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Gender differences in colorectal cancer screening barriers and information needs[1]

Greta Friedemann-Sánchez PhD,*† Joan M. Griffin PhD*† and Melissa R. Partin PhD*†‡

*Investigator at the Center for Chronic Disease Outcomes Research, Minneapolis VA Medical Center, Minneapolis, MN, †Assistant Professor of Medicine, University of Minnesota, Minneapolis, MN and ‡Associate Director at the Center for Chronic Disease Outcomes Research, Minneapolis VA Medical Center, Minneapolis, MN, USA

Correspondence
Greta Friedemann-Sánchez
Center for Chronic Disease Outcomes Research
VA Medical Center
One Veterans Drive (#1110)
Minneapolis
MN 55417
USA
E-mail: greta.friedemann-sanchez@med.va.gov

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Abstract

Context Several prior studies have found that women are less likely to be screened for colorectal cancer (CRC) than men. While the source of this screening differential is unknown, recent studies suggest gender differences in barriers to screening might explain the disparity.

Objective This formative study was designed to explore CRC screening barriers, attitudes and preferences by gender.

Methodology Focus group interviews with groups stratified by gender and screening status. Participants included 27 females and 43 males between the ages of 50 and 75 years who receive primary care at the Minneapolis VA Medical Center. We conducted interpretive and grounded text analysis of semi-structured focus group interviews to assess how knowledge, experiences and sociocultural norms shape female and male preferences and barriers to current CRC screening guidelines.

Results Female and male participants reported similar preferences for CRC screening mode, but there were notable differences in the barriers and facilitators to screening. Key findings suggest that women viewed the preparation for endoscopic procedures as a major barrier to screening while men did not; women and men expressed different fears and information preferences regarding endoscopic procedures; and women perceive CRC as a male disease thus feeling less vulnerable to CRC. Gender-specific barriers may explain women's lower rate of screening for CRC.

Conclusion Colorectal cancer screening promotion interventions, decision aids and clinical practice may benefit by being tailored by gender.

Introduction

Colorectal cancer (CRC) is the third most common cancer and the third leading cause of cancer death among both women and men in the United States.[1] Various screening modalities have been found to reduce CRC mortality.[2–4] Current screening guidelines recommend that women and men age 50 years and older have either a Fecal Occult Blood Test (FOBT) annually, sigmoidoscopy or Double Contrast Barium Enema (DCBE) every 5 years, colonos-

copy every 10 years or a combination of annual FOBT and sigmoidoscopy every 5 years.[5,6] Unfortunately, the US population-based surveys indicate that current CRC screening rates are much lower than optimal. At most 45% of those recommended for screening have ever had an FOBT, sigmoidoscopy or colonoscopy.[5,7] Among individuals who have ever had an FOBT, $<25\%$ report receiving this test annually, as recommended.[5] Gender differences in screening rates have been documented in several studies.[8–19] For instance, three recent studies based on national surveys examining overall CRC screening compliance found rates to be 7–9% lower among women.[10,12] Evidence regarding gender differences in FOBT adherence in the US is somewhat equivocal; some population-based studies document rates of 1–4% higher among women[13,14,18] and others document rates of 1–3% lower.[12,18] However, population-based studies examining use of sigmoidoscopy and colonoscopy have generally found that women are less likely to complete these procedures, with rates 4–21% lower among women).[12,14–17,19] Current data from the United States Veterans Health Administration (VHA) also suggest that women are less likely than men to be compliant with CRC screening guidelines (69% vs. 73%, respectively).[20]

Very little evidence exists regarding the determinants of these gender differences in CRC screening behaviour. Furthermore, studies that compare barriers to screening by gender are scant due to either including only women in samples[21] or not conducting a gendered analysis despite having adequate samples of both men and women.[22] One exception includes a recent study by Brawarsky *et al*. which found that, while women and men were equally likely to receive a recommendation to undergo CRC screening, men were significantly more likely than women to complete the test, suggesting that the gender gap may be due to variation in patient-level barriers.[11]

This qualitative formative study was designed to explore this issue further by generating new information and hypotheses. We specifically sought to attain a range of attitudes and beliefs on CRC screening and to determine whether female and male individuals have different preferences, barriers and facilitators related to screening for CRC.

