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Research Article

Assessment of Individuals' Perceived Benefits of and Barriers to Colorectal Cancer Screening

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Abstract

Objectives: This study aimed to examine individuals' perceived benefits of and barriers to colorectal cancer (CRC) screening and to identify the sociodemographic and clinical factors influencing these perceptions.

Methods: This descriptive cross-sectional study was conducted with 201 participants who presented to the outpatient clinics of our hospital. Data were collected using a sociodemographic characteristics form and the CRC Screening Benefits and Barriers Scale. Descriptive statistics, the independent-samples t-test, one-way ANOVA, the Mann-Whitney U test, correlation analysis, and multivariate regression analysis were used.

Results: A total of 201 individuals aged 50 and above were enrolled, with a mean age of 59.30±7.01 years, and 53.2% were female. More than half of the participants (57.7%) had never undergone CRC screening, and 60.3% reported no intention of doing so. Mean subscale scores for the CRC Screening Benefits and Barriers Scale were 9.04±2.18 for fecal occult blood test (FOBT) benefits, 19.06±4.42 for FOBT barriers, 11.86±2.64 for colonoscopy (COL) benefits, and 34.01±6.58 for COL barriers, indicating that perceived barriers to COL were the highest among all measured perceptions. Men scored significantly higher on the FOBT barriers subscale than women ($p=0.003$). Education level was positively associated with both FOBT benefits ($p=0.001$) and COL benefits scores ($p=0.009$), with university graduates reporting the highest perceived benefits. No significant association was found between age or BMI and any subscale score ($p>0.05$). Individuals who had previously undergone CRC screening had higher benefits scores and lower COL barriers scores compared with those who had never been screened ($p<0.05$). Participants with constipation had significantly higher COL benefits scores ($p=0.013$). In multivariate regression analysis, education level ($\beta=0.292$, $p=0.001$) and constipation ($\beta=0.145$, $p=0.033$) were independent predictors of higher FOBT benefits scores, explaining 10.4% of the variance. Male sex independently increased perceived FOBT barriers ($\beta=0.143$, $p=0.046$). Higher COL benefits scores were independently associated with education level ($\beta=0.258$, $p=0.001$) and constipation ($\beta=0.184$, $p=0.007$), while a family history of cancer was associated with lower COL barriers scores ($\beta=-0.163$, $p=0.022$).

Conclusion: CRC screening rates in our study were low, and perceived barriers, particularly for COL, substantially exceeded perceived benefits. Higher education level and prior screening experience were associated with greater perceived benefits, while men reported greater perceived barriers to screening. These findings suggest that interventions targeting barrier reduction and benefit awareness are needed to improve screening participation.

Keywords: Colorectal Cancer Screening, Colonoscopy, Fecal Occult Blood Test, Perceived Benefits And Barriers, Preventive Health Behavior; Primary Health Care, Screening Behavior

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Colorectal cancer (CRC) ranks among the most frequently occurring malignancies worldwide and remains a leading cause of cancer-related mortality. According to global cancer statistics, CRC continues to pose a significant public health burden in terms of both incidence and mortality.[1] Similarly, in Türkiye, it ranks among the most common cancers in both men and women.[2,3]

A defining characteristic of CRC is that it is largely treatable when diagnosed at an early stage. Screening programs are therefore critical for early detection and mortality reduction. The fecal occult blood test (FOBT) and colonoscopy (COL) are the most widely used methods for CRC screening. In Türkiye, screening for average-risk individuals is conducted between the ages of 50 and 70, with an immunochemical fecal test conducted every two years and/or COL every ten years. COL, in particular, is recognized as a preventive procedure for both diagnosis and the removal of precancerous lesions.[4] Emerging evidence shows that CRC incidence is rising in younger populations, especially among individuals aged 40-49. Considering these findings, current guidelines now recommend initiating CRC screening for average-risk individuals at age 45.[5] Despite this, CRC screening rates in Türkiye, as in many other countries, remain below the desired level. Among the factors influencing screening behaviors, the individual's level of knowledge about the disease, perceived benefits and barriers, sociodemographic characteristics, and access to health services play important roles.[6] Within the framework of the health belief model, individuals are expected to engage in screening behavior when the perceived benefits are high and the perceived barriers are low.[7]

