Participation in a Sigmoidoscopic Colorectal Cancer Screening Program: A Pilot Study

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Abstract

At present, very little is known about the determinants of endoscopic screening participation. This study presents an analysis of the psychosocial associations of participation and nonparticipation in a sigmoidoscopic colorectal cancer screening program. The pilot study was executed among members of a Dutch target group, ages 50–60 years, who visited an internal medicine outpatient clinic. Individuals who were asked to participate in the program (n = 200) received general information with regard to the screening procedure. The participation rate was 45%. Persons who participated in the screening program as well as those who wanted to participate in the study but did not want to participate in the screening program were asked to fill out a questionnaire. Self-efficacy, i.e., the individual's perception of the difficulty of participating in the screening program, appeared to be the most important association of participation. Furthermore, response efficacy, i.e., the individual's beliefs about the outcome of participation, and social support proved to be concepts that were associated with participation.

Introduction

CRC is a major cause of death from cancer in the developed world. The lifetime risk of dying from CRC is approximately 2.6% (1). In the Netherlands, more than 3100 patients die of CRC each year (2). Although several possible extrinsic and intrinsic risk factors for CRC have been identified (3), its exact etiology remains unknown (4). Because of limited insight into aspects of behavior associated with developing CRC, primary prevention has proved to be difficult (5, 6). However, early detection does provide an important tool for implementing secondary prevention (7, 8). Scientific evidence is accumulating to support the effectiveness of population-based screening with fecal occult blood tests and sigmoidoscopy in reducing mortality from CRC (1, 9–16). Currently, there is an increasing need to evaluate whether screening for CRC on a large scale is advisable. At present, little is known about the determinants or associations of CRC screening behaviors (1, 17–19), and very little theory-based research has been done to assess determinants of participation in a sigmoidoscopic CRC screening program. This study attempts to provide some insights into the motivations that people have for their decision to participate or for their decision to refuse participation. The study was executed at the General District and University Hospital of Maastricht (Maastricht, the Netherlands) and focused on sigmoidoscopy as the method of screening for colorectal neoplasia.

Materials and Methods

Participants. Two hundred individuals were asked to take part in the pilot study. These subjects were between 50 and 60 years of age and were visiting internal medicine outpatient clinics for nephrology or general internal medicine at the General District and University Hospital of Maastricht. Exclusion criteria, which were assessed by an internist using the patient’s file and a telephone call, were: (a) known malignancy at the time of invitation; (b) an estimated life expectancy of less than 5 years; (c) having had colonoscopy, sigmoidoscopy, or barium enema in the last 10 years; (d) abdominal complaints or blood in the feces; (e) high risk for sigmoidoscopy (such as obligatory use of anticoagulant drugs); (f) hemostasis defects; (g) need for antibiotic prophylaxis for endoscopic treatment; (h) chronic heart failure (defined as inability to walk up two flights of stairs); and (i) being on hemodialysis.

Recruitment Procedures. Every patient visiting the internal medicine outpatient clinics for nephrology or general internal medicine who met the inclusion criteria was invited to participate. A mailed invitation package was used, which contained an introductory letter that explained the procedures of the study, a booklet with general information on endoscopic screening for colorectal neoplasia, and an answering card. The card presented the invited individuals with three options: (a) participating in the sigmoidoscopy and completing a questionnaire; (b) not participating in the sigmoidoscopy but completing a questionnaire; or (c) not participating in the pilot study at all. If subjects that presented to the screening group. Data were collected that could not be extracted from the patient’s file. The data collection procedures. In the screening group, participants received flexible sigmoidoscopy. Actual participation was confirmed by appointment review. Determinants of participation were assessed within 1–2 weeks before the sigmoidoscopy. Individuals who had indicated that they did not wish to participate in the sigmoidoscopy but were willing to fill in a questionnaire were mailed a questionnaire that was identical to that presented to the screening group. Data were collected between June 1997 and November 1997.

