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RESEARCH ARTICLE

Assessing Intersectional Disparities in Cervical Cancer Screening by Disability Status, Race, and Ethnicity

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Introduction: Separate bodies of research have studied disparities by disability status and by race or ethnicity in receipt of cervical cancer screening. Much less is known about how these disparities intersect. The purpose of this study was to evaluate disparities in compliance with the U.S. Preventive Services Task Force guidelines for Pap testing in age-eligible women at the intersection of disability and race or ethnicity.

Methods: We conducted cross-sectional analyses of the Medical Expenditure Panel Survey Household Component deidentified public data files pooled for years 2007−2016, using a modified Poisson regression analysis to compute prevalence ratios for being up to date with Pap testing by disability status and race or ethnicity. We also calculated predicted marginal proportions adjusting for demographic and socioeconomic covariates.

Results: The analytic sample included 68,507 women with nonmissing covariates; 15.6% had a disability. Overall, the proportion current with Pap testing was significantly lower among women with disabilities than among those without disabilities (82.1% vs 88.6%, $p<0.0001$). Furthermore, within each racial and ethnic group, women with disabilities were less likely than those without disabilities to be current with Pap testing. In adjusted analyses, prevalence ratios for White women with disabilities (adjusted prevalence ratio=0.94; 95% CI=0.92, 0.96) and other race women with and without disabilities (adjusted prevalence ratio=0.91; 95% CI=0.86, 0.95 and adjusted prevalence ratio=0.91; 95% CI=0.89, 0.95, respectively) were significantly below those for the reference group of White women without disabilities. Hispanic women with disabilities did not differ significantly from White women without disabilities, and Black women with disabilities had significantly higher adjusted prevalence ratios than White women without disabilities (adjusted prevalence ratio=1.07; 95% CI=1.05, 1.09). When taking covariates into account, the proportion of Black women with disabilities current with screening was only slightly lower than the estimated proportion for Black women without disabilities (92% vs 93%). The gap in screening between White women with and without disabilities narrowed somewhat (from 9 percentage points to 4 percentage points) but remained significant.

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Conclusions: Our results extend previous research focused separately on disability or race and ethnicity. Women with disabilities in all racial and ethnic groups fell short of *Healthy People 2020* goals for cervical cancer screening.

INTRODUCTION

Multiple national guideline committees, including the U.S. Preventive Services Task Force (USPSTF), recommend screening for cervical cancer in women aged 21–65 years by Pap test once every 3 years.[1−5] Pap tests can detect precancerous cells, allowing treatment before cancer develops; 6 of 10 cervical cancers in the U.S. occur in women with no Pap testing within the past 5 years.[6,7] Increasing the proportion of eligible women receiving cervical cancer screening has been a long-standing *Healthy People* objective, serving as an important benchmark for population health efforts.[8,9] Furthermore, cervical cancer screening is a practice-based provider service that can be received in a doctor's office during an annual preventive visit without a referral; thus, it serves as a good gauge of whether standards of care are being met.[10,11]

Although the effectiveness of Pap testing is well established,[1−5,7,12,13] disparities in testing exist for specific populations.[14−40] In particular, numerous studies have identified differences in the receipt of Pap testing by disability status and have consistently found that women with disabilities are less likely than women without disabilities to have received a Pap test within the USPSTF-recommended timeframe.[14−22] Much of this literature has focused on overall comparisons of women with and without disabilities. A few studies have examined subgroup differences within the disability population (e.g., by rural versus urban residence, by disability type, and disability severity).[14−18] Separately, several studies have examined Pap screening disparities by race or ethnicity.[24−40] However, there has been much less attention to intersectional disparities in Pap testing by disability status and race or ethnicity. Women who have a disability and belong to a medically underserved racial or ethnic group may experience magnified and cumulative barriers to obtaining screening.[32−40] Understanding and addressing such disparities is crucial to advancing health equity in cervical cancer screening, a priority of the NIH Office of Disease Prevention.[41]

The purpose of this study was to examine the differences in receipt of cervical cancer screening at the intersection of disability status with race and ethnicity. In other words, we assessed how the association of disability with screening was modified by race and ethnicity. We hypothesized the following:

1. that in each racial and ethnic group, lower proportions of women with disabilities would be current with Pap testing than their counterparts without disabilities and
2. that in racial and ethnic groups with lower rates of screening, women with disabilities would experience compounded disparities—compared with the disparity associated with disability alone or race or ethnicity alone.

