Intraurban Influences on Physician Colorectal Cancer Screening Practices

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Background: Community social and economic resources influence colorectal (CRC) screening decisions by physicians and patients. The aim of this study is to systematically assess the differences in screening recommendations of primary care physicians within two urban communities that are distinct in socioeconomic characteristics.

Methods: Two-hundred-sixty-four primary care community (i.e., not hospital-based) physicians were stratified by community. Using self-report questionnaires, we examined primary care physicians' CRC screening practices, knowledge of risk factors and perceived physician and patient barriers to screening, Physicians practicing in upper-socioeconomic status (SES) communities were compared with those of participants practicing in lower SES communities.

Results: Physicians practicing in low-SES urban communities were significantly more likely to screen with fecal occult blood test than were physicians in upper-SES areas. Alternatively, upper-SES physicians were significantly more likely to recommend screening colonoscopy than were lower-SES physicians. The number of physicians (N=11) who screened for CRC using the double-contrast barium enema were few.

Conclusions: Community-level SES influences physician cancer screening practices. Further understanding of these relationships may guide the development of interventions targeted to specific neighborhoods within urban areas.

Key words: colorectal cancer screening ■ primary care physician practices ■ health disparities ■ community barriers

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Colorectal cancer (CRC) is currently the fourth most common cancer in the United States and ranks second as a cause of cancer-related death. About 5.6% of Americans can expect to get this disease at some point in their lives.[1]

The past several decades have seen the introduction and expanded use of the fecal occult blood test (FOBT, IFOBT), sigmoidoscopy, colonoscopy and double-contrast barium enema (DCBE) for screening of the large bowel. There are consistent reductions in CRC mortality with the use of either the annual or biennial FOBT (either guaiac- or immunochemical-based),[2-6] or sigmoidoscopy.[7-16] While the efficacy of screening colonoscopy for the prevention of CRC and CRC-related death has not yet been established,[17] considerable indirect evidence suggests that the colonoscopy may be a highly effective screening tool.[18-21] To date, there is no published evidence supporting the effectiveness of the DCBE for population-based CRC detection.[17] A systematic review could not establish a single optimal screening strategy based on cost-effectiveness.[22] As a result, the American Cancer Society has endorsed the use of an annual FOBT for screening asymptomatic adults age ≥50, and less frequent sigmoidoscopy, colonoscopy or DCBE.[23] Certain high-risk groups do warrant more aggressive screening with colonoscopy or barium enema.

Physician recommendation is one of the strongest predictors for adherence with CRC screening.[24] A recent national survey of primary care physicians[25] reported that >94% of primary care physicians performed any FOBT. From 24–64% of these FOBTs used a single sample taken in the office via digital rectal examination, however, rather than the three-sample home FOBT that is recommended by professional guidelines. The other approaches were less frequently recommended, from 61–82% for sigmoidoscopy, 34–49% for colonoscopy and 5–24% for the DCBE. Even among those with access to primary care, differences in the uptake of CRC screen-

ing remain by income, insurance status, gender, race and ethnicity,[26-29] with resultant increased mortality.[30,31]

Community social and economic resources also influence CRC screening decisions, particularly through referrals to, the distribution of and access to providers and neighborhood testing sites.[32-37] Using SEER-Medicare data, McMahon and colleagues[38] found a strong influence of census tract location on CRC screening in a Michigan elder population. Cooper et al.[39] have uncovered relationships between county-level CRC mortality and physician screening behaviors. The Harlem Household Survey demonstrated low rates of CRC screening in the neighborhoods with higher case fatalities.[40] Studies have shown worse CRC mortality among residents of low socioeconomic status (SES) of Harlem and the Washington Heights communities in New York City by comparison to those more geographically distant, due to later detection.[41,42] To our knowledge, no study has yet explored interurban community variations in primary care physician CRC screening practices.

