Lichter, & Anderson, 1994), inability to access insurance through a spouse (Zuvekas & Taliaferro, 2003), and lack of perceived social legitimacy (Lewin, 2004) resulting in perceived or real discrimination in health care settings (Clark, Bonacore, Wright, Armstrong, & Rakowski, 2003). As a result, unmarried women may be at higher risk of later-stage breast cancer and mortality (Banerjee, George, Song, Roy, & Hryniuk, 2004; Bowen, Hickman, & Powers, 1997; Dibble, Roberts, & Nussey, 2004; Osborne, Ostir, Du, Peek, & Goodwin, 2005).

Half of WWD are unmarried (Jans & Stoddard, 1999), and the more functional limitations that a woman has, the less likely she is to report being married (Chevarley, Thierry, Gill, Ryerson, & Nosek, 2006). Given the increased risk of later-stage breast cancer and mortality among unmarried women and among WWD, unmarried WWD may be a particularly vulnerable group. Therefore, the purpose of our research was to compare the breast cancer screening experiences of unmarried WWD and WND and to determine how these experiences influenced adherence to repeat screening. Our study design allowed us to reduce some of the socioeconomic differences between WWD and WND that have been observed in prior studies. Second, it allowed us to begin to address the temporal relationships between disability status and mammography utilization. Our objectives were to:

1. Examine reasons that WWD and WND selected particular mammography facilities;
2. Compare the mammography experiences (e.g., scheduling an appointment, transportation to facility, satisfaction with most recent appointment) for WWD and WND;
3. Compare repeat mammography rates for WWD and WND;
4. Determine whether repeat mammography rates differed between WWD and WND after controlling for demographic characteristics and mammography experiences; and
5. Identify factors, including the severity and type of disability, that are associated with repeat mammography.

METHODS

Study Sample

Participants were selected from women originally enrolled in the Cancer Screening Project for Women (CSPW), a 2003–2005 survey that examined the cancer screening practices of unmarried women. The CSPW sample consisted of 630 women, ages 40 to 75, who received the majority of their health care in Rhode Island and had never been diagnosed with cancer other than non-melanoma skin cancer. Women were recruited through community events, health fairs, mailings and flyers, personal networks, and print media. For additional details about the CSPW including participant recruitment, data collection methods, and survey timetable, see (Clark et al., 2007; Clark, Rogers, Armstrong, Rakowski, & Kviz, 2008).

The Mammography Project was a matched cohort study in which we selected all women who were classified as having a disability (WWD) in the CSPW and matched these women by age (± 2 years) and insurance status (insured vs. not insured) to women without a disability (WND). All women were unmarried. Women who agreed in the CSPW to participate in follow-up studies (96%) were eligible. We completed telephone interviews from February to July 2007 with 186 eligible women comprising 93 matched pairs. The average age of participants was 57.1 years and 10.8% were not insured.

Five attempts were made to contact non-respondents. There were 34 eligible women with a disability at the time of the CSPW who were not interviewed in the MP. Compared to WWD who were not interviewed, interviewed WWD were older (57.1 vs. 52.2) and more likely to be living alone (58.1% vs. 38.2%). Of the 34 WWD who were not interviewed, 25 (73.5%) could not be located. Of the remaining nine, one was physically unable to participate, four could not be contacted, two refused to participate, and two initially agreed to participate but then did not complete the interview. The project was approved by the Brown University Institutional Review Board.

Measures

Dependent Measure—Despite some controversy about age of initiation and interval between screenings (Gotzsche & Nielson, 2006), most guidelines for screening mammography in the United States recommend screening intervals of one to two years beginning at age 40 for asymptomatic women (American Cancer Society; United States Preventive Services Task Force, 1995). We defined on-schedule mammography as having had a screening mammogram within 15 months of the Mammography Project (MP) interview and having had the next most recent screening mammogram within 15 months of the most recent one. We used the stricter criterion of one rather than years between screenings, but allowed up to 15 months to account for scheduling difficulties and insurance coverage protocols that require at least one year between screening mammograms (Clark, Rakowski, & Bonacore, 2003; Partin, Casey-Paol, Slater, & Korn, 1998).