METHODS

Study Sample

We analyzed data from the household component of the Medical Expenditure Panel Survey (MEPS). The MEPS is administered by the Agency for Healthcare Research and Quality (AHRQ) using samples drawn from the previous year's National Health Interview Survey. The MEPS has a multistage stratified sampling design that oversamples racial and ethnic minorities and low-income respondents to improve the accuracy of estimates for these groups. MEPS respondents participate in a series of in-person interviews over a 2-year time period. The MEPS employs an overlapping panel design, with a new panel enrolled each year; AHRQ creates consolidated data files for each year.[41,42,43] We conducted cross-sectional analyses of these annual publicly available deidentified data files, combining consecutive years 2007 through 2016 to provide a large enough sample size to analyze 4 subgroups of race and ethnicity by disability status. We employed AHRQ procedures for pooling annualized data sets.[44]

The analyses focused on women aged 21−64.9 years. Routine Pap testing is not recommended for those aged >65 years, and we selected age 21 years as the youngest age at which women would likely need Pap testing under the various versions of USPSTF recommendations applicable during the study period.[1−5,44] The 2007−2016 sample included a total of 103,160 women within the age range of 21−64.9 years. We excluded 14,241 women with hysterectomy or cervical cancer. As detailed in Figure 1, our final analytic sample size was 68,507 after excluding those missing data on 1 or more variables of interest.

Measures

Dependent variable. During the study period, the USPSTF recommended that Pap tests be conducted every 3 years, starting within 3 years of initiating sexual activity or at age 21 years, whichever came first (years 2007−2011), or starting at age 21 years