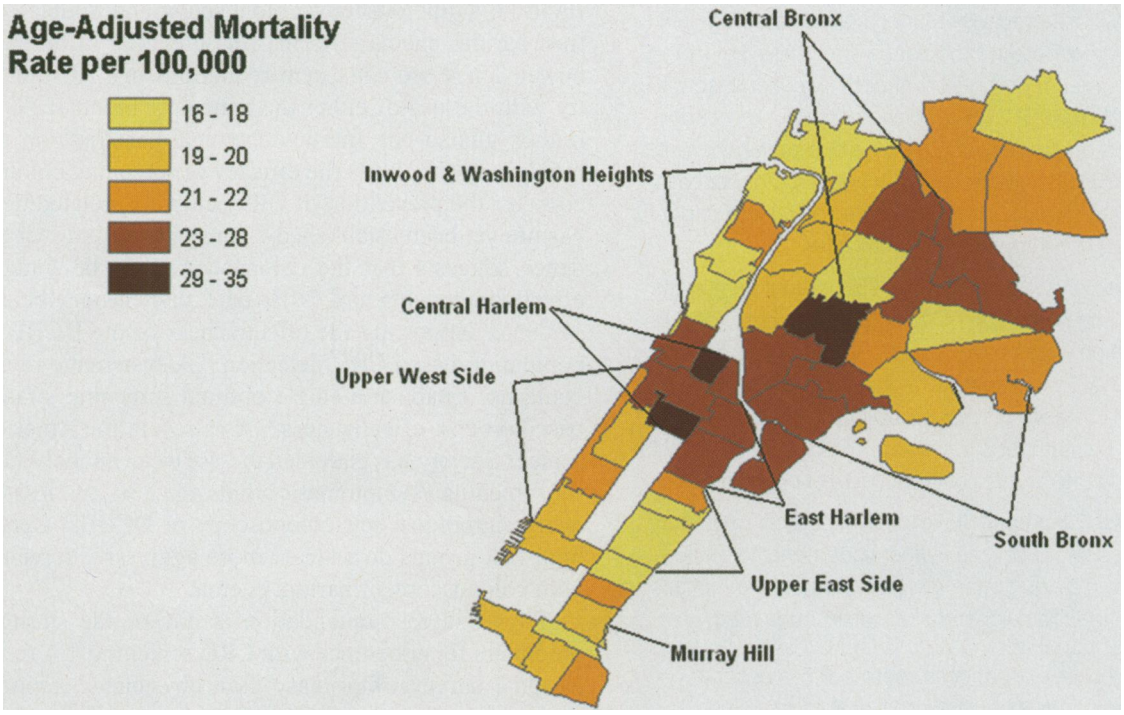
In the New York metropolitan area, we have the opportunity to directly compare the recommendations of community-based physicians, who are central to CRC screening recommendations, within geographically concentrated yet socioeconomically divergent communities. The practice of medicine is very local, responding to indigenous standards of practice, referral patterns and patient mix (Bernard Levin, personal communication), suggesting that community-targeted interventions and policy measures should rest on an understanding of local detection practices, and the barriers to neighborhood-based screening.

The aim of this study is to describe interurban variations in CRC screening practices among primary care physicians. The study is a part of a larger randomized clinical trial on the use of academic detailing[43] for the dissemination of CRC screening recommendations.

METHODS

We stratified the urban sample into two communities, as defined by ZIP codes and using U.S. Census data[44] into those of higher or lower SES. As there are no widely accepted standards for measuring community SES,[45] we

Figure 1. Colorectal cancer mortality in selected New York City ZIP codes



a: Citywide and ZIP code colorectal mortality rates were determined using data from the New York City Department of Health Death Master Files for the years 1993–2002. These data were supplied by the Bureau of Vital Statistics of the New York City Department of Health and Mental Hygiene. The death master files do not include names, addresses or other individual identifiers, and subjects are anonymous. These files contain information on all deaths in New York City, and among other information, report patient age, borough of residence, ZIP code, gender, race/ethnicity, occupation and cause of death using the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) diagnoses. Data were collected across the years 1993–2002 to provide sufficient numbers of cases for analysis in the selected zip codes.[83,84] Colorectal cancer death was identified with ICD-9 (153.0, 153.1, 153.3, 153.4, 153.5, 153.6, 153.7, 153.8, 153.9, 154.0, 154.1, 154.2, 154.3, 154.8) and ICD-10 (C18.x, C19.x, C20.x, C21.x). The 2000 New York City and U.S. populations were taken from the U.S. Census.[85] Direct age adjustment was done using the standard of the U.S. population.

created a composite index that includes multiple dimensions of a community's socioeconomic conditions found to be salient in previous studies.[46] We used median family income, percent of adults in poverty, percent unemployment and percent of individuals age ≥25 who are college graduates as community SES indicators. We summed the four measures to produce one composite SES index to distinguish the two communities.