Independent Measures

Disability: We included three markers of disability: status, severity, and type. Each participant in the CSPW was asked two questions regarding disability: (a) “Do you consider yourself to have a disability?” and (b) “Do others consider you to have a disability?” A participant was classified as having a disability if she considered herself to have a disability or reported that others considered her to have a disability. We included two indices of disability severity. First, as part of the MP, women were asked to report their difficulty with activities of daily living (ADLs) and instrumental activities of daily living (IADLs) due to a disability, including bathing, dressing, eating, getting in or out of bed, walking, using the toilet, using the telephone, doing light housework, doing heavy housework, preparing own meals, shopping, and managing money. The endorsed items were summed. Second, for each ADL or IADL for which difficulty was endorsed, women were asked if they received help from another person or used special equipment or devices to do the activity. The endorsed items were again summed. In addition, as a measure of disability type, we provided a list of 13 common physical and mental health conditions in the MP, including diabetes, arthritis, and depression and asked women to indicate whether or not they had that condition. Finally, we included the option for women to report any other conditions that were not already endorsed.

Demographic characteristics: Demographic characteristics were assessed as part of the CSPW and included education (high school degree or less vs. more than high school), current employment status (employed full or part-time vs. not employed), household income (< \$15,000 vs. ≥\$15,000), race (white vs. non-white), living arrangement (live alone vs. live with others), and sexual orientation (heterosexual vs. sexual minority).

Health status: As part of the MP, we asked women to rate their health compared to women their same age (better vs. same or worse). Second, we calculated Body Mass Index (BMI) from self-reported height and weight.

General experiences with mammography: All questions regarding experiences with mammography were asked as part of the MP. We asked women how important getting a

mammogram was compared to addressing other medical issues (less, same, or more important). We also asked them to report the number of different facilities that they had gone to for a mammogram in their lifetime. They were asked how they generally get to a facility to obtain a mammogram (drive themselves vs. all else), as well as whether they always or usually go alone or with someone else. Additionally, we asked women if they needed any special assistance when scheduling an appointment for a mammogram.

Experiences with most recent mammogram: We asked women for the name of the facility at which they obtained their most recent mammogram and classified each facility as hospital-based vs. non-hospital based. We included items about satisfaction with (1) the facility location; (2) wait time for an appointment; (3) wait time during an appointment; (4) communication with receptionists; and (5) communication with the technologists. We also asked respondents whether they would go back to the same facility for their next mammogram.

Reasons for deciding where to obtain mammograms: Among women who reported having at least one mammogram, we asked about the facility they had visited most recently. We asked women to endorse reasons why they initially chose this facility rather than another one. We then asked if they had gone to the same facility for their two most recent mammograms. For women who went to the same facility for their recent mammograms, we asked why they returned to the same facility. We combined the reasons for initially choosing or returning to a facility into three categories using Principal Components Analysis with varimax rotation: (1) location—closest facility to home, closest facility to work, closest facility to errands, easiest facility to get to, facility in safe neighborhood (range=0–5; Cronbach alpha=0.79); (2) access—accessible to physical and mental health needs, most convenient facility for person accompanying participant, facility that health provider recommended, only facility aware of, facility accepted health insurance or provided free screenings (range=0–5; Cronbach alpha=0.55); (3) care provided by facility—good experience with technologists and doctors, technologists good at explaining what would happen, technologists gentle with exam, facility provided privacy, short wait time for appointment (range=0–5; Cronbach alpha=0.93). We then summed the number of endorsed responses within each category and the summed items were used in all analyses.