Because no prior research has identified and described gendered barriers, attitudes, beliefs and information needs in the area of CRC screening, we used grounded[23,24] and interpretive[25] text analysis of focus group interviews.

Methods

Design

In this study, we used focus group methodology to gain an understanding of the range of attitudes, beliefs and preferences about CRC and CRC screening in our target population. Eligible patients included women and men between the ages 50 and 75 who had used primary care services at the Minneapolis VHA Medical Center within the previous 2 years. A sex-stratified random sample of eligible patients was used to assure adequate representation of women, who are a relatively small proportion of the target population (5%).[26] Ten focus groups, composed of six to eight individuals each were completed. Four female and six male focus groups were distributed as follows: two groups each of screened and unscreened females and three groups each of screened and unscreened males were recruited. Individuals were classified as screened if their VHA medical record indicated they had ever been screened by one or more of the four CRC screening modes. Age, gender, screening status and race information on all participants was obtained from the VHA database from which we drew our sample. We stratified by screening status to make sure we adequately captured the views of unscreened individuals, who represented a smaller fraction of our target population (approximately 36%), as prior research suggests the views of screened and unscreened individuals might differ in important ways. However, because we found that the *range* of views expressed by participants did not differ by screening status, we do not present results separately by screening status in this study.

Study site

Focus groups were conducted between September and December 2004 at the Minneapolis VA Medical Center. This medical centre is one of the largest hospitals in a nationwide health-care network that treats US veterans. Because of the criteria for receiving services, the majority of veterans treated at VHA facilities are low income. Nationally, >95% of patients receiving care at VHA facilities are male, the majority (64%) are currently complaint with CRC screening guidelines, and the mean age is approximately 65 years. While racial mix varies considerably across VHA facilities, at the Minneapolis facility, the majority (approximately 90%) are Caucasian. The Medical Center's Institutional Review Board approved the study protocol.

Participants

A list of all eligible participants was generated and 254 women and 150 men were randomly chosen to receive a letter stating they might be contacted by telephone and invited to participate in a CRC discussion group. Recruitment calls ceased when the limit of eight per group was achieved. For women we made 57 attempted contacts, 34 agreed to participate and 27 attended. For men, 104 were called, 52 agreed to participate and 43 attended (Table 1). Participants gave informed consent and received a $30 incentive.

Data collection

To reduce potential anxiety about discussing private matters, we maintained sex concordance between participants and facilitators. The first author facilitated the female groups and one expert consultant in focus group methodology facilitated the male groups. After introductions and questions about general knowledge, familiarity and experiences with CRC and CRC screening, a short verbal presentation with visual aids was given summarizing key information about the FOBT, flexible sigmoidoscopy, DCBE and colonoscopy. The aim of this presentation was to create a level field of basic knowledge for all participants. The presentation included information about the mechanics, reliability, recommended frequency, preparation requirements, possible complications, recommended follow-up diagnostics and test reliability. A table with the same information was also distributed (Table 2). Mode-specific attitudes, beliefs, experiences and preferences were then discussed. Participants were also asked to compare and contrast CRC screening with other cancer screening tests (e.g. PSA, pap smear and mammography). To insure reliability of qualitative results,[27] the semi-structured interview guide and parameters for its consistent use within- and across-groups (see Table 3) were designed in consensus by the team and focus group facilitator of the male groups. Team members debriefed after each interview and field notes from those sessions informed the text analysis. The audiotaped sessions were transcribed by an independent professional.

