

Perceived Neighborhood Quality and Cancer Screening Behavior: Evidence from the Survey of the Health of Wisconsin

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Abstract Socioeconomic disparities in colorectal and breast cancer screening persist, partially accounting for disparities in cancer outcomes. Some neighborhood characteristics—particularly area level socioeconomic factors—have been linked to cancer screening behavior, but few studies have examined the relationship between perceived neighborhood quality and screening behavior, which may provide more insight into the ways in which neighborhood environments shape cancer related behaviors. This study examines the relationship between several aspects of the perceived neighborhood environment and breast and colorectal cancer screening behavior among a population-based sample of Wisconsin residents. A sub-goal was to compare the relevance of different perceived neighborhood factors for different screening tests. This is a cross-sectional study of 2008–2012 data from the Survey of the Health of Wisconsin, a population-based annual survey of Wisconsin residents. An average risk sample of Black, Hispanic and White women age 50 and older ($n = 1265$) were selected. Survey regression analyses examined predictors of screening, as well as adherence to screening

guidelines. Models controlled for individual socio-demographic information and insurance status. Perceptions of social and physical disorder, including fear of crime and visible garbage, were associated with screening rates. Findings emphasize the particular importance of these factors for colorectal cancer screening, indicating the necessity of improving screening rates in areas characterized by social disorganization, crime, and physical disorder. Additional work should be done to further investigate the pathways that explain the linkage between neighborhood conditions, perceived neighborhood risks and cancer screening behavior.

Keywords Neighborhood characteristics · Cancer screening · Colon cancer · Breast cancer · Epidemiology

Introduction

Breast and colorectal cancer are major contributors to cancer morbidity and mortality [1]. Survival gaps by race and socioeconomic status persist despite recent decreases in mortality rates for breast and colorectal cancer [1]. Successes in cancer screening have aided this decrease [1, 2], but breast and colorectal cancer screening tests have persistent differences in rates of uptake among the general population. Approximately 72 % of women report adherence to breast cancer screening recommendations, and 58 % of adults report being up to date with colorectal cancer screening; both numbers fall short of Healthy People 2020 targets for breast (81.1 %) and colorectal (70.5 %) cancer [3].

Barriers to screening have been shown to be disproportionate based on socioeconomic status (SES) [4–7]. Peek and Han [6] found that low SES women were

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screened for breast cancer at rates 24 % lower than their more affluent counterparts, and McCaffery et al. [7] found low SES to be associated with lowered interest and participation in colorectal cancer screening. Meissner et al. [5] found more patient-identified difficulties for colorectal cancer screening than for breast due to shortages of facilities, lack of screening awareness, not wanting to discuss the test, not perceiving cancer as a threat, being unable to afford the test, or not following through to complete the test.

Some neighborhood characteristics—particularly area level socioeconomic factors—have been linked to cancer screening behavior [8, 9]. Qualitative investigations have revealed a number of neighborhood level processes that may influence screening behavior, including access to medical care and perceived environmental contamination [4, 10]. Pruitt et al. [9] identified 19 research papers examining area-level SES and cancer screening behaviors (breast, cervical and colorectal); the majority ($n = 13$) focused on neighborhood context and breast cancer screening and only several ($n = 5$) on colorectal cancer screening. Further, few studies have examined the relationship between perceptions of neighborhood quality, which may be more important than objectively measured factors in influencing behavior, and may provide greater insight into the pathways linking neighborhood environments with behavior. This study examines the relationship between several aspects of the perceived neighborhood environment and breast and colorectal cancer screening behavior among a population-based sample of Wisconsin residents. A sub-goal was to compare the relevance of different perceived neighborhood factors for different screening tests.

Methods

Data

This cross-sectional study examines 2008–2012 data from the Survey of the Health of Wisconsin (SHOW), an annual, population-based survey [11]. Each year a representative sample of civilian, non-institutionalized adult (age 21–74) residents of the State of Wisconsin is selected from random households using a two-stage probability-based cluster sampling approach, stratified by region and poverty level to participate in data collection. Since initiation in 2008, recruitment has ranged from 500 to 1000 participants per year.

Study Subjects

An average risk cohort of women age 50 and older was selected to facilitate comparison of determinants for breast

and colorectal screening behaviors. Thus, the SHOW sample of women age 50 or older from the 2008–2009, 2010, 2011 and 2012 cohorts is included in our study. The sample was limited to women who self-reported White, Black/African American, or Hispanic heritage, due to small numbers in other racial and ethnicity categories. Women of average risk were identified based on available information and the most recent American Cancer Society guidelines specified for breast and colorectal cancer as inclusion and exclusion criteria [12]. The sample was restricted to women who reported no personal or family history of colon, rectal, breast, or ovarian cancer. The final cohort included 1265 women.

Outcome Measures

Outcomes were specified as having ever been screened and being up to date with colorectal cancer screening [including colonoscopy/sigmoidoscopy and fecal occult blood test (FOBT)] and mammography. Screening status was categorized as never screened, screened but not up to date, possibly up to date (if test was a colonoscopy due to a combination in SHOW cohorts of sigmoidoscopy and colonoscopy, which have different frequency guides, or no indication of timing of reported screening), and up to date.