The communities are located either in northern Manhattan (Harlem, Inwood, Washington Heights) and the Central and South Bronx, NY (with lower SES) or the Upper East or Upper West Sides and Murray Hill sections of New York City (with higher SES), The communities are described in detail elsewhere.[43]

According to the Health Resources and Services Administration,[47] there are three times more primary care physicians per capita in the upper-SES community than in the lower-SES community. Similarly, there are six times more gastroenterologists per capita in the wealthier community than in the less affluent (lower-SES) area.

Participants

One-thousand, six-hundred-eighty-five physicians (642 in northern Manhattan and the South Bronx, and 1,043 in the Upper East and West sides and Murray Hill, in New York City) were identified through lists from the American Medical Association (AMA) Master File List,[48] supplemented by listings from the New York State Department of Education, and comprehensive searches of managed care, hospital and private insurance websites as well as windshield and foot searches of the practice communities. Five-hundred-forty-three physicians met our eligibility criteria, including: devoting ≥50% of their community (i.e., non-hospital-based) practice to primary care, working in the study communities and intending to practice over the coming year. Of these, we enrolled 264 primary care physicians at baseline, 123 in the Upper East/West sides and Murray Hill sections of Manhattan (upper SES) and 141 in northern Manhattan and the central and south Bronx (lower SES).

Physicians were recruited through an introductory letter followed by telephone contact, and they received continuing medical education (CME) credits and a $100 honorarium for their participation in the study. Participants were interviewed face to face to assess their CRC knowledge, barriers to screening and the practice of detection behaviors. The study was approved by the institutional review board of Columbia University.

Measures

The 71-item questionnaire, administered in face-to-face interviews by project staff, contained self-report items that assessed the physician's CRC knowledge, attitudes and practices. We developed the instrument by modifying an earlier questionnaire.[49]

Outcome

Estimates of CRC screening recommendations were based on the binary answer ("yes"/"no") as to whether the primary care physician recommends or conducts each of four screening tests (FOBT, flexible sigmoidoscopy, colonoscopy and DCBE) for asymptomatic patients age ≥50.

Knowledge of Risk Factors for CRC and Barriers to Screening

Physicians were asked about their knowledge of screening and management approaches for CRC according to American Cancer Society guidelines. Using a series of five clinical cases (available from the senior author),[17] the number of correct responses were summed to form a continuous measure.

Participants were asked about the perceived barriers to *each* CRC screening test, using items derived from a recent review.[24] Responses to the items on perceived negative behavioral beliefs to screening, called "barriers to screening" (Table 3 for colonoscopy) were Likert scaled from strongly agree (1) to strongly disagree (4). The subscales were internally consistent (range in Cronbach's α=0.52 to 0.84); the number of barriers per test was summed for the multivariate analyses.

Sociodemographic and Medical Practice Characteristics

Based on previous work,[43] the following provider and medical practice characteristics were included in the model: physician gender, race/ethnicity, whether s/he attended a U.S. or foreign medical school, number of years of practice, whether salaried or not, whether s/he had hospital admitting privileges, average number of patient contacts per week, patient race/ethnicity (measured as a percentage of non-Hispanic white persons), health insurance coverage, and whether flexible sigmoidoscopy or colonoscopy were conducted in the office or not.

The instrument was pilot tested on a subsample of 15 primary care physicians, who were not included in the final study.