Analysis

We conducted descriptive analyses to characterize women with and without a disability. Significant differences between the groups were reported with the chi-square test. Next, relative risks and 95% confidence limits were estimated for the association between disability status and repeat mammography. We used the GENMOD procedure in SAS 9.1 to fit univariable and multivariable fixed effects conditional Poisson models (Alexander & Kufera, 2007; Hardin & Hilbe, 2001). We used empirical-based standard error estimates to account for the appropriate standard errors in the matched cohort design. We included variables in the adjusted model that were associated with disability status and repeat mammography or changed the disability parameter by 10% or more (Rothman & Greenland, 1998). We tested for disability status as a main effect, as well as for interaction effects between disability status and other determinants associated with repeat screening.

Among women with a self-reported disability, we examined the association between repeat mammography and severity of disability and type of health conditions. We fit generalized linear models with binomial distributions. The log link function was specified to estimate relative risks with 95% confidence limits (Spiegelman & Hertzmark, 2005). Statistical significance for all analyses was set at a two-sided 0.05 alpha level.

RESULTS

Participant characteristics by disability status are shown in Table 1. Women with a disability (WWD) were significantly more likely than those with no disability (WND) to be previously married, have a high school degree or less, to not be employed, have a household income less than \$15,000, identify as non-White, and to live alone. WWD were less likely to report having private insurance and more likely to report having Medicare or Medicaid. WWD were less likely to identify as a sexual minority. As expected, WWD were also more likely than WND to report two or more limitations with ADLs or IADLs (range of limitations: 0–8), and to receive assistance with at least two activity limitations (range of limitations requiring assistance: 0–7). In addition, WWD were more likely to endorse one or more health conditions, including diabetes, a musculoskeletal condition, hypertension or other heart condition, or a mental health condition. Finally, WWD were more likely to report poorer health status and a higher BMI.

Selection of Mammography Facility

The reasons women gave for deciding where to obtain a mammogram are presented in Table 2. The frequency of each reason provided by WWD is compared to WND. A recommendation from a doctor or other health care provider was the most common reason associated with access for both initially choosing a facility (64.3%) and returning to the same facility (66.4%). This reason was significantly more common for WWD than WND. Similarly, WWD were more likely to indicate that they initially chose or returned to a facility because it was accessible to someone with their physical or mental health needs. WWD were more likely to endorse convenience of the facility for the person that went with them to obtain a mammogram as a reason for initially choosing and returning to a facility. In addition, they were more likely to return to the same facility because their health insurance was accepted or the facility provided free screenings. The mean number of reasons associated with access was also significantly different by disability status (WWD=2.28, 95% CI=2.01, 2.55; WND=1.53, 95% CI=1.28, 1.77; data not shown in table).

Ease of getting to the facility was the most common reason associated with location for both initially choosing a facility (58.4%) and returning to the same facility (53.9%). Compared to WND, WWD were more likely to endorse that they initially chose or returned to a facility because it was in a neighborhood where they felt safe. In addition, WWD were also more likely to report returning to a facility because it was close to where they did their errands. However, the mean number of reasons associated with location was not significantly different by disability status (WWD=2.27, 95% CL=1.91, 2.62; WND=1.86, 95% CL=1.50, 2.22).

Positive experiences at the facility were endorsed by the majority of women as reasons for returning to the same facility. None of the specific reasons associated with facility experience were significantly different by disability status nor was there a difference by disability status in the mean number of reasons associated with experiences at the facility (WWD=2.82, 95% CL=2.36, 3.27; WND=2.69, 95% CL=2.24, 3.14).