Table 1 Demographic information on focus group participants available in VHA database

	Female $n = 27$ (%)	Male $n = 43$ (%)	All $n = 70$ (%)
Age (years)			
Mean	58.2	62.0	61.1
Range	50–74	50–78	50–78
Race/ethnicity			
White	24 (88.9)	30 (69.8)	54 (77.1)
African-American	1 (3.7)	13 (30.2)	14 (20.0)
Hispanic	1 (3.7)	0 (0)	1 (1.4)
Asian	1 (3.7)	0 (0)	1 (1.4)
Screening status			
Screened	13 (48.1)	24 (55.8)	37 (52.9)
White	13 (48.1)	16 (37.2)	29 (78.4)
African-American	0 (0)	8 (18.6)	8 (21.6)
Hispanic	0 (0)	0 (0)	0 (0)
Asian	0 (0)	0 (0)	0 (0)
Unscreened	14 (51.9)	19 (44.2)	33 (47.1)
White	11 (40.7)	14 (32.6)	25 (75.8)
African-American	1 (3.7)	5 (11.6)	6 (18.2)
Hispanic	1 (3.7)	0 (0)	1 (3.0)
Asian	1 (3.7)	0 (0)	1 (3.0)
Total	27 (100)	43 (100)	70 (100)

Table 2 Screening tests for colorectal cancer

	Stool test (FOBT)	Flexible sigmoidoscopy 'flex sig'
What is this test?	The patient puts a small piece of stool on a test card. You do this for three bowel movements in a row and then return the cards to the doctor or lab. The samples are checked for blood, and if blood is found, it may mean there are polyps in the colon or rectum.	A doctor inserts a short, thin, flexible tube with a camera on the end into the rectum and looks for polyps in the rectum and lower third of the colon.
Where is it done?	At home	In a hospital or clinic.
How often is it done?	Every year	Every 5 years
What kind of preparation is there?	Certain foods (such as red meat) should not be eaten for approximately 3 days before the samples are taken.	Patients usually need to clean out the rectum and colon by using a laxative the night before and an enema the morning of the examination.
Are there any possible complications?	No	Complications are rare but some possibilities are: infection and small tears in the colon.
What happens if polyps are found?	If blood is found in the stool, a colonoscopy should be done to see if there are polyps in the colon or rectum.	A biopsy can be done If the biopsy shows a cancerous polyp, a colonoscopy must be done to remove the polyps.
How good is this test at finding cancer?	This test can show signs or symptoms of cancer, but cannot be used to find cancer. Also, many polyps do not bleed and, because of that, this test may show a false-negative result.	This test can find polyps in the rectum and lower part of the colon, and samples of the polyps can be taken, but it cannot detect polyps in upper parts of the colon.
	DCBE	Colonoscopy
What is this test?	This is an X-ray of the colon (but not the rectum). You are first given an enema with a liquid called barium. The doctor then takes an X-ray. The barium makes it easy for the doctor to see the outline of the colon on the X-ray to check for polyps.	A doctor inserts a long, thin flexible lighted tube into the rectum and the entire colon. The tube has a camera on the end to check for polyps. During this procedure, doctors can both find and remove polyps.
Where is it done?	In a hospital or clinic.	In a hospital or clinic
How often is it done?	Every 5–10 years.	Every 10 years. If polyps have been found previously, the test may be done more frequently.
What kind of preparation is there?	Patients need to clean out the rectum and colon completely for 1–3 days before the examination by taking special medicine or enemas. Patients cannot eat or drink anything for at least 1 day before and morning of the examination.	Patients need to clean out the rectum and colon completely for 1–3 days before the examination by taking special medicine or enemas. Patients cannot eat or drink anything for at least 1 day before and morning of the examination. During the examination patients are given medicine through a vein to sedate them (make them go to sleep).

Table 2 Continued

	Stool test (FOBT)	Flexible sigmoidoscopy 'flex sig'
Are there any possible complications?	Complications are rare but some possibilities are: infections, small tears in the colon, bleeding, fever and difficulty having a bowel movement.	Complications are rare but some possibilities are: infections and small tears in the colon.
What happens if polyps are found?	Samples of polyps cannot be taken A colonoscopy must be done to remove the polyps.	If polyps are found during the procedure, they are removed.
How good is this test at finding cancer?	This test can find polyps in the colon, but samples cannot be taken. This test may miss small polyps and sometimes even small cancers.	This test can find and remove polyps throughout the entire colon and rectum.