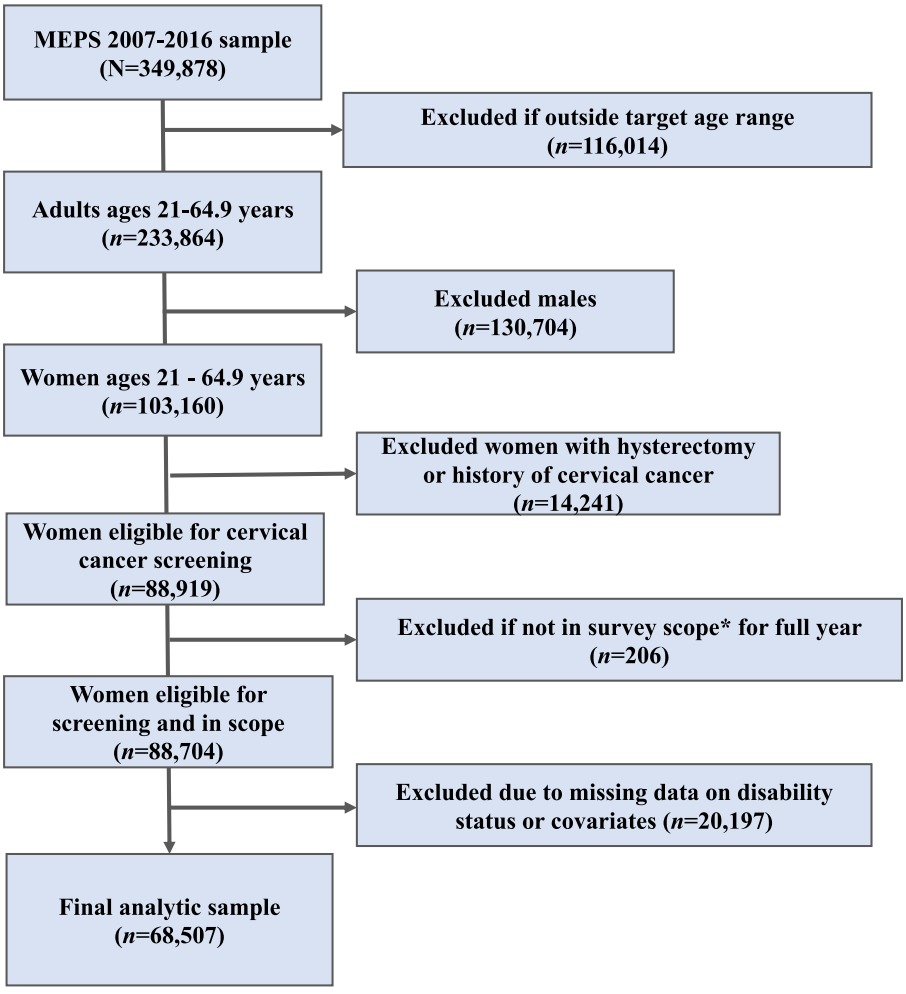

Figure 1. Flow diagram of sample construction. *A person is considered in scope if he or she is a member of a MEPS household and is a member of the U.S. civilian, non-institutionalized population. MEPS, Medical Expenditure Panel Survey.

regardless of sexual history (years 2012−2016).[1−5,45] We created a binary variable coded as 0, meaning >3 years since the last Pap test or never screened (not up to date), or 1, meaning 3 years or less since the last Pap test (up to date).

Primary independent variables. We defined any disability on the basis of the presence of limitations in basic actions or complex activities.[46] This included limitations in physical functions (e.g., walking, lifting); limitations in cognition (e.g., memory, decision making); limitations in vision; limitations in hearing; limitations in activities of daily living; limitations in instrumental activities of daily living; social and recreational limitations; and imitations in work, housework, or school. In 2013, questions assessing the full range of difficulty (including mild or moderate) with vision or hearing were dropped; for consistency across the study period, we therefore included only individuals identified as completely deaf or blind. For all other disability items, we categorized women with any reported degree of difficulty as having a disability. We combined self-reported race and ethnicity into a single variable with 4 categories: (1) non-Hispanic Black (referred to as Black in the remaining part of this paper); (2) Hispanic of any race (referred to as Hispanic in the remaining part of this paper); (3) non-Hispanic Other race (referred to as other race in the remaining part of this paper), which because of small sample sizes combined Alaska Native or American Indian, Asian, Native Hawaiian or other Pacific Islander, and Multiple Races; and (4) non-Hispanic White (referred to as White in the remaining part of this manuscript).[47] To examine the combined effect of disability and race and ethnicity, we created a composite variable with 8 categories: (1) Black with disability, (2) Black without disability, (3) Hispanic with disability, (4) Hispanic without disability, (5) other race with disability, (6) other race without disability, (7) White with disability, and (8) White without disability.

Covariates. Our adjusted analyses controlled for the following demographic and socioeconomic variables selected on the basis of previous studies on cervical cancer screening in women with disability: age (21−29.9 years [ref], 30−39.9 years, 40−49.9 years, 50−59.9 years, and 60−64.9 years), marital status (married [ref], never married, divorced/separated/widowed), education (bachelor's degree or other postsecondary degree [ref], some college with no degree, high-school diploma or GED, no high-school

diploma), region (Northeast [ref], Midwest, South, West), family income as a percentage of the Federal Poverty Level (≥400% [ref], 200 to <400%, 100 to <200%, or <100%), health insurance (privately insured any time during the year [ref], only public insurance coverage during the year, uninsured for the entire year), and presence of a usual source of care (yes [ref] versus no).[14–19]