Mammography Experiences

Almost all women (95.1%) reported having at least two mammograms in their lifetime. WWD and WND were equally unlikely to report that getting a mammogram was less important than addressing other medical conditions (6.5% vs. 6.5%) while WWD were somewhat more likely than WND to report that getting a mammogram was more important (43.0% vs. 32.6%). Compared to WND, WWD were more likely to report usually or always going with someone to obtain a mammogram (14.1% vs. 4.3%) and were less likely to report driving themselves to the facility (60.9% vs. 80.7%). Almost half the participants had been to only one mammography

facility in their lifetimes (44.1% for WWD vs. 51.7% for WND), and the majority reported having had their two most recent mammograms at the same facility (80.5% for WWD vs. 82.0% for WND). There was no difference by disability status in whether women had ever been asked when scheduling an appointment if they needed any special assistance (11.1% for WWD vs. 6.5% for WND).

The majority (64.4%) of all women indicated that they had received their most recent mammogram at a non-hospital based facility. Almost all women reported being satisfied with their most recent mammography facility experience with regard to: location (94.6%), wait time for appointment (88.1%), wait time during appointment (93.0%), communication with receptionist (97.3%), and communication with technologists (95.7%). There were no differences in the measures of satisfaction by whether the facility was hospital versus non-hospital based. The majority of women (79.6% of WWD and 85.0% of WND) planned to have another mammogram within the next year. Almost all women (90%) reported that they would go back to the same facility for another mammogram.

Repeat Mammography Screening

Overall, 63% of women reported being on-schedule for repeat mammography. In univariable analyses, WWD were less likely to be on-schedule than WND (54.8% vs. 71.0%; unadjusted relative risk (RR)=0.77, unadjusted 95% CL= 0.61, 0.97).

Table 3 shows results of the multivariable analyses of repeat screening. Because the demographic characteristics were highly correlated, education was the only demographic factor included in the final model. The main effect for disability status was not significant (adjusted RR=0.62, 95% CL=0.35, 1.10). However, we found a significant interaction between disability status and education. Among WWD, there was no difference in repeat mammography by education (high school or less=51.8% vs. college or more=59.5%). However, among WND, 78.7% of women with a college degree were on-schedule compared to 56.3% of women with less than a college degree. There was also a significant interaction between disability status and positive experiences as the reasons for attending the facility. Among WND, repeat screening ranged from 59.4% for women reporting zero positive experiences, 69.7% for those reporting one to four positive experiences, and to 85.7% for those reporting all five positive experiences. In contrast, among WWD, screening rates were only 36.7% among those who did not report any positive experiences and increased to a maximum of just over 60% regardless of whether women endorsed one to four (65.5%) or all five (61.8%) positive experiences.

Severity and Type of Disability

Among women with a disability, repeat mammography was not associated with severity. The repeat screening percentage for women with at least two limitations was 56.4% compared to 53.7% for those with fewer than two limitations (unadjusted RR=1.05, 95% CL=0.72, 1.52). Similarly, there were no differences in the measure of assistance needed for at least two versus fewer activity limitations (53.3% vs. 55.6%; unadjusted RR=0.96, 95% CL=0.64, 1.43). Findings were similar when we compared women with one or more limitations versus no limitations. In addition, the number of health conditions reported overall was not associated with being on-schedule. The mean number of conditions for those on-schedule was 3.24, (95% CL=2.94, 3.53) compared to 3.10 (95% CL=2.73, 3.46) for those off-schedule.

Repeat mammography was also not significantly associated with reporting specific types of health conditions. Furthermore, when we compared the experiences of women who reported at least one mental health condition to those who reported only physical health problems, there were no differences by type of disability in importance of mammography, reasons for choosing

a facility, experiences at the facility, future intentions for mammography, or plans for returning to the same facility in the future.