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2 To whom requests for reprints should be addressed, at Department of Health Education and Promotion, University of Maastricht, P. O. Box 616, 6200 MD Maastricht, the Netherlands. Phone: 31433882415; Fax: 31433610755; E-mail: s.kremers@gvo.unimaas.nl.
3 The abbreviations used are: CRC, colorectal cancer; OR, odds ratio; CI, confidence interval.
Short Communication: Participation in Colorectal Cancer Screening Program

Table 1  Results of bivariate comparisons of determinants of participation in a sigmoidoscopic CRC screening program between participants (n = 74) and nonparticipants (n = 57)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Participants</th>
<th>Nonparticipants</th>
<th>Significance test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultimate variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender (n = 131)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>46 (62.2%)</td>
<td>22 (38.3%)</td>
<td>( ^{a} )</td>
</tr>
<tr>
<td>Female</td>
<td>28 (37.7%)</td>
<td>35 (61.7%)</td>
<td></td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>55.3</td>
<td>55.5</td>
<td></td>
</tr>
<tr>
<td>Educational level (n = 126)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>9 (12.5%)</td>
<td>11 (20.4%)</td>
<td>( ^{b} )</td>
</tr>
<tr>
<td>Low to medium</td>
<td>16 (22.2%)</td>
<td>13 (24.1%)</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>26 (36.1%)</td>
<td>17 (31.5%)</td>
<td></td>
</tr>
<tr>
<td>Medium to high</td>
<td>6 (8.3%)</td>
<td>7 (13.0%)</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>15 (20.8%)</td>
<td>6 (11.1%)</td>
<td></td>
</tr>
<tr>
<td>Having a partner (n = 129)</td>
<td>68 (91.9%)</td>
<td>52 (90.9%)</td>
<td></td>
</tr>
<tr>
<td>Distal variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear of CRC (8–32)</td>
<td>13.08</td>
<td>15.66</td>
<td>( ^{b} )</td>
</tr>
<tr>
<td>(SD 5.15)</td>
<td>(SD 6.29)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General self-efficacy (4–20)</td>
<td>15.07</td>
<td>13.55</td>
<td>( ^{b} )</td>
</tr>
<tr>
<td>(SD 3.21)</td>
<td>(SD 3.73)</td>
<td></td>
<td></td>
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<tr>
<td>Proximal variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severity in comparison to other diseases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severity taking progress of science into account</td>
<td>11.03</td>
<td>10.57</td>
<td>( ^{c} )</td>
</tr>
<tr>
<td>(SD 2.07)</td>
<td>(SD 2.09)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response efficacy, certainty of having or not having CRC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response efficacy, better chance of being cured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-efficacy (6–27)</td>
<td>21.23</td>
<td>15.83</td>
<td>( ^{c} )</td>
</tr>
<tr>
<td>(SD 4.08)</td>
<td>(SD 4.59)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informational support</td>
<td>18.9%</td>
<td>5.3%</td>
<td>( ^{b} )</td>
</tr>
<tr>
<td>Practical support</td>
<td>21.6%</td>
<td>7.3%</td>
<td>( ^{b} )</td>
</tr>
<tr>
<td>Emotional support</td>
<td>62.0%</td>
<td>70.9%</td>
<td></td>
</tr>
<tr>
<td>Support by social network</td>
<td>4.1%</td>
<td>5.3%</td>
<td></td>
</tr>
</tbody>
</table>

\(^{a} P < 0.01.\)  
\(^{b} P < 0.05.\)  
\(^{c} P < 0.001.\)  
\(F(20, 131) = 4.56.\)

Questionnaire. A questionnaire developed by Boer (20) assessing the psychosocial determinants of participation in a breast cancer screening program was adapted for CRC. The questionnaire included 39 questions (see “Appendix”).