Analysis Plan

While physicians' self-report data tend to overestimate their screening behaviors relative to medical audits or patient surveys,[50-52] findings from physician surveys are frequently used to effect policy change[53] and to examine the impact of national initiatives.[54,55] In this study, physician self-report was also used to examine their attitudinal barriers to CRC screening within socioeconomically disparate communities.

Physician knowledge, barriers and CRC surveillance were each tested as bivariates with the dichotomous community index via Chi-squared analyses or by a one-way analysis of variance (ANOVA). In separate analy-

ses, community racial/ethnic and economic characteristics and patient racial/ethnic and insurance factors were strongly intercorrelated (r^2, 0.42–0.57); therefore, these patient factors were excluded from the final model.

Those items found to be significant in the bivariate analyses, and group interaction terms were tested simultaneously for their effects on the rates of screening by use of a stepwise logistic regression analysis, with the community term entered in the last step.[56] To identify factors for intervention tailoring by community and to reduce the number of separate statistical tests, we tested the interactions of community and physician knowledge or community and barriers to screening during the penultimate step in the logistic regression, using the likelihood ratio statistic ($p<0.05$). Missing data, of ≤5%, were excluded from each analysis. When applicable, all P values resulted from the use of two-sided tests. Analyses were conducted with SAS® (SAS Institute Inc., Cary, NC), and a map of colorectal mortality rates was created using ArcGIS® (RockWare USA, Golden, CO).

RESULTS

According to the New York City Department of Health Death Master Files, the 1993–2002 age-adjusted mortality rate for CRC for New York City was 22.30 per 100,000. Of 42 ZIP codes, 24% had CRC death rates equal to or above the city average, and 76% were below (Figure 1). CRC-related mortality data are collected by counties, so the geographic boundaries are broader than those used to distinguish communities in this study—in general, age-adjusted CRC-related mortality is greater in the lower-SES community than in the upper-SES areas (Figure 1).

Physicians practicing in the upper-SES areas were significantly older ($p<0.00001$), described themselves as non-Hispanic whites ($p<0.00001$) and graduated from a U.S. medical school ($p<0.00001$) by comparison to primary care physicians practicing in the lower-SES communities (Table 1). Primary care physicians in the upper-SES communities had more years of medical practice ($p<0.00001$) and more frequent admitting privileges to a hospital ($p=0.03$), and were less often salaried employees of the practice ($p<0.00001$) than were those practicing in the lower-SES communities. Upper-SES community physicians had smaller practices, with about one-third fewer patient contacts per week ($p<0.0001$) than lower-SES physicians. Upper-SES physicians accepted about five times fewer Medicaid patients ($p<0.00001$) and one-half fewer uninsured individuals ($p<0.01$) than did those practicing in the lower-SES communities. Conversely, physicians in the upper-SES communities saw about twice the number of patients with managed care coverage ($p<0.00001$) than did physicians from the lower-SES communities. Upper-SES physicians performed more than twice as many procedures in the office than did lower-SES physicians (flexible sigmoidoscopy, $p=0.002$; colonoscopy,

Table 1. Sociodemographic and practice characteristics of primary care physicians in upper- and lower-SES urban communities

	Lower[a] M/% (SD)	Upper[b] M/% (SD)	P
Physician Characteristics			
Female	35	31	0.50
Salaried Physician	60	25	<0.00001
U.S. Medical School Graduate	48	77	<0.00001
Admitting Privileges	89	97	0.03
Non-Hispanic White	32	85	<0.00001
No.years of Practice	13 (10)	19 (14)	<0.00001
Practice Characteristics			
No. Patient Contacts/Week	94 (49)	74 (43)	0.001
Patient Insurance			<0.00001[c]
Medicare	27 (20)	29 (17)	0.40
Medicaid	37 (29)	7 (14)	<0.00001
Private	14 (15)	23 (23)	0.001
Managed care	25 (22)	48 (26)	<0.00001
Uninsured	10 (9)	5 (11)	0.003
Perform Flexible Sigmoidoscopy	12	29	0.002
Perform Colonoscopy	7	16	0.03
Patient Ethnicity/Race			0.00001[d]
Non-Hispanic black	37 (25)	19 (11)	<0.00001
Non-Hispanic white	13 (20)	58 (22)	<0.00001
Hispanic/Latino	49 (27)	16 (13)	<0.00001
Asian/Pacific Islanders	4 (4)	8 (8)	<0.00001