CONCLUSIONS

Our goal was to compare the breast cancer screening experiences of unmarried women with disabilities (WWD) to unmarried women with no disability (WND) and to determine whether these experiences were associated with adherence to repeat screening. We found that WWD had significantly lower screening rates than WND in unadjusted analyses. The screening rate for WND of 71% is consistent with the 72% of women who reported repeat, on-schedule screening in a national-level survey conducted in 2002–2003 (Rakowski et al., 2006). It is also within the range of one and two-year screening rates in the 2006 Rhode Island Behavioral Risk Factor Surveillance Survey (RI-BRFSS). Among women who reported no activity limitations in the 2006 RI-BRFSS, rates of mammography screening were 75% within the previous one year and 86% within the previous two years (computed from the 2006 BRFSS for this report). Assuming relative intra-individual consistency in screening patterns, this translates to estimated repeat screening rates of about 56% (i.e., $75\% \times 75\%$) to 74% (i.e., $86\% \times 86\%$). Similarly, only half of WWD were on-schedule for repeat screening in our sample, which is in the range of the one and two year screening rates for women in the RI-BRFSS with at least one activity limitation (estimated repeat rate of 42% to 69%; computed for this report). Therefore, WWD are not getting screened at the same rate as WND even in a state with one of the highest percentages of women in the nation getting screened for mammograms (Balluz et al., 2004).

We found, however, that WWD and WND were equally likely to report that getting a mammogram was equally, or more, important than other medical issues. In addition, WWD were as likely as WND to report that they were planning to have another mammogram within the next year. Therefore, we cannot attribute lower rates of screening among WWD in our sample to a lower priority for breast screening as compared to their other health conditions.

Our analyses extend the findings of Liu and Clark (Liu & Clark, 2008). In a cross-sectional analysis of unmarried women from the Cancer Screening Project for Women, they found no differences in on-schedule mammography screening by disability status. However, they found differences by disability status in general measures of the quality of the breast screening experiences. WND were more likely than WWD to report higher quality experiences including explanation and ease of the mammography procedures. In addition, mammography rates were somewhat higher among WND than WWD among those women with higher quality experiences. Our prospective findings suggest that over time, WWD may be less likely than WND to remain on-schedule for mammography and this may be due to experiences at the screening facilities.

Negative interactions with health care professionals, including lack of knowledge, biased attitudes, and demeaning treatment have been previously noted as barriers to screening for WWD (Becker, Stuifbergen, & Tinkle, 1997; Thierry, 2000). Almost all women in our sample reported being satisfied with their experiences at the mammography facility that they attended most recently, including communication with receptionists and technologists. In addition, the majority of WWD and WND noted positive experiences at the facility, including good experiences with technologists and doctors, as reasons for returning to a particular facility. However, the relationship between these positive experiences and repeat screening differed by disability status. Among WND, repeat screening increased with the number of positive experiences from 59% for those who endorsed zero positive experiences to 86% for those who endorsed all five positive experiences. Among WWD, screening rates were only 37% among those who did not report any positive experiences and reached 60% regardless of whether

women endorsed one to four or all five positive experiences. These findings have two distinct implications. First, the absence of reports of positive experiences at facilities may be an important marker of WWD who are at particularly high risk of underutilization of mammography. On the other hand, WWD may be less influenced than WND to return to a facility because of the number of positive experiences at that facility.

Our findings suggest that there are likely other important aspects of the mammography experiences for WWD that we did not capture in our study. For example, we found that only 11% of WWD had ever been asked when scheduling an appointment if they needed any special assistance. As a result, it is likely that facilities may have been unaware of women's needs, such as extra time for the mammogram, prior to an actual appointment. Therefore, WWD may have been more likely than WND to feel that their needs were not adequately met by the facility. Second, we found that WWD were more likely to report choosing a facility that was convenient for an individual going with them to the appointment and the facility was accessible to someone with their physical or mental health needs. This suggests that, by necessity, accessible facility options are higher priorities for WWD than the actual experiences while at the facility. Finally, because of the modes of data collection, we had a very low representation of women in our sample with vision and communication-related disabilities. It is unclear how our findings would differ if more women with vision, speech, language, and hearing disabilities were included.