DCBE, Double Contrast Barium Enema; FOBT, Fecal Occult Blood Test.

Analysis

Standard practice in qualitative research is to code the data several times,[25,27] as coding is analysis.[27] Our grounded[23,24] and interpretive text analysis[25] was conducted in a two-stage process utilizing open (inductive) coding, standard for formative non-confirmatory studies.[28] The first objective of the first stage was to understand results within groups and of the second, known as pattern coding,[27] to contrast and compare results by gender between groups. The analytical categories stem from the content areas of the study, which were arrived at by consensus (Table 3). We employed mnemonic coding, which are words that summarize the concept being coded,[25] following the conceptual domains scripted in the guide[27] (see Table 3). As the analytical categories were pre-established, this coding was for the most part descriptive. The second analytical stage was grounded and interpretive. Two simultaneous analytical tasks took place for all transcripts, leading to a contrast and compare analysis:[27] coding with *in vivo* codes,[25] i.e. using participants' own analytical categories which were not pre-established as conceptual areas (Table 3), and memo-writing.[23,27] The latter are the analytical processes of building relationships among categories and conceptual clusters, which allows the researcher to formulate hypotheses and theoretical models. We used ATLAS.TI software for data management.[29]

Results

Here, we present gender difference findings in the following content areas: barriers to each mode, preferred mode and CRC screening knowledge and information needs.

Views on FOBT and DCBE were similar by gender, therefore, we focused much of our analyses on the endoscopic procedures reflecting participants' intensity and interest, which was quickly turned towards discussing colonoscopy and sigmoidoscopy. Our identification of themes or patterns of behaviour is not confirmatory, as this study was formative. The selected quotes chosen to illustrate results come from a variety of individuals and are balanced across groups.

Barriers and facilitators by mode

FOBT

Female and male participants expressed some similar attitudes towards FOBT screening, including the advantage of non-invasiveness and the disadvantages of the perceived dietary restrictions and collection process being disgusting, frustrating and confusing. Additionally, while most men stated that the FOBT test was convenient because it does not require time-off of work, some expressed concerns about obtaining the necessary privacy to collect the samples or discomfort at sending the kit through the mail. By contrast, most women stated that sending it by

Table 3 Examples of questions from the focus group discussion guide and codes

Domains	Sample questions	Mnemonic codes	*In vivo* codes
CRC knowledge	What have you heard or read about colorectal cancer? Do you know any one who has CRC?	CRC knowledge – family CRC knowledge – friends CRC knowledge – media CRC no knowledge	TV personality who had a televised colonoscopy
CRC screening knowledge	Have you heard or read anything about tests for colorectal cancer?	No knowledge Doctor recommendation FOBT test card	Butt scope Unused card stored
Mode-specific attitudes and beliefs, mode-specific barriers and facilitators	What do you like and what do not you like about… (specific mode)?	Barrier – embarrassment Barrier – fear Barrier – pain Barrier – no provider recommendation Barrier – disgust Barrier – invasive Barrier – frequency Facilitators – provider recommendation Facilitator – sedative Facilitator – effectiveness Facilitator – frequency	Anxiety Dirty Not feminine Being looked at Virginity Pain Fear Information need mental – preparation Information needs what to expect Information need to lessen anxiety Information need – pain Information need – no information better
Mode preference; barriers to least preferred and facilitators to most preferred mode	Which test would be your favourite and least favourite and why?	Same as previous	Full test Partial test Easy test Less invasive Anxiety Pain Be sedated
Gender-specific cancer screening behaviour	(For women only) Women do not get tested as much for colorectal cancer as men do. Why do you think that is?	Breast Cervical	Information need – cancer Information need – timing Information need – prevalence Have pictures of procedure Menopause

FOBT, Fecal Occult Blood Test.

mail was a facilitator by sidestepping the embarrassment of handling the stool sample in public view at a clinic.