Statistical Analysis

We calculated survey-weighted percentages of demographic characteristics and Pap testing and race and ethnicity and disability status. Next, we used modified Poisson regression to assess the association between Pap testing and our 8-category variables combining disability status and race and ethnicity.[48] We conducted our regression analyses both and with and without adjusting for the covariates specified earlier. Finally, to facilitate comparisons across groups, we used multivariable logistic regression analysis to calculate predicted marginal proportions adjusted for our covariates.[48] To compute complex survey weights to correctly estimate population counts, we generated a pooled weight variable by dividing person weight by 10 (the number of years of data we pooled).[44] We applied the svyset command using the assigned pooled weight as well as the variance stratum and variance primary sampling unit, which account for the lack of independence between data years.[43,44] We used a significance level of $p<0.05$ and calculated 95% CIs for all estimates. We conducted analyses using Stata/MP 16.1.[49]

RESULTS

Demographic and healthcare access characteristics for the sample are shown in Table 1. Higher proportions of women with disabilities were older (aged 50 years−64.9 years); were of Black or White race; had a high-school diploma or less education; were divorced, separated, or widowed; were poorer; had only public health insurance; and had a usual source of care than women without disabilities.

Table 2 shows the unadjusted proportions of women with and without disability who received a Pap test within the past 3 years, by race and ethnicity. For each racial and ethnic group, lower proportions of women with disabilities than women without disabilities were up to date with Pap testing, with findings significant for Black women (88.75% vs 91.95%, $p<0.0001$) and White women (80.43% vs 89.3%, $p<0.00001$). Among women with disabilities, the proportion screened was highest for Black women (88.75%).

Table 3 presents the results of unadjusted (Model 1) and adjusted (Model II) regression analyses of Pap testing for women at the intersection of disability and race or ethnicity. In unadjusted analyses, White, Hispanic, and other race women with disabilities all had significantly lower prevalence ratios (PRs) for Pap testing than the reference group of White women without disabilities ($p\leq0.01$). Black women with disabilities did not differ significantly from White women without disabilities. In adjusted analyses, Hispanic women with disabilities no longer differed significantly from White women without disabilities. Black women with disabilities had a significantly higher adjusted PR (APR) than White women without disabilities (APR=1.07; 95% CI=1.05, 1.09). PRs for White women with disabilities and other race women with and without disabilities remained significantly below those of White women without disabilities even when covariates were added to the model (Table 3).

Table 4 shows the adjusted predicted marginal proportions (i.e., the estimated proportions up to date with Pap testing) for women with and without disabilities in each race or ethnicity category. When taking covariates into account, the proportion of Black women with disabilities current with screening was only slightly lower than the estimated proportion for Black women without disabilities (92% vs 93%). The gap in screening between White women with and without disabilities narrowed somewhat (from 9 percentage points to 4 percentage points) but remained significant. Conversely, the screening gap between Hispanic women with and without disabilities expanded slightly compared with unadjusted results, although CIs still overlapped.

DISCUSSION

This study is novel in examining the intersectional differences in the receipt of cervical cancer screening by disability status and by race and ethnicity simultaneously. We found support for the first hypothesis we tested: in each racial and ethnic group, women with disabilities had lower unadjusted proportions and PRs of having a Pap test within the last 3 years than women without disabilities of the same race or ethnicity. Although differences between women with and without disabilities did not reach statistical significance in all of our racial and ethnic groups, the general pattern with regard to the direction of differences was consistent. Previously, most research on Pap testing by disability status has controlled for race and ethnicity rather than examining how patterns may be similar or different by race and ethnicity.[14–19] Although the difference between women with and without disabilities in our study was largest among White women, our findings clarify that disability-related disparities in screening cut across racial and ethnic groups. In addition, our findings suggest that disability may be a particularly pressing issue impeding screening for White women, whereas other factors may be more critical for women in other racial and ethnic groups.