Other authors have argued that WWD face health care access problems due to older age, lower levels of educational attainment and employment, and higher levels of poverty than WND (Chevarley, Thierry, Gill, Ryerson, & Nosek, 2006; M. A. Nosek, 2000). We attempted to take into account some of the confounding influence of these socio-demographic characteristics by matching WWD to WND on age and insurance status. In addition, we tested for an interaction between education and disability on repeat screening in adjusted analyses. We found no differences in repeat mammography by education level among WWD but having a college degree or more was associated with higher repeat screening among WND. Therefore, in our sample of WWD, we did not find the positive effect of education that is often observed to have a facilitative effect in mammography screening studies. This suggests that continued efforts are needed to assess, and raise awareness about, the specific needs of all women with disabilities regardless of educational attainment.

Our findings add to the literature about the vulnerabilities faced by WWD in both financial and personal access to health care. For example, despite the fact that we matched women based on whether or not they had health insurance, WWD were more likely than WND to report that they chose to return to the same facility for a mammogram because the facility accepted their type of health insurance or provided free screenings. This is likely because WWD were more likely to rely on Medicaid and perceive that they have fewer options in their decisions about where to be screened. Second, WWD were more likely than WND to report choosing a facility because of the safety of the neighborhood in which it was located. WWD may have more reasons for concern about safety because they live in neighborhoods where crime is more prevalent and/or because they have actual or perceived limitations in their ability to protect themselves against a violent incident.

We did not find significant differences in repeat screening by type or severity of disability. Our use of a general self-report of disability may have diluted the association between disability and mammography screening. Caution should be also used in the interpretation of our findings due to the coarse measurement for the indices of type and severity of disability. For example, as a marker of type of disability, we asked women to report on physical and mental health conditions experienced rather than on specific impairments such as blindness or upper extremity mobility difficulty. Similarly, we used number of activity limitations and assistance

needed for these limitations as markers of severity rather than items such as extent to which women have difficulties (e.g., some, a lot, completely unable). In addition, our limited sample size prohibited the examination of specific conditions or other potentially important disability-related subgroups (i.e., women with lower extremity disability for at least 5 years).

There are a number of other study limitations. First, we used nonprobability-based sampling procedures in one geographic area, which may result in reduced generalizability of the results. Second, disability status is not a static phenomenon and may change over time. Therefore, we have some misclassification bias in our analyses. For example, 2.2% of WND reported two or more activity limitations. This misclassification may be due to changes in short-term disability or to reporting errors. Next, this study was based on self-reported screening behaviors. Other investigators have found both underestimation (Kagay, Quale, & Smith-Bindman, 2006) and overestimation (Cronin et al., 2009) in self-reported cancer screening data. However, concordance with medical record documentation has been generally satisfactory (Gordon, Hiatt, & Lampert, 1993; Montano & Phillips, 1995; Zapka et al., 1996). Finally, we were not able to distinguish whether women's two most recent mammograms were for screening or diagnostic purposes. Therefore, our self-reported rates of screening may have been overestimated because diagnostic mammograms were included.

Despite the limitations, our study had a number of strengths. First, we had a diverse sample of all unmarried women, a growing segment of the population that may have elevated risk of cancer and yet has been previously under-represented in screening studies. Finally, this was one of the first studies to explore why WWD chose to attend particular mammography facilities and their experiences at those facilities. As a result, our findings have important implications for health and social service providers as they consider programs to assist WWD in obtaining clinical and preventive services.

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Table 1Participant Characteristics by Self-Reported Disability^a