> [Unscreened Female participant] It is kind of embarrassing handling it [FOBT] to the doctor, this way it goes through the mail, it is more discrete.
>
> [Screened Male participant] You are probably ashamed to put it in the mail.

Double Contrast Barium Enema

Most of the women and men who participated in this study perceived the DCBE as outdated, voiced concerns about ensuing constipation, and expressed fear and embarrassment associated with not being able to hold the barium.

> [Screened female participant] I do not think I can take the pressure. They shoot this barium in, I can't hang on to it. [Unscreened female participant] It's going to cause constipation, even blockage.
>
> [Screened male participant] I guess you are living in fear of making a hell of a mess. If I don't hold this [the enema], I have a mess on my hands and I am going to be standing here looking stupid. [Unscreened male participant] Doesn't that seem to be kind of outdated? That is the feeling I get.

Additionally, all participants who had undergone the DCBE procedure stated it was painful. When asked what they liked about the DCBE, some men characterized it as less invasive than endoscopies, whereas most women reported no advantages to the DCBE, and did not find the procedure less invasive than endoscopies.

Sigmoidoscopy and colonoscopy

Our findings suggest gender differences in the perceived degree and nature of invasiveness associated with sigmoidoscopy and colonoscopy. The majority of women participants viewed both procedures as equally invasive. The majority of men perceived the sigmoidoscopy as less invasive than the colonoscopy. Men described degrees of invasiveness relative to how far the scope enters and how much potential damage can occur. By contrast, invasiveness for women had a physical as well as an affective component. Some women voiced feeling exposed during the procedures because they are lying down, partially unclothed, and doctors might 'look' at their bodies. Thus, for the majority of women the physical discomfort involved appeared secondary to affective concerns about exposure. By contrast, only a few men in the study talked about emotional exposure and most emphasized the physical invasiveness. Pain was foremost in the majority of men's minds, vulnerability in women's.

> [Screened female participant] I think another part of the fear and anxiety for women is exposure. You think that the doctors are going to be 'looking' at your body [emphasis made by participant]. You don't want to be laying there naked, and have your body exposed for the whole world to see. [Unscreened female participants] I am an anxious person. That's one of the reasons I haven't done it, because you're in an embarrassing position. [Second participant] I am very anxious about things like that.
>
> [Screened male participants] I was in there screaming and hollering and trying to jump up and down. They held me down. I didn't like it. It hurt a little bit. It was painful… [Second participant] I thought that was awful rough. Just ram. Painful. [Third participant] That thing that they blow up is very, very painful. They've got to make that more acceptable.

Having a sedative available appealed to both women and men, but for different reasons. Most men in the study liked sedatives for pain relief. By contrast, most women wanted sedatives in order to relieve fears, anxiety and feelings of vulnerability and exposure. While some women did cite pain relief, the perceived advantages were associated more with affective than physical barriers. Several female participants changed their minds regarding their preferred screening mode when they grasped, thanks to group interaction and despite having been previously briefed, that a sedative is given with the colonoscopy.

> [Unscreened female participant] I would need something to relax me to go in and get a colonoscopy or a sigmoidoscopy. I would definitely need something to help me. [Second unscreened female participant] After hearing that you could be on sedation for the colonoscopy changed my mind. Next time I'll get a butt scope. [Third unscreened female participant] I was totally unaware that you could have something to help you relax.

[Unscreened male participant] I would rather be out [sedated] … [so] I don't feel pain. You give me a shot, I will do it. [Second unscreened male participant] The flex sig is my least favorite because of the pain, you are not sedated and it cannot detect polyps in the upper part of the colon.

While most women and men participants expressed anxiety because of 'stories that go around' regarding colonoscopy, the strategies each voiced to relieve it were different. Information needs, not a pre-established conceptual domain in the interview guide, surfaced as a new domain during discussions. While some men stated that too much information is not always good, most women agreed that the more information they have ahead of time and during the procedure, the easier the test becomes and the more likely they are to repeat it.