The literature shows that variables such as education level, age, sex, and socioeconomic status influence CRC screening behaviors. In particular, higher education levels have been consistently associated with greater participation in screening programs.[8] At the same time, factors such as fear, embarrassment, procedure-related concerns, and lack of knowledge constitute significant barriers to screening behaviors.[9]

Understanding CRC screening behaviors and identifying the factors that shape them is of considerable importance for planning community-based interventions. In this context, assessing individuals' perceived benefits of and barriers to screening will contribute to the development of effective educational and awareness programs. This study aimed to examine individuals' perceived benefits of and barriers to CRC screening and to identify the sociodemographic and clinical factors influencing these perceptions.

Methods

Study Design and Setting

This was a descriptive cross-sectional study. The study was conducted between 1 December 2025 and 1 March 2026 in the Family Medicine Outpatient Clinic of Recep Tayyip Erdoğan University Training and Research Hospital (Rize, Türkiye).

Population and Sample

The study population consisted of individuals aged 50 and above who presented to family health units for any reason during the specified period. Inclusion criteria were as follows: age of ≥50 years, willingness to participate in the study, and provision of informed consent. Individuals with a prior diagnosis of CRC and those who declined to participate were excluded. The necessary sample size was calculated using G*Power 3.1. Assuming a moderate effect size ($f=0.25$; $f^2=0.15$), a significance level of 5%, and statistical power of 80%, a minimum sample of 160-200 participants was determined to be sufficient for regression analyses and group comparisons.

Data Collection Instruments

Data were collected through face-to-face interviews. The data collection tool consisted of two parts:

Sociodemographic Information Form

This form included questions on participants' personal sociodemographic characteristics (age, sex, education level, etc.) and health history (chronic diseases, family history of cancer, bowel habits, etc.).

CRC Screening Benefits and Barriers Scale

The CRC Screening Benefits and Barriers Scale was used to assess participants' perceived benefits of and barriers to CRC screening. The scale was originally developed by Rawl et al.,[10] and it was validated in Turkish by Dönmez et al.[11]. Permission to use the scale was obtained from its authors via e-mail.

The scale consists of 31 items assessing perceived benefits of and barriers to FOBT and COL. Responses are rated on a four-point Likert-type scale as "strongly disagree" (1 point), "disagree" (2 points), "agree" (3 points), or "strongly agree" (4 points). The options "I don't know" and "I prefer not to answer" are scored as 0 and coded as missing data.

The scale comprises four subscales: FOBT benefits (items 1-3), FOBT barriers (items 4-12), COL benefits (items 13-16), and COL barriers (items 17-31). Each subscale score is calculated by dividing the total score for the relevant items by the number of items. The scale yields no total score. Higher

scores on the benefits subscales indicate greater perceived benefits, while higher scores on the barriers subscales indicate greater perceived barriers. The scale contains no reverse-scored items.

For missing responses, the mean score of the relevant subscale can be used. However, it was planned to exclude participants with large numbers of missing responses from the analyses.

Data Collection Process

Data were collected over a three-month period between December 2025 and March 2026. Prior to scale administration, participants were given a brief standardized explanation of the FOBT and COL procedures.

Statistical Analysis

IBM SPSS Statistics 27 (IBM Corp., Armonk, NY, USA) was used for all statistical analyses. Quantitative variables were reported as mean, standard deviation, median, minimum, and maximum values, while categorical variables were reported as frequency and percentage. Normality of the data was assessed using the Shapiro-Wilk test, skewness and kurtosis values, and box plots. For comparisons of normally distributed quantitative variables between two groups, the Student's t-test was used; for comparisons among three or more groups, one-way ANOVA was applied, with the Bonferroni test used to identify the source of the difference. The Mann-Whitney U test was used for comparisons of non-normally distributed variables between two groups. Pearson correlation analysis was used to examine associations between variables, and linear regression models were constructed for further assessment. Results were evaluated at 95% confidence intervals, with statistical significance set at $p<0.05$.