Characteristic	Women With a Disability (n=93)	Women With No Disability (n=93)	X ² or t-value
Demographic Characteristics			
Age (mean)	57.1	57.1	0.00
Marital status (%)			19.60***
Never married	36.5	68.8	
Separated or divorced	45.2	23.7	
Widowed	18.3	7.5	
High school degree or less (%)	60.2	34.4	12.42***
Not currently employed (%)	69.9	25.8	36.22***
Household income less than \$30,000 (%)	68.8	33.3	23.43***
Non-white race (%)	37.6	18.3	8.64**
Type of insurance			
Private insurance (%)	18.0	47.7	17.56***
Medicare (%)	59.6	26.7	19.16***
Medicaid (%)	32.6	4.7	22.30***
Live alone (%)	58.1	41.3	5.20*
Sexual minority (%)	20.4	38.7	7.46**
Disability Characteristics			
<u>Severity</u>			
≥ 2 self-reported limitations (%)	41.9	2.2	42.83***
Assistance for ≥ 2 self-reported limitations (%)	32.3	2.2	29.59***
<u>Type of conditions</u>			
Diabetes (%)	32.3	6.5	19.84***
Musculoskeletal conditions (%)	87.1	60.2	17.32***
Hypertension or other heart condition (%)	60.2	37.6	9.48**
Mental health condition (%)	64.5	25.8	28.13***
Other health condition (%)	73.1	58.1	4.67*
Health Status			
Self-reported health status same or worse than others(%)	71.7	40.2	18.55***
Mean body mass index (range: 17.2–51.5)	31.0	26.6	-4.52***

^aWomen with and without a disability were matched on age and insurance status (insured vs. not insured)*
 $p < .05$ **
 $p < .01$ ***
 $p < .001$

Table 2

Reasons for Deciding Where to Obtain Mammograms by Self-Reported Disability^a (%)

Reason	Initial reasons for choosing facility			Reasons for returning to the same facility			
	Total (n=143)	Disability (n=70)	No Disability (n=73)	Total (n=143)	Disability (n=70)	No Disability (n=73)	χ^2
Access							
Recommendation by doctor or other health care provider	64.3	71.7	57.0	66.4	75.7	57.5	5.30*
Type of health insurance accepted or provided free screenings	39.8	44.1	35.5	44.8	55.7	34.3	6.66**
Accessible for physical or mental health needs	28.1	43.5	12.9	52.5	70.0	35.6	16.94***
Convenience of facility for person that went with participant	12.4	17.4	7.5	12.0	20.3	4.1	8.81**
Only known facility	12.4	14.1	10.8	11.2	14.3	8.2	1.32
Location							
Ease of getting to facility	58.4	62.0	54.8	53.9	60.0	48.0	2.09
Location of facility to home	52.4	57.6	47.3	46.2	52.9	39.7	2.48
Safety of neighborhood in which facility was located	34.6	43.5	25.8	32.9	44.3	21.9	8.10***
Location of facility to errands	23.2	27.2	19.4	25.9	34.3	17.8	5.06*
Location of facility to work	22.2	20.7	23.7	23.1	20.0	26.0	0.73
Experience at facility							
Experience with technologists and doctors			NA	81.1	81.4	80.8	0.01
Provision of privacy			NA	79.7	82.8	76.7	0.83
Technologist's explanation of procedure			NA	76.2	80.0	72.6	1.08
Technologist's gentleness doing the exam			NA	72.7	74.3	71.2	0.17
Wait time for appointment			NA	48.3	55.7	41.1	3.06

^aWomen with and without a disability were matched on age and insurance status (insured vs. not insured)

* $p < .05$

** $p < .01$

*** $p < .001$

NA=Not asked

Table 3

Correlates of On-Schedule Mammography

Characteristic	Parameter Estimate	95% CL
Demographic factors		
Disability status (WWD=1) ^a	-0.44	-1.06, 0.19
Education (College degree or more=1) ^a	0.47	0.04, 0.89
Reasons for choosing mammography facility		
Experiences at facility (range = 0–5 reasons) ^a	-0.07	-0.17, 0.03
Facility location (range= 0–5 reasons)	-0.07	-0.25, 0.09
Access (range= 0–5 reasons)	-0.08	-0.25, 0.09
Interactions		
Disability status by education	-0.44	-0.75, -0.13
Disability status by experiences at facility	0.23	0.07, 0.39

CL=Confidence limit

^aIncluded in interaction term