[Screened female participant] It would have helped me relax to have a nurse explain exactly what is going to happen step by step. This is exactly where [the scope] is going to go, this is how it is going to feel … Relaxation is important otherwise the procedure is traumatizing and is not something you are going to repeat. [Second screened female participant] … and to have the reassurance that what is going on is part of the normal procedure. [Unscreened female participant] A barrier is the fear of the unknown. The more I know ahead of time what's going to happen, I can process it intellectually, and then I bite the bullet. [Second unscreened female participant] I would like to have the whole procedure explained and know what to expect.

[Unscreened male participant] Sometimes too much information is not a good thing. It scares them. They will do the reverse. They will rabbit. They will run. [Second unscreened male participant]You don't have to go into great depth of what you are going to do, so much as you need to impress the importance of the test: Do you like living? [Screened male participants] I didn't know the whole process but once I arrived you are into the party and then you go there no matter what it is. But if you explain it to another individual, he will back away just like anything else. [Second screened male participant] I would say to men, 'man, getting the test its nothing.

The majority of women participants who had experienced endoscopic screening described the preparation procedures as a major barrier to screening. Because patients were not arriving adequately prepared, the Minneapolis VA facility has required that the preparation for sigmoidoscopy and colonoscopy be the same. Both women and men said it is difficult to restrict the diet prior to the test. While some men said it is difficult to drink the preparatory laxative, this appeared to be a major barrier for women in this study. About half of female participants stated that the amount of laxative is excessive and questioned why a woman weighing 100 pounds needs to drink the same amount as a 300 pounds man. They perceived the preparation as abusive and unreasonable; the amounts of laxative made them gag, feel nauseous and vomit. Some women, but no men, mentioned that restricting medication prior to the test is difficult.

[First screened female participant] The test itself is very simple. It's the prep that's a bitch. [Second screened female participant] There is no way I am doing this. It's too abusive. [Third screened female participant] I think they were designed for men. [Unscreened female participant] Women do not need as much of a prep as men. Women are usually smaller in stature … the preps could be cut by half.

Preferred screening mode

The majority of women and men reported being less likely to complete the FOBT than other screening modes despite provider recommendation. Of 70 participants, only two (one male, one female) routinely completed yearly FOBTs. Several participants said they had been given the test kit but had not completed it.

[Unscreened Female participant] I am asked every time I have my physical if am I ready to do that [colonoscopy] and I always say 'No' [so they give me an FOBT kit] and then I take the little packet they give you and I put it under my sink.

[Unscreened male participants] Primary care suggested it [FOBT] and gave me one [FOBT kit]. I went home and I didn't think I had a problem with it so I put it in the cupboard and there it sits. I never did it. [Second participant] That is the way mine is too.

In all groups and regardless of gender, the discussion quickly centred on colonoscopy and its comparison with sigmoidoscopy. Most participants, women and men alike, regarded the sigmoidoscopy as a 'partial' test and the colonoscopy as a 'complete' test. Participants in all focus groups preferred colonoscopy over all other screening modes. The majority of the participants considered DCBE obsolete.

> [Screened female participants] Why even bother with the barium or with the sigmoidoscopy? Why not have just the colonoscopy? The sigmoidoscopy is only partial. [Second participant] I would like the colonoscopy because I'd rather do the whole thing at once, because I would want to see everything.

> [Unscreened female participant] The colonoscopy is complete and you do not have to go though a scheduled test again.

> [Screened male participants] All the procedures, except the stool test, require the same amount of preparation and the same amount of time, so why not go for the touchdown with the colonoscopy. It makes more sense for the doctor to go up and if he finds a problem, correct it then rather than have to go again and correct it at a future date. [Second participant] They don't call it a silent killer for nothing. Do the colonoscopy and find out if you have something. [Unscreened male participant] Colonoscopy because if they find polyps they can get rid of them.