Based on the theory of triadic influence (21), we distinguished three levels of influence on participation behavior: (a) ultimate factors (in one’s background and environment); (b) distal factors (general sense of self and social competence); and (c) proximal factors (health beliefs, social perceptions, and self-efficacy). Gender, age, having a partner, and educational level were the ultimate causes assessed in the present study. Distal causes assessed in the study were general self-efficacy and fear of CRC. Proximal causes of screening behavior were perceived severity of CRC, perceived susceptibility to CRC, response efficacy, self-efficacy, and social support. The operationalization of the concept of self-efficacy paralleled that of a validated instrument by Vernon et al. (22). This was supplemented by potential salient barriers that could increase the magnitude of the self-efficacy expectations (23). Social influence was operationalized as social support.

Statistical Analyses. The scores on the items within each concept were summed. Cronbach’s \( \alpha \) of each scale was computed to test its reliability. Two types of statistical tests were then applied to the data: (a) bivariate comparisons, using \( z \) tests and \( \chi^2 \) tests, to test significant differences; and (b) logistic regression analyses (24) to find significant contributions of variables in the model to participation behavior. Because the research model assumes that proximal variables directly influence participation behavior, whereas ultimate and distal variables indirectly influence participation behavior, the proximal variables were entered in the equation first, followed by the distal variables and the ultimate variables.

Results

Participants. Of the 200 individuals invited to take part in the sigmoidoscopy screening, 166 (83%) were willing to participate in the sigmoidoscopy screening. Sixteen of these were not included in the pilot study, for example, because they had undergone colectomy surgery. Thus, 74 individuals completed flexible sigmoidoscopy. Another 60 individuals refused to participate in the endoscopic screening but were willing to fill out a questionnaire. Three of them did not return the questionnaire. This means that 74 participants and 57 nonparticipants were analyzed to study the associations of participation.

A certain selection bias might have occurred with regard to the 50 respondents who refused to participate in the study. These persons were compared with those who did participate for gender, age, and health status (hypertension, \( n = 92 \); kidney disease, \( n = 25 \); other problems, \( n = 82 \)). No differences were found with regard to gender and health status. The mean age of the group that refused to participate in the study (56.4 years) was slightly higher than that of the group that did participate in the study (55.4 years; \( P < 0.05 \)).

Associations of Participation. The associations of participation were assessed by comparing the participants in the sigmoidoscopic CRC screening with the nonparticipants. The
scales of general self-efficacy, fear of CRC, susceptibility to CRC, and self-efficacy were found to have an acceptable level of reliability. The scales of perceived severity and response efficacy were not reliable. As a result, each of these separate items was used in the analysis. Table 1 shows the results of the bivariate comparisons of participants and nonparticipants.

Using a significance level of 0.05, participants differed from nonparticipants on the concepts of gender, general self-efficacy, fear of CRC, response efficacy with regard to the certainty of having or not having CRC, self-efficacy, and information and practical social support.

Logistic regression analysis was applied to the data (Table 2). Results revealed that the contributions of the intrapersonal variables gender, general self-efficacy, and fear of CRC were neutralized when the proximal factors were included in the equation. Self-efficacy proved to be a concept that was highly associated with participation in the screening program. Response efficacy with regard to the certainty of having or not having CRC appeared to explain some of the variance in participation behavior, whereas informational and practical support also appeared to have predictive value.

Several findings in this study are in accordance with studies on related subjects. For example, various studies have reported that variations in self-efficacy contributed most to explaining preventive health behavior (27). Nevertheless, some critical comments need to be made about the findings. The health belief variables “response efficacy” and “severity of CRC” could not be assessed on a reliable scale. As a result, the items had to be analyzed separately, which affects the validity of the results found. In addition, it should be kept in mind that this determinant study concerned participation behavior, not participation intention. Individuals (n = 9) who wanted to participate but were excluded on the basis of exclusion criteria (such as use of medication or having undergone colorectal surgery) were not asked to fill in a questionnaire. In addition, a selection bias might have been introduced in the study. The fact that the group of people who refused to participate in the study were, on average, 1 year older than the people who did participate is an indication of this potential bias. Furthermore, this study did not exclude individuals who had a family history of CRC or prior experience with CRC screening using fecal occult blood test. Having these experiences might have biased individuals favorably toward participation in sigmoidoscopic screening. Finally, the level of significance of the determinants is influenced by the relatively small number of participants in this pilot study. It is certain that differences between the two groups would be more clear cut in a larger study population.