a: Northern Manhattan, South Bronx, NY (N=124); b: Upper east and west sides of Manhattan, Murray Hill sections of New York, NY (N=126); c: Wilks Lambda = 0.02; d: Wilks Lambda = 0.003

p=0.03). Physicians practicing in the upper-SES communities saw a significantly greater percentage of non-Hispanic white (p<0.00001) and Asian-American and Pacific-Islander (p<0.00001) patients in their practices than did lower-SES participants; on the contrary, lower-SES physicians saw significantly more non-Hispanic black (p<0.00001) and Hispanic (p<0.00001) patients than did upper-SES physicians.

Upper-SES physicians were significantly less likely to screen with the FOBT (p=0.04), to recommend flexible sigmoidoscopy (p=0.02) than were lower-SES physicians (Table 2). Alternatively, upper-SES physicians were significantly more likely to recommend colonoscopy for CRC screening (p<0.00001) than were lower-SES physicians. The number of physicians (N=11) who screened for CRC using DCBE were few, and there were no differences in use of the DCBE for routine CRC screening practices between the two geographic communities.

There were no statistically significant differences on the knowledge of CRC risk factors between physicians practicing in the lower-SES and the upper-SES communities (Table 2). Looking at physicians' barriers to the regular practice of FOBT and flexible sigmoidoscopy screening, there were no statistically significant differences by community. Physicians practicing in lower-SES communities reported significantly more barriers to colonoscopy screening than those working in upper-SES areas (p<0.00001).

There were statistically significant differences among many of the individual barriers to colonoscopy screening among primary care physicians who practiced in communities with higher SES relative to primary care physicians who practiced in areas with lower SES (Table 3). The effect sizes for the statistically significant differences between these barriers ranged from small (0.08) to medium (0.45). There were significantly greater barriers to colonoscopy screening among physicians practicing in the lower-SES community than those in the upper-SES community due to reduced access (scheduling the test, the wait period, the test's expense and too much time to do), reduced normative support among other providers in the community for colonoscopy screening, increased perceived patient discomfort, increased cognitive barriers (difficulties in patient understanding the test, too time-consuming and difficult to explain the procedure), more affective barriers (unnecessary patient worry), and increased influence on patient–physician interactions (impact of screening on the relationship, patient openness to a screening recommendation). Physicians in the upper-SES community reported fewer barriers to the test itself (the perceived effectiveness of the procedure to detect CRC and adenomatous polyps, its medical indication and its relative benefits to costs) than providers practicing in the lower-SES community. Both groups reported similarly high yield from the colonoscopy (in identifying neoplasms), little difficulty interpreting colonoscopy results and adequate training in performing colonoscopies.

The results of a stepwise logistic regression (Table 4) revealed that primary care physicians in upper-SES areas were significantly less likely to recommend the home FOBT for routine screening of those age ≥50 than were their counterparts in the lower-SES communities (p=0.04). Conversely, physicians practicing in higher-SES communities were significantly more likely to recommend colonoscopy for routine CRC screening of asymptomatic patients age ≥50 than were physicians practicing in less socioeconomically advantaged communities (lower SES, p=0.02). There were no statistically significant differences in physicians' CRC screening practices using flexible sigmoidoscopy alone or DCBE by geographic community. The two interaction terms were nonorthogonal with the other predictors of CRC screening (via FOBT, flexible sigmoidoscopy, colonoscopy or DCBE) and so were excluded from the final model.