Predictors

We used four measures of perceived neighborhood quality: (1) perceived stress experienced from living in the neighborhood, and agreement/disagreement that (2) “My community is generally free from garbage, litter, or broken glass,” (3) “My community is safe from crime,” and (4) “My community is well maintained.” We included several individual level control variables: age, race/ethnicity, education, income, marital status, insurance status, and employment status.

Statistical Analysis

All analyses incorporated the SHOW survey design and sampling weights to adjust for SHOW’s two stage cluster sampling design. Models controlled for individual socio-demographic information (age, race/ethnicity, education, income, employment status, and marital status), and insurance status. Survey regression analyses were performed in STATA SE/13. Regression models predicted the odds of having ever been screened and being up to date with each screening test. Individuals in the “possibly up to date” category were considered as not up to date for modeling purposes, due to small numbers (<3 % of the study sample). Each predictor was examined independently, controlling only for individual level control

variables. Models were run with and without controlling for length of residence in the neighborhood—a proposed approach to addressing neighborhood selection bias; results did not differ materially, and final results are reported without controlling for length of residence.

Results

The proportion of women ever screened and adherent to guidelines varied by screening test (Table 1). Higher proportions of women had been screened for breast cancer than for colorectal cancer, as expected, and adherence to breast cancer screening guidelines was better than adherence to colorectal cancer screening guidelines. Multiple regression models (Table 2) reveal a role for some perceived neighborhood characteristics.

Individuals who agreed that their neighborhood was safe from crime had increased odds of colorectal cancer screening. Individuals who agreed that their neighborhood was free from garbage had increased odds of colorectal cancer screening, and increased odds of adherence. Those reporting that neighborhood stress did not apply to them had increased odds of mammography screening adherence. No association was detected between screening outcomes and whether a community was well-maintained.

Discussion

This study examined associations between perceived neighborhood quality and cancer screening behaviors in order to add to the literature on neighborhood level contributors to cancer outcomes and ultimately to inform efforts to increase early detection, improve survival, and address persistent disparities. Results indicate that perceived neighborhood characteristics may be important influences on cancer screening behaviors. Findings emphasize a more prominent association between perceived environmental factors and colorectal cancer screening, as compared to breast cancer screening, consistent with rate differences by type, and reports of larger socioeconomic barriers to colorectal cancer screening [3, 5].

Perceived environmental problems (crime, garbage) were associated with colorectal cancer screening, indicating that efforts to improve screening rates may find greater need and success in areas characterized by social disorganization, crime, and physical disorder. In addition, stress from living in the neighborhood was important for breast cancer screening behavior. These findings indicate a potentially important role for perceptions of the neighborhood environment in influencing cancer screening behavior. Existing literature provides some explanation for this relationship.

Factors such as crime and garbage could be conceived as sources of stress, and stress is linked to both biological and behavioral factors that may affect cancer related behavior, including screening [8, 13, 14]. Chida et al. [13] found that stress-prone personality or poor coping style were associated with increased cancer incidence and mortality, and reduced survival. Stressors are implicated by von Wagner et al. [14], who proposed that individuals of lower SES are more likely to experience stressful life events while having less resources to draw upon in coping with these stressors, possibly leading lower SES individuals to have lower expectations of screening benefits.

In addition, lower SES environments, or those characterized by problems of environmental quality or safety, can also contribute to feelings of powerlessness, whereby individuals perceive that the locus of control over health status is external to them. Some work has indicated that perceived environmental problems could be important for cancer related behavior by shaping larger perceptions of the sources of cancer risk and influencing individual beliefs in the efficacy of health behaviors in the context of environmental risk [4, 15]. Finally, low SES environments may be characterized by a lack of social support and normative values encouraging screening [14].

There are several limitations to note. SHOW data are based on self-report and cannot be verified with medical records to confirm breast or colorectal cancer screening status. SHOW is designed to be representative of individuals in the state of Wisconsin, limiting generalizability of results beyond the state of Wisconsin. SHOW respondents may differ from non-respondents, further limiting generalizability.

Additional research is needed to disentangle associations among related variables to provide clearer understanding of

Table 1 Proportion ever screened and up to date with screening (n = 1265 Black, White and Hispanic women of average risk from a population-based representative sample of Wisconsin residents)

Screening test and recommended screening interval	Screened		Up to date		Screened but not up to date		Screened, possibly up to date		Missing	
	N	%	n	%	n	%	n	%	n	%
Colonoscopy (10 years), sigmoidoscopy (5 years) or FOBT (every year)	482	36	383	29	48	4	51	3	0	–
Mammogram (1 year)	779	60	516	40	257	20	6	0	0	–

Table 2 Models relating perceived neighborhood environment and cancer screening behavior