Our second hypothesis was that in racial and ethnic groups with lower screening rates, women with disabilities would experience compounded disparity, such that

Table 1. Characteristics of Women Aged 21–64.9 Years, MEPS Household Component, 2007–2016

	Unweighted *n* (survey-weighted %)				
Characteristics	**With disability 10,688 (15.39)**	**Without disability 57,819 (84.61)**	**Total 68,507 (100)**	**F**	***p*-value**
Age (in years)				265.4	**<0.0001**
21–29.9	1,436 (14.37)	15,219 (25.81)	16,555 (24.05)		
30–39.9	1,914 (16.85)	16,558 (26.85)	18,472 (25.31)		
40–49.9	2,511 (22.6)	13,505 (22.86)	16,016 (22.82)		
50–59.9	3,380 (31.47)	9,495 (18.15)	12,875 (20.20)		
60–64.9	1,447 (14.70)	3,042 (6.33)	4,489 (7.62)		
Race and ethnicity				41.3	**<0.0001**
Black	2,762 (15.0)	10,790 (11.86)	13,552 (12.35)		
Hispanic	2,284 (11.78)	18,140 (16.9)	20,424 (16.11)		
Other race	767 (6.78)	5,827 (8.41)	6,594 (8.16)		
White	4,875 (66.45)	23,062 (62.83)	27,937 (63.39)		
Marital status				398.7	**<0.0001**
Married	3,931 (41.64)	31,166 (58.82)	35,097 (56.18)		
Never married	3,281 (27.31)	17,462 (26.81)	20,743 (26.89)		
Divorced/separated/widowed	3,476 (31.06)	9,191 (14.37)	12,667 (16.93)		
Education				156.5	**<0.0001**
College degree or more	1,916 (24.31)	16,927 (39.28)	18,843 (36.98)		
Some college degree, no degree	2,606 (27.17)	14,762 (27.18)	17,368 (27.17)		
HS diploma or GED	3,390 (24.55)	15,456 (23.36)	18,846 (24.55)		
Some HS or less	2,776 (17.55)	10,674 (10.18)	13,450 (11.31)		
Region				2.2	0.0867
Northeast	2,005 (19.67)	9,064 (18.62)	11,069 (18.78)		
Midwest	2,315 (22.75)	10,791 (20.9)	13,106 (21.19)		
South	3,992 (35.76)	21,604 (36.47)	25,596 (36.36)		
West	2,376 (21.82)	16,360 (24.01)	18,736 (23.67)		
Family income				325.0	**<0.0001**
≥400%	1,895 (27.06)	16,951 (42.12)	18,846 (39.80)		
200% to <400%	2,540 (26.33)	16,806 (30.18)	19,346 (29.59)		
100% to <200%	2,561 (20.41)	12,707 (15.77)	15,268 (16.48)		
<100%	3,692 (26.21)	11,355 (11.93)	15,047 (14.13)		
Insurance				819.9	**<0.0001**
Any private	4,644 (55.33)	36,298 (75.83)	40,942 (72.68)		
Public only	4,462 (31.85)	8,922 (9.61)	13,384 (13.04)		
Uninsured	1,582 (12.82)	12,599 (14.55)	14,181 (14.29)		
USC				255.2	**<0.0001**
Have USC	8,903 (84.5)	40,865 (75.32)	49,768 (76.73)		
No USC	1,785 (15.50)	16,954 (24.68)	18,739 (23.27)		

Note: Boldface indicates statistical significance ($p<0.0001$).
Hispanic category includes Hispanics of any race; all other categories are non-Hispanic only. Other race includes Alaska Native or American Indian, Asian, Native Hawaiian or other Pacific Islander, and Multiple Races. F indicates Pearson-designed–based F (weighted) comparing women with and without disabilities.
HS, high school; MEPS, Medical Expenditure Panel Survey; USC, usual source of care.

the combined effect of disability and race or ethnicity would be greater than the effect of either disability alone or of race or ethnicity alone. Overall (regardless of disability status), women in Hispanic, other race, and White categories were less likely to be current with Pap testing than Black women. For White women with disability, predicted marginal proportions of being up to date with screening were lower than that for both White women without disabilities and Black women with disabilities. In other words, the combined effect of race and disability did appear to have a greater impact on White women with disabilities than we observed for race alone or for disability alone. This pattern was less pronounced (and not statistically significant) for Hispanic women

with disabilities. Women with disabilities in the other race group had lower predicted marginal proportions for screening than women with disabilities in any other racial or ethnic group, but they did not differ significantly from their counterparts without disabilities. In other words, although there was compelling evidence of racial disparity in screening for the other race group, disability did not appear to further compound the disparity.