Table 2. Comparison of upper- and lower-SES urban communities on study outcomes of knowledge, attitudes and beliefs, and colorectal cancer screening

	Lower SES[a]	Upper SES[b]	P
	M (SD) %	M (SD) %	
Knowledge of colorectal cancer risk factors[c]	3.02 (0.99)	3.18 (0.80)	0.17
Barriers to fecal occult blood test (FOBT)[d]	13.66 (2.74)	14.14 (2.11)	0.13
Barriers to flexible sigmoidoscopy[e]	15.75 (6.63)	16.26 (4.32)	0.49
Barriers to colonoscopy[f]	18.86 (2.74)	16.31 (3.46)	<0.00001
Barriers to double-contrast barium enema (DCBE)	0.68 (2.71)	0.67 (2.87)	0.99
Recommend FOBT	81	69	0.04
Recommend flexible sigmoidoscopy	53	37	0.02
Recommend colonoscopy	53	88	<0.00001
Recommend DCBE[g]	2	3	1.00

a: Northern Manhattan and Bronx, NY; b: Upper east and west sides of Manhattan, Murray Hill sections of New York, NY; c: ANOVA with number of answers reported correctly (range 0–5); d: ANOVA with number of barriers to practice of FOBT screening (range 0–18); e: ANOVA with number of barriers to practice of flexible sigmoidoscopy screening; (range 0–23); f: ANOVA with number of barriers to practice of colonoscopy screening (range 5–23); g: ANOVA with number of barriers to practice of DCBE screening (range 0–18)

DISCUSSION

This is the first study to demonstrate interurban differences in physician CRC screening recommendations by communities that differ markedly by SES. Variations in physicians' CRC screening recommendations suggest that, although patients live in close geographic proximity, their access to and experience of medicine is likely to be vastly different.[57]

Table 3. Barriers to screening colonoscopy for asymptomatic patients by upper- and lower-SES urban communities

Barrier	Mean, 95% CI, Lower SES[b]	Mean, 95% CI, Upper SES[c]	P
According to published studies, regular colonoscopy screening effectively detects CRC.	1.11 (1.05–1.17)	1.02 (0.99–1.04)	0.006
Colonoscopy can effectively identify patients with adenomatous polyps.	1.16 (1.09–1.23)	1.04 (0.99–1.08)	0.007
Colonoscopy can effectively identify asymptomatic patients with early CRC.	1.11 (1.05–1.17)	1.02 (0.99– 1.06)	0.018
Colonoscopy is not standard practice in this medical community.	2.59 (2.37–2.80)	3.43 (3.25–3.60)	<0.0001
Colonoscopy is not medically indicated.	3.51 (3.37–3.64)	3.70 (3.59–3.82)	0.031
There is a low yield from this test.	3.54 (3.40–3.68)	3.46 (3.29–3.62)	0.439
This test is too expensive for the patients in my practice.	2.57 (2.39–2.76)	3.23 (3.07–3.39)	<0.0001
Patients experience too much discomfort from colonoscopies.	2.41 (2.25–2.56)	2.98 (2.82–3.13)	<0.00001
Colonoscopy takes too much time to explain.	3.50 (3.36–3.63)	3.79 (3.69–3.89)	0.001
Colonoscopy takes too much time to do.	3.39 (3.22–3.56)	3.64 (3.49–3.79)	0.032
Patients are not receptive to my recommendation for colonoscopy.	2.74 (2.55–2.92)	3.13 (2.97–3.29)	0.001
I am concerned about the impact of normal findings on the physician–patient relationship.	3.85 (3.77– 3.93)	4.21 (3.74–4.69)	0.116
I am concerned about the general impact of colonoscopy screening on the physician–patient relationship.	3.83 (3.75–3.91)	3.99 (3.98–4.01)	<0.0001
Colonoscopy is too difficult to explain.	3.63 (3.51–3.75)	3.90 (3.82–3.97)	<0.0001
Colonoscopy is too difficult for the patients in this practice to understand.	3.56 (3.42–3.69)	3.83 (3.73–3.92)	0.002
The benefits of colonoscopy screening in this practice outweigh the costs of screening.	1.93 (1.75–2.11)	1.56 (1.41–1.71)	0.002
I am concerned that colonoscopy causes unnecessary worry for patients.	3.40 (3.24–3.56)	3.62 (3.50–3.75)	0.029
The risk of false positives is too great.	3.86 (3.79–3.92)	3.92 (3.87–3.97)	0.194
I often have difficulty interpreting results.	3.87 (3.78–3.96)	3.96 (3.92–3.99)	0.083
I have not been adequately trained to perform colonoscopies.	1.25 (1.13–1.38)	1.27 (1.07– 1.47)	0.902
I am concerned about the risks involved in performing colonoscopies, such as perforations.	2.54 (2.37–2.72)	2.77 (2.59–2.95)	0.074
The waiting period for an appointment is too long.	2.80 (2.60–2.99)	3.58 (3.45–3.72)	<0.0001
Patients have difficulty scheduling appointments for screening colonoscopy.	2.79 (2.60– 2.99)	3.61 (3.47–3.74)	<0.0001