Knowledge about CRC and CRC screening

Some study participants voiced having a relative with CRC. The majority of women perceived CRC as a male disease. Only the group of screened women with the highest numbers of nurses (three) and exposure to endoscopic screenings did not mention CRC as a male disease.

> [Unscreened female participant] You can obviously look up the statistics and base your judgment on the most number of deaths, it is all categorized. Colorectal cancer deaths are higher for males than females.

Some participants stated that this belief is reinforced by the emphasis placed on reproductive organ cancers for women. In addition, women said that by the time they are 50 years old, in addition to breast and cervical cancer, health concerns shift to menopause.

> [Unscreened female participants] I think [the need for pap smear and mammography] is talked about more in the media and in the medical profession. [They remind you] how often you should be going in for them, but nothing is never really directed towards women about getting a colonoscopy… [Second participant] Breast and cervical cancer are women's issues. Women's diseases and colorectal cancer are not the same.

> [Screened female participants] We're more focused on menopause, and we just totally ignore our colons. It's our menopause changes, our hot flashes, our periods, and how frequent they become, or don't. PR-wise, this is what we're all talking about: breast cancer and menopause [Second participant, our emphasis] [Breast and cervical cancer screening] are just a natural part of having a physical exam.

Many women in the study voiced the need of being informed of CRC screening guidelines and options at an earlier age rather than at the time of the first screening. In particular, they stressed needing the information in the context of other preventive care examinations, which include pap smears and mammograms. Men did not express a parallel need.

> [Screened female participant] What if the information is put out at the same time as you are due for a mammogram or a pap smear so women get used to it.

> [Unscreened female participants] Say to us [during a regular appointment] 'in three years we need to look at this'. [Second participant] Prepare us psychologically.

Discussion and conclusion

Our findings enhance the general understanding of mode-specific barriers, facilitators and information needs to CRC screening among patients who have been presented with mode-specific screening information. These results suggest that, while men and women in this study expressed similar CRC screening mode preferences, they also reported several notable differences in screening barriers and facilitators. The

most important gender differences in barriers include: (i) women viewed the preparation required for endoscopic procedures as a major barrier to screening, (ii) women and men expressed different fears and information preferences regarding endoscopic procedures and (iii) women who perceived CRC as a male disease felt less susceptible to CRC, possibly due to the emphasis on reproductive health over women's lifetime. Women articulated that their fears were predominantly affective while men voiced that theirs were predominantly physical. Both expressed different information needs as a strategy to overcome their fears. Women's strategy included having more information in both quantity and detail regarding the procedures before and during the procedures. Men in this study expressed preferences for having little or no information about screening tests. As susceptibility and fears have both been associated with CRC screening behaviour in prior studies,[30] these differences by gender may explain part of the gender gap in screening rates. That endoscopic preparation is a more significant barrier for women than men has not, to our knowledge, been documented in prior research. The breadth and depth of detail offered by women may be due to the presence of nurses in the sample. Their knowledge of alternative lower volume laxatives may have made the discussion on this particular barrier more extensive and precise. As this barrier was only expressed by those with prior endoscopic experience; however, it is likely to be more relevant to efforts to promote repeat rather than initiate CRC screening behaviour. However, the use of high volume laxative for endoscopic preparations might be specific to the Minneapolis VA setting. Thus, such barrier to screening might only generalize to those facilities using this type of laxative.

To our knowledge, only three previous studies have examined gender differences in CRC screening barriers: (i) Brawarsky *et al*. who found no gender-based disparities in doctor's recommendations for CRC screening;[11] (ii) Farraye *et al*. who found that women reported more embarrassment and fear about having a sigmoidoscopy and were more concerned about the gender of the endoscopist than men and[31] (iii) Wardle *et al*. who also found women to have more attitudinal barriers to flexible sigmoidoscopy.[32] Although we examined barriers by gender for all available CRC screening modes, the main differences detected were related to endoscopic procedures and corroborate the conclusions of Farraye *et al*.[31] that women and men report important differences in attitudes and beliefs about CRC screening. Our findings indicate colonoscopy is the preferred screening modality among both women and men participating in this study. These results differ somewhat from previously published work on screening preferences, which have found that patients prefer CRC screening by colonoscopy and FOBT at nearly equal rates.[33,34] In this study, reasons commonly cited for preferring colonoscopy included accuracy, frequency, the fact that polyps can be removed during the procedure (requiring no further work up) and the availability of sedation, all modified by the expected degree of discomfort.