In our adjusted analyses, Black and Hispanic women with and without disabilities had the greatest prevalence of being up to date with USPSTF Pap testing guidelines, whereas White women with disabilities and women both with and without disabilities in the other race group had the lowest prevalence of being up to date. These findings are consistent with self-reported data from multiple different sources showing that higher percentages of non-Hispanic Black and Hispanic women indicate having had a Pap test in the last 3 years than non-Hispanic White women.[24−40] Despite these screening efforts, Hispanic and Black women experience a disproportionate burden of cervical cancer incidence, late stage of diagnosis, and poor survival rates.[13,37−39,50] These disparate burdens may be because of a lack of follow-up care[33,34] rather than because of insufficient screening. However, other studies have found that Hispanic women receive recommended Pap tests less than other women[24−31]; thus, suggesting a need for further research on how Pap testing may differ for Hispanic women with disability from different countries of origin.[24] Women with and without disabilities in the other race group (which included Asian, Alaska Native or American Indian, Native Hawaiian or other Pacific Islander, and multiple races) had markedly lower predicted proportions of screening. Thus, there is a clear need for improving access to and uptake of routine screening among these women. Addressing the factors that influence social determinants of health (operating further upstream in the causal pathway) could help to reduce the risk factors for cervical cancer as well as increase screening, thus reducing both incidence and mortality from cervical cancer.

Our findings support previous research on disparities related to disability. Prevalence of Pap testing for women with disabilities in each racial and ethnic group remained short of the *Healthy People 2020* target of 93% for cervical cancer screening.[8] Given the disparities in screening for women with disabilities, it is concerning that the *Healthy People 2030* target for cervical cancer screening was lowered by nearly 10 percentage points from the *Healthy People 2020* target.[9,,51] This change could result in Black and Hispanic women with disabilities being considered at target with no further action

Table 2. Percentage of Women Up to Date With Pap Testing, by Disability Status and Race and Ethnicity

	With disability		Without disability		Total			
Race and ethnicity	**Unweighted *n***	**Weighted % (95% CI)**	**Unweighted *n***	**Weighted % (95% CI)**	**Unweighted *n***	**Weighted % (95% CI)**	**F**	***p*-value**
All	10,688	82.13 (80.87, 83.33)	57,819	88.57 (88.11, 89.01)	68,507	87.58 (87.11, 88.03)	140.5	**<0.001****
Black	2,762	88.75 (87.22, 90.11)	10,790	91.95 (91.2, 92.64)	13,552	91.35 (90.68, 91.97)	16.6	**0.0001***
Hispanic	2,284	85.54 (82.72, 87.96)	18,140	87.26 (86.25, 88.2)	20,424	87.07 (86.00, 88.07)	2.2	0.1357
Other race	767	78.3 (75.01, 81.27)	5,827	80.89 (79.28, 82.39)	6,594	80.56 (78.91, 82.1)	2.0	0.1582
White	4,875	80.43 (78.73, 82.02)	23,062	89.3 (88.71, 89.87)	27,937	87.87 (87.25, 88.47)	162.5	**<0.001****

Note: Boldface indicates statistical significance (*$p<0.01$, **$p<0.001$). Hispanic category includes Hispanics of any race; all other categories are non-Hispanic only. F indicates Pearson-designed–based F (weighted) comparing women with and without disability.