CI: confidence intervals; a: Likert scale from 1–4, 1= strongly agree; b: Northern Manhattan, South Bronx; c: Upper east and west sides of Manhattan, Murray Hill; Cronbach's α=0.80

Recommendations for screening with the FOBT were relatively common, even in the underserved urban areas described with these findings, yet they are below physician rates nationally (94%).[25] Physician recommendations for flexible sigmoidoscopy are also below average national rates (73%).[25] When we compared barriers to CRC screening recommendations between the two communities to explore these findings more fully, we found that providers in the lower-SES communities reported the time necessary to explain FOBT for patient understanding as a significant impediment. Reported barriers to sigmoidoscopy recommendations in the lower-SES neighborhoods paralleled those listed previously for colonoscopy, including increased patient worry, reduced access, reduced normative support, increased perceived patient discomfort, increased cognitive barriers and increased influence on patient–physician interactions (data not displayed). Importantly, a primary barrier to recommending sigmoidoscopy in lower-SES communities was inadequate training in the procedure (data not displayed), suggesting the use of trained nurse and physician assistant endoscopists in testing.[58,59] By contrast, in upper-SES communities, the primary barriers to both FOBT and sigmoidoscopy involved the perceived characteristics of the two tests such as their low yield, limited effectiveness and unfavorable cost to benefit ratios for screening (data not displayed), suggesting that participating primary care physicians view these two tests as suboptimal CRC screening approaches for their patients. Given the numerous barriers to both FOBT and sigmoidoscopy in lower-SES communities, the perceived superior effectiveness of colonoscopy by physicians in upper-SES neighborhoods, and the emerging dominance of colonoscopy as the preferred screening approach for CRC both city- and nationwide, FOBT and sigmoidoscopy may have been supplanted by colonoscopy for CRC screening, as discussed next.

The rates of recommending screening colonoscopy to asymptomatic individuals in the communities with higher SES are almost twice the average national rates of 42%;[25] rates in the communities with lower SES are comparable to population-based findings from the last five years of the National Health Interview Survey.[29] Both the findings from this study and results from the National Health Interview Survey may reflect several national trends toward recommending colonoscopy rather than other evidence-based forms of CRC screening, as suggested previously. The trend toward colonoscopy for CRC screening is itself influenced by media attention, endorsement of colonoscopy by the American College of Gastroenterology as the preferred screening approach, the greater profitability of colonoscopy relative to sigmoidoscopy, with reimbursement by Medicare extended to screening colonoscopy during the time of this study.[29,60-62] At the local level, in 2003, during data collection for this study, the New York City Department of Health began to promote colonoscopy as the preferred CRC screening approach.[63] Together, these influences have encouraged an increase in colonoscopy as the primary screening test, even in communities of lower SES, as revealed in this study.

Colonoscopy is becoming the dominant screening approach to CRC in the United States, with considerable implications for public health in the United States.[29] Colonoscopy is an expensive, invasive, relatively time-consuming test that currently is done by a physician.[29] This study found that physician-reported access, and normative and affective barriers to endoscopy in lower-SES communities were considerable. Further, there is some evidence that patients (particularly those concerned with the costs of the procedure) may prefer FOBTs to endoscopies.[64-67] Findings on CRC screening by gender from the National Health Interview Survey in 1987, 1992, 1998, 2000 and 2003 identified socioeconomic disparities in CRC screening by educational attainment, household income, health insurance coverage and having a usual source of care.[29] Even assuming that capacity exists to perform screening colonoscopy for