Measure	Ever CRC screen	Up to date with CRC screen	Ever mammogram	Up to date with mammography
Experienced stress from living in neighborhood				
No stress [63 %]	Referent	Referent	Referent	Referent
Mild stress [14 %]	1.17 [0.78, 1.75]	1.14 [0.74, 1.76]	0.97 [0.63, 1.51]	0.72 [0.47, 1.08]
Moderate or severe stress [4 %]	1.74 [0.68, 4.43]	0.93 [0.32, 2.69]	1.21 [0.54, 2.67]	0.62 [0.24, 1.62]
Does not apply [3 %]	2.25 [0.89, 5.71] [§]	1.67 [0.67, 4.13]	2.18 [0.76, 6.25]	2.51 [1.09, 5.75]*
Community is well-maintained				
Disagree/strongly disagree [9 %]	Referent	Referent	Referent	Referent
Agree/strongly agree [74 %]	1.36 [0.83, 2.25]	1.55 [0.93, 2.56] [§]	0.85 [0.48, 1.49]	0.89 [0.53, 1.51]
Neighborhood is safe from crime				
Disagree/strongly disagree [2 %]	Referent	Referent	Referent	Referent
Agree/strongly agree [82 %]	3.61 [1.24, 10.56]*	2.19 [0.68, 7.04]	1.14 [0.34, 3.77]	1.22 [0.37, 3.97]
Neighborhood is free from garbage				
Disagree/strongly disagree [13 %]	Referent	Referent	Referent	Referent
Agree/strongly agree [71 %]	1.86 [1.13, 3.06]*	1.86 [1.14, 3.04]*	1.32 [0.82, 2.11]	1.07 [0.74, 1.54]

* Significant at $p < 0.05$; [§] marginally significant ($p < 0.10$)

the importance of these factors to cancer screening behaviors. In particular, future work should examine whether and how local community and neighborhood environmental stressors pose barriers to health care seeking behavior, and how such barriers can be overcome to improve screening rates and ultimately improve cancer survival.

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Compliance with Ethical Standards

Conflict of interest No authors have any conflicts of interest to report. The Medical College of Wisconsin's Institutional Review Board exempted approval of human subjects research due to public access data.

References

- Siegel, R., Naishadham, D., & Jemal, A. (2013). Cancer statistics, 2013. *CA: A Cancer Journal for Clinicians*, 63(1), 11–30.
- Centers for Disease Control and Prevention (CDC). (2013). Vital signs: Colorectal cancer screening test use—United States, 2012. *Morbidity and Mortality Weekly Report*, 62(44), 881–888.
- Centers for Disease Control and Prevention (CDC). (2012). Cancer screening—United States, 2010. *Morbidity and Mortality Weekly Report*, 61(3), 41–45.
- Beyer, K. M., Comstock, S., Seagren, R., & Rushton, G. (2011). Explaining place-based colorectal cancer health disparities: Evidence from a rural context. *Social Science and Medicine*, 72(3), 373–382.
- Meissner, H. I., Klabunde, C. N., Breen, N., & Zapka, J. M. (2012). Breast and colorectal cancer screening: US primary care physicians' reports of barriers. *American Journal of Preventive Medicine*, 43(6), 584–589.
- Peek, M. E., & Han, J. H. (2004). Disparities in screening mammography. *Journal of General Internal Medicine*, 19(2), 184–194.
- McCaffery, K., Wardle, J., Nadel, M., & Atkin, W. (2002). Socioeconomic variation in participation in colorectal cancer screening. *Journal of Medical Screening*, 9(3), 104–108.
- Daley, E., Alio, A., Anstey, E. H., Chandler, R., Dyer, K., & Helmy, H. (2011). Examining barriers to cervical cancer screening and treatment in florida through a socio-ecological lens. *Journal of Community Health*, 36(1), 121–131.
- Pruitt, S. L., Shim, M. J., Mullen, P. D., Vernon, S. W., & Amick, B. C., I. I. I. (2009). Association of area socioeconomic status and breast, cervical, and colorectal cancer screening: A systematic review. *Cancer Epidemiology Biomarkers & Prevention*, 18(10), 2579–2599.
- Weitzman, E. R., Zapka, J., Estabrook, B., & Goins, K. V. (2001). Risk and reluctance: Understanding impediments to colorectal cancer screening. *Preventive Medicine*, 32(6), 502–513.
- Nieto, F. J., Peppard, P. E., Engelman, C. D., et al. (2010). The survey of the health of wisconsin (SHOW), a novel infrastructure for population health research: Rationale and methods. *BMC Public Health*, 10, 785.
- Smith, R. A., Brooks, D., Cokkinides, V., Saslow, D., & Brawley, O. W. (2013). Cancer screening in the United States, 2013. *CA: A Cancer Journal for Clinicians*, 63(2), 87–105.
- Chida, Y., Hamer, M., Wardle, J., & Steptoe, A. (2008). Do stress-related psychosocial factors contribute to cancer incidence and survival? *Nature Clinical Practice Oncology*, 5(8), 466–475.
- von Wagner, C., Good, A., Whitaker, K. L., & Wardle, J. (2011). Psychosocial determinants of socioeconomic inequalities in cancer screening participation: A conceptual framework. *Epidemiologic Reviews*, 33(1), 135–147.
- Salant, T., & Gehlert, S. (2008). Collective memory, candidacy, and victimisation: Community epidemiologies of breast cancer risk. *Sociology of Health & Illness*, 30(4), 599–615.