Table 3. PRs for Pap Test Within the Last 3 Years, by Disability and Race or Ethnicity

Characteristics	Model I			Model II		
	PR	95% CI	*p*-value	APR	95% CI	*p*-value
Race/ethnicity and disability						
Black with disability	0.99	(0.98, 1.01)	0.513	1.07	(1.05, 1.09)	**<0.0001****
Black without disability	1.03	(1.02, 1.04)	**<0.0001****	1.08	(1.07, 1.09)	**<0.0001****
Hispanic with disability	0.96	(0.93, 0.99)	**0.008***	1.02	(0.99, 1.05)	0.140
Hispanic without disability	0.98	(0.96, 0.99)	**<0.0001****	1.05	(1.04, 1.06)	**<0.0001****
Other with disability	0.88	(0.83, 0.92)	**<0.0001****	0.91	(0.86, 0.95)	**<0.0001****
Other without disability	0.91	(0.83, 0.92)	**<0.0001****	0.91	(0.89, 0.93)	**<0.0001****
White with disability	0.90	(0.88, 0.92)	**<0.0001****	0.94	(0.92, 0.96)	**<0.0001****
White without disability	ref			ref		
Age (year)						
21–29.9				ref		
30–39.9				1.01	(1.00, 1.02)	0.106
40–49.9				0.96	(0.95, 0. 97)	**<0.0001****
50–59.9				0.92	(0.91, 0.94)	**<0.0001****
60–64.9				0.89	(0.87, 0.91)	**<0.0001****
Marital status						
Married				ref		
Never married				0.92	(0.91, 0.93)	**<0.0001****
Divorced/separated/widowed				0.97	(0.96, 0.98)	**<0.0001****
Education						
BS, >BS, or other degrees				ref		
Some college or no degree				0.96	(0.95, 0.97)	**<0.0001****
HS diploma or GED				0.93	(0.91, 0.94)	**<0.0001****
No HS diploma or less				0.93	(0.91, 0.94)	**<0.0001****
Region						
Northeast				ref		
Midwest				0.98	(0.97, 0.99)	**0.006***
South				0.99	(0.82, 1.03)	0.157
West				0.99	(0.97, 1.00)	**0.041**
Family income						
≥400%				ref		
200% to <400%				0.98	(0.97, 0.98)	**<0.0001****
100% to <200%				0.97	(0.96, 0.99)	**<0.0001****
<100%				1.00	(0.99, 1.01)	0.716
Insurance						
Any private				ref		
Public only				0.98	(0.97, 1.00)	**0.015**
Uninsured				0.85	(0.84, 0.87)	**<0.0001****
Usual source of care						
Yes				ref		
No				0.90	(0.89, 0.91)	**<0.0001****

Note: Boldface indicates statistical significance (*$p<0.01$, **$p<0.001$). Hispanic category includes Hispanics of any race; all other categories are non-Hispanic only. Other race includes Alaska Native or American Indian, Asian, Native Hawaiian or other Pacific Islander, and Multiple Races. BS includes BA, AB, BS, and BBA.
APR, adjusted prevalence ratio; BS, bachelor's degree; HS, high school; PR, prevalence ratio.

needed when a disparity still remains compared with women without disabilities.

Targeted efforts such as clinical and community partnerships are needed to reduce barriers to cervical cancer screening for women with disabilities, particularly those who also face additional sociodemographic disadvantages.[18] These barriers include inaccessible clinics and lack of adjustable examination tables, provider assumptions that women with disabilities are not sexually active and therefore not in need of Pap testing, lack of

Table 4. Adjusted Predicted Marginal Proportions (Predicted Percentage Up to Date With Pap Testing, by Disability Status and Race or Ethnicity), MEPS Household Component, 2007–2016

Race or ethnicity and disability status	Predicted marginal proportion, %	95% CI
Black with disability	92	91–93
Black without disability	93	93–94
Hispanic with disability	89	87–91
Hispanic without disability	91	90–91
Other with disability	80	76–84
Other without disability	78	76–80
White with disability	83	81–84
White without disability	87	87–88

Note: Black indicates non-Hispanic Black. Other indicates non-Hispanic other. White indicates non-Hispanic White. Other includes non-Hispanic American, Indian, Non-Hispanic Alaskan Native, non-Hispanic Asian, non-Hispanic Native Hawaiian, non-Hispanic Pacific Islander, and non-Hispanic multiple races. Proportions are adjusted for the following covariates: age in years, marital status, education, region, family income as a percentage of the Federal Poverty Level, health insurance, and presence or absence of a usual source of care.
MEPS, Medical Expenditure Panel Survey.