Our findings also suggest that making distinctions between physical and affective discomfort in future research may improve the precision of measuring mode preferences. While Weinberg *et al*. found pain to be a barrier to women, which differs from our results, they do not disaggregate anxiety due to screening procedures and due to pain, nor do they compare barriers by gender.[21] Aside from participant's perceived accuracy of colonoscopy, these findings are somewhat different from those of Ling *et al*., who found that individuals rank accuracy as the most important element in deciding what mode to use, followed by discomfort, complications, inconvenience, further work up and frequency.[35] Sampling differences in the studies might explain part of the variation. While the study sample analysed by Ling *et al*. was predominantly made up of individuals who had undergone previous CRC screening, our study sample, by design, contained individuals who previously had been screened and those who had not. It is possible that the barriers to screening differ when considered hypothetically as

opposed to based on prior screening experiences. Additionally, subtle differences in the presentation of the different modes during the interviews, including the amount of mode-specific detail and emphasis on risks and benefits might have influenced participants' choices and could account for the differences in preferences observed across studies. Because the preparation for sigmoidoscopy and colonoscopy is the same in our setting, more individuals may have selected colonoscopy as their preferred mode, even though participants were informed that the preparation requirements are different in other settings.

Limitations

First, for the most part, women veterans in this sample appeared to be more homogenous socioeconomically than the male veterans. These differences might be due to the self-selected socioeconomic characteristics of women who entered the armed forces in the age cohort from which we sampled. For instance, none of the women reported living in shared housing with non-relatives while several men did. These socioeconomic differences across gender might explain some of our findings (such as men emphasizing difficulty in getting privacy to complete an FOBT). In addition, the female groups, in particular those screened by endoscopic procedures, included six nurses (22% of female sample). This might explain the level of specificity voiced in the objections to the volume of laxative used to prepare for endoscopic procedures and alternative laxatives.

Another potential limitation of this study is that we cannot verify from our existing resources whether the non-screened participants were offered screening and refused or were not offered screening at all. However, the VHA has CRC screening guidelines in place, expects all eligible patients to be screened for CRC, and has hospital performance measures associated with screening compliance. Hence, there certainly is the expectation that all eligible individuals, regardless of gender, will be offered CRC screening. Furthermore, the fact that none of the study participants, women or men, mentioned lack of a doctor recommendation for screening as a barrier suggests lack of recommendation is not a salient barrier in this population. This finding is consistent with the results of one previous study which found that doctor recommendation did not explain gender differences in screening rates.[11]

Finally, differences in facilitation style by the female and male moderators may have influenced group discussions. However, same sex moderators may have enhanced the quality of discussion as well as by increasing participants' comfort level.

Despite these limitations, our study revealed important gender differences in barriers and information needs to CRC screening. Future research with larger study samples is needed to assess whether the specific barriers found in our study to vary by gender are correlated with CRC screening behaviour and do in fact account for the gender gap in screening rates.

If our hypothesis and formative finding that women and men have different information preferences are confirmed by future qualitative and quantitative research, tailoring future promotion materials, shared decision-making processes, decision aids, interventions and screening practice by gender may be warranted.

Although our findings on preparation required for endoscopies as major barriers to women may be influenced by the fact that preparation is the same for sigmoidoscopies and colonoscopies at the Minneapolis VA and which uses a high volume laxative, clinicians working in facilities that still use high volume laxative might use these findings to tailor by gender endoscopic preparations by offering women the smallest effective volume of laxatives.

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