Table 4. Logistic regression analysis of the effect of upper- and lower-SES urban communities on colorectal cancer screening

	Upper- or Lower-SES Community			
	Wald	**OR**	**95% CI**	**P[a]**
Fecal occult blood test (FOBT) screening[b,c]	4.17	2.71	1.04–7.06	0.04
Flexible sigmoidoscopy screening[b,d,e]	2.16	1.81	0.82–3.99	0.14
Colonoscopy screening[b,f,g]	5.72	0.29	0.11–0.80	0.02
Double-contrast barium enema screening (DCBE)[b,h,i]	0.20	0.62	0.08–5.06	0.65

a: Two sided; b: Adjusted for number of knowledge questions answered correctly, number of patient contacts per week, whether physician is salaried or not, whether physician has admitting privileges or not, non-Hispanic white race of physician, number of years in medical practice, whether attended U.S. medical school. Interaction terms were nonorthogonal to the other predictors so were excluded from the analysis; c: Adjusted for attitudes/beliefs toward FOBT screening in number of barriers; d: Adjusted for attitudes/beliefs toward flexible sigmoidoscopy screening in number of barriers; e: Adjusted for whether flexible sigmoidoscopy performed in the physicians' office; f: Adjusted for attitudes/beliefs toward colonoscopy screening in number of barriers; g: Adjusted for whether colonoscopy performed in the physicians' office; h: Adjusted for attitudes/beliefs toward DCBE screening in number of barriers; i: N=11

every age-eligible person at recommended frequency at the national level,[29,68,69] promotion of colonoscopy as the "preferred" CRC screening test may widen socioeconomic disparities.[29] The supply of gastroenterologists is uneven; these specialists are particularly scarce in low-SES communities.[47] These several barriers to screening could be addressed by increased patient informed choice about the several evidence-based CRC screening tests, increased training of mid-level providers in endoscopy (as suggested previously), and policies and reimbursement approaches that encourage a more equitable distribution of gastroenterologists among high- and low-SES communities. Reliance on colonoscopy alone seems insufficient for high participation in CRC screenings at a population level.[29] Within low-SES urban settings, preferred colonoscopy recommendations could increase CRC risks where CRC mortality is already high.

Patient and physician preferences may influence the selection of the colonoscopy over other tests, highlighting the importance of education and decision assistance for *both*. Some studies have found that decision aids (particularly computerized) or patient educational videos[70] can facilitate shared decision-making around the choice of screening test[71] by explicitly balancing the aims of more aggressive approaches (such as colonoscopy) to detect every lesion with the availability, cost, safety and quality trade-offs of less aggressive approaches of FOBT and flexible sigmoidoscopy. Physician-directed intervention approaches, such as academic detailing (using a brief, repeated in-office cancer screening message)[72] and performance feedback[73,74] have also been influential on increasing cancer screening behavior.

Interpretation of the study's findings are subject to several constraints. As a cross-sectional observational study, we cannot determine causal effects. While the urban neighborhoods examined in this study are unique by their location in the New York metropolitan area[37] and generalizability is perforce limited, many urban centers across the United States (and internationally, for example[75]) have similar enclaves of diverse subgroups with similar socioeconomic characteristics living in close proximity to one another, offering opportunities for replication. The definition of neighborhoods by ZIP codes, while conventional in studies of this type, may not capture the perceived demarcations of neighborhoods from the perspective of local residents, thus obscuring the mechanisms through which screening practices may be affected. To encourage replication of the study's findings, there is a need to develop reliable and valid measures of relevant area characteristics that can be obtained systematically from across varied physician practice communities. The self-report findings are likely to overestimate the uptake of screening by patients;[76] it is unlikely that the physicians would differ in their reporting behavior by community, however.

The study's findings suggest that physician CRC screening practice patterns vary by the SES of their surrounding urban neighborhoods. To increase the uptake of CRC screening, community and policy interventions should be tailored to the socioeconomic and medical structure characteristics of specific neighborhoods, including the supply of testing resources, and to the local pactice patterns.

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