transportation, and cost and lack of insurance.[19,22,23,52,53] The Affordable Care Act (ACA) has led to progress in addressing some of the barriers mentioned earlier. For example, the ACA added an amendment to Section 510 of the Rehabilitation Act to authorize the development of standards for accessible examination equipment to reduce screening barriers.[54] However, the standards subsequently put forth by the U.S. Access Board for Accessible Medical Diagnostic Equipment were adopted as federal guidelines and not yet enforceable requirements[55]; thus, it is not clear to what extent physical access to screening has changed since the passage of the ACA. The ACA also eliminated copays for evidence-based preventive services in private insurance plans and for those newly qualifying for Medicaid under ACA provisions; the impact of copay elimination on preventive service uptake among people with disabilities remains understudied. More recently, disparities in receipt of preventive care may have been exacerbated by the disruptions associated with coronavirus disease 2019 (COVID-19). Future studies should examine potentially differential impacts of the pandemic on Pap testing among women with disabilities in different racial and ethnic groups.

In addition to improving screening, efforts are needed to increase human papillomavirus (HPV) vaccination so that risk of cervical cancer is reduced. Research is needed on HPV vaccine uptake among youth with disabilities compared with that among those without disabilities. If disparities exist, younger people with disabilities could be a focus of specific interventions. It is also possible that exposure to HPV could precede a person's disability status, and it can take many years after exposure to develop cervical cancer. Thus, it is important to improve vaccination among all age-eligible people, preferably completing the vaccination sequence before or during early adolescence.

Limitations

To avoid small sample sizes for subgroups, our analysis combined smaller racial groups, potentially obscuring differences in patterns between these groups. Similarly, we combined all women with disabilities and did not categorize disability by type or severity. Consistent with other analyses of survey data, *disability* was defined on the basis of responses to questions regarding functional limitations, with no specific information about underlying causes or diagnoses. In addition, the measurement of some disability variables in MEPS changed during our study period, particularly with regard to the severity of sensory disabilities. However, we were careful to harmonize disability variables across calendar years to maintain consistent definitions of disability. Similar to disability, receipt of Pap testing was self-reported by MEPS participants and may reflect reporting bias. The concordance of medical record data with self-reported survey data suggests that self-report survey data may overestimate the receipt of Pap tests in the general population by 55% and also overestimate Pap testing among Hispanic women.[56,57] Therefore, we cannot rule out the possibility of bias in reports of Pap testing by race.[58–62] Furthermore, beginning in 2012, USPSTF recommendations included an option for less frequent (every 5 years) Pap testing in women aged 30–65 years if HPV testing was also conducted. We were not able to incorporate HPV testing because this information was not available in the MEPS. If HPV testing varied by race, ethnicity, and/or disability, our analyses may overestimate or underestimate the disparities in cervical cancer screening. Finally, our analysis is based on observational data, and therefore we cannot delineate any associations as causal.

Strengths of our study include that our results are based on nationally representative MEPS data that include oversampling of racial and ethnic minorities. By pooling 10 years of data, we were able to obtain sufficient sample sizes of women with disabilities to separately analyze women in typically underrepresented racial and ethnic groups. In addition, our data source enabled us to restrict our analyses to Pap testing for screening rather than to diagnostic purposes (e.g., we omitted women

with hysterectomy and those with a history of cervical cancer, for whom screening requirements would differ from standard recommendations).

CONCLUSIONS

Our results extend previous disparities research focused separately on disability or on race and ethnicity.[14–40,63] Women with disability in all racial and ethnic groups may be prone to reduced receipt of timely Pap testing. However, the lesser impact of disability on Pap testing in groups other than non-Hispanic White suggests that other factors may be more salient for receipt of screening in these groups.[64,65] Future research is needed to understand how factors at social, organizational, and provider levels may differ for women with disabilities in different racial and ethnic groups and inform targeted strategies to mitigate inequities in the provision of recommended preventive services such as cervical cancer screening.

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