Despite these critical comments, the present study has prepared the ground for future determinant studies of sigmoidoscopic CRC screening participation. The model used in this study proved to be useful in explaining the participation behavior. Although the operationalization of some variables should be redefined to improve reliability, further research on participation in sigmoidoscopic CRC screening could use this combined model as a theoretical starting point. In conclusion, endoscopic screening for CRC is a promising development in the field of secondary prevention of cancer, although future research remains necessary.

**Discussion**

The participation rate in this study (45%) is comparable to that in other studies on screening for CRC in a clinical setting (e.g., Refs. 12 and 25). Nevertheless, it must be assumed that the percentages in a general population will be lower because patients already under treatment for other diseases are thought to be more health conscious (25). Whereas Atkin et al. (26) advocated a national CRC screening program using sigmoidoscopy in individuals ages 55–60 years, we feel that determinants of participation and nonparticipation in endoscopic screening programs should be carefully studied and translated into health education practice to successfully implement such a program. Some indicators of salient associations of participation can be derived from the present study.

The results of the present study indicate that nonparticipants perceive great difficulties in participating. This indicates that nonparticipants do not like the idea of participating in the program because they feel nervous about it and expect it to be painful. Furthermore, nonparticipants perceive difficulties in finding the time to participate in sigmoidoscopy. Response efficacy with regard to the certainty of having or not having CRC appeared to explain some of the variance in participation behavior, whereas informational and practical support also appeared to have predictive value.

**Table 2** Results of logistical regression analysis (n = 131) with participation as the dependent variable

<table>
<thead>
<tr>
<th>Variables</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>0.10 (0.01–1.0)</td>
</tr>
<tr>
<td>Age</td>
<td>1.2 (1.0–1.4)</td>
</tr>
<tr>
<td>Educational level</td>
<td>1.1 (0.9–1.3)</td>
</tr>
<tr>
<td>Having a partner</td>
<td>1.2 (1.0–1.4)</td>
</tr>
</tbody>
</table>

**Proximal variables**

- Severity in comparison to other diseases
- Severity, taking progress of science into account
- Susceptibility
- Response efficacy, certainty of having or not having CRC
- Response efficacy, better chance of being cured
- Self-efficacy
- Informational support
- Practical support
- Emotional support
- Support by social network

**Distal variables**

- Fear of CRC
- General self-efficacy

**Ultimate variables**

- Gender
- Age
- Educational level
- Having a partner

**References**

1. Atkin, B. et al. (2000) Advocated a national CRC screening program using sigmoidoscopic CRC screening could use this combined model as a theoretical starting point. In conclusion, endoscopic screening for CRC is a promising development in the field of secondary prevention of cancer, although future research remains necessary.

**Acknowledgments**

We thank Dr. Wim Hameeteman for support of this study. In addition, we acknowledge the kind cooperation of the secretary and nursing staff of the Department of Internal Medicine of the General District and University Hospital in Maastricht, the Netherlands.

**Appendix**

**Severity**

I think CRC is: less severe than most other diseases, as severe as most other diseases, more severe than most other diseases, or the most severe disease I know.

Despite the progression of medical science, CRC is as severe as it was in the past: completely agree, agree, neither agree nor disagree, disagree, or completely disagree.
I give up easily: completely agree, agree, neither agree nor disagree, disagree, or disagree completely.

References
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