Ethical Considerations

Ethical approval for this study was obtained from the local ethics committee of our Recep Tayyip Erdoğan University's Faculty of Medicine (Decision No: 2025/473; Date: 20 November 2025). The principles of the Declaration of Helsinki were observed throughout the study. All participants were informed about the purpose, scope, and procedures of the study, and written informed consent was obtained. The confidentiality of participants' personal data was maintained, and data were used for scientific purposes only.

Results

This study was conducted between December 2025 and March 2026 in the Family Medicine Outpatient Clinic of Recep Tayyip Erdoğan University Training and Research Hospital with a total of 201 participants. The general descriptive characteristics of the participants are summarized in Table 1. Of the participants, 53.2% (n=107) were female and 46.8% (n=94) were male. The mean age was 59.30±7.01 years, ranging from 50 to 78. Mean height was 165.78±8.97 cm, mean weight was 82.12±13.62 kg, and mean BMI was 29.88±4.45.

Of the participants, 7.5% were illiterate, 52.7% were primary school graduates, 18.4% were high school graduates, and 21.4% were university graduates. Regarding place of residence, 74.1% lived in an urban center. The rates of smoking and alcohol use were 31.8% and 5.5%, respectively. Comorbid conditions were present in 59.2% of participants.

Table 1. Distribution of descriptive characteristics

	n (%)
Sex	
Female	107 (53.2)
Male	94 (46.8)
Age	
Mean±SD	59.30±7.01
Median (min-max)	58 (50-78)
Height	
Mean±SD	165.78±8.97
Median (min-max)	165 (144-190)
Weight	
Mean±SD	82.12±13.62
Median (min-max)	80 (46-130)
BMI	
Mean±SD	29.88±4.45
Median (min-max)	29.4 (20.4-42)
Education level	
Illiterate	15 (7.5)
Primary school	106 (52.7)
High school	37 (18.4)
University	43 (21.4)
Place of residence	
Village	28 (13.9)
District center	24 (11.9)
Urban center	149 (74.1)
Smoking	
No	137 (68.2)
Yes	64 (31.8)
Alcohol use	
No	190 (94.5)
Yes	11 (5.5)
Comorbidity	
No	82 (40.8)
Yes	119 (59.2)

SD: Standard deviation; BMI: Body mass index.

Table 2. Distribution of patient-related characteristics

	n (%)
Personal history of cancer	
No	188 (93.5)
Yes	13 (6.5)
Family history of colon cancer	
No	182 (90.5)
Yes	19 (9.5)
Family history of cancer	
No	121 (60.2)
Yes	80 (39.8)
Dietary habits	
Predominantly vegetable-based	128 (63.7)
Predominantly meat-based	71 (35.3)
Balanced	2 (1)
Water consumption	
>2 liters	70 (34.8)
<2 liters	131 (65.2)
Bowel habits - constipation	
No	158 (78.6)
Yes	43 (21.4)
Screening history	
FOBT only	44 (21.9)
COL only	19 (9.5)
Both FOBT and COL	22 (10.9)
Never screened	116 (57.7)
Intention to undergo screening	
Yes	46 (39.7)
No	70 (60.3)

FOBT: Fecal occult blood test; COL: Colonoscopy.

When patient-related characteristics were examined (Table 2), a personal history of cancer was observed for 6.5% of participants, a family history of colon cancer for 9.5%, and a family history of any cancer for 39.8%. Regarding dietary habits, 63.7% reported a predominantly vegetable-based diet and 65.2% consumed less than 2 liters of water per day. Constipation was present in 21.4% of participants. With respect to screening history, 57.7% had never undergone any form of screening and only 10.9% had undergone both FOBT and COL. A total of 60.3% of participants stated that they had no intention of undergoing screening.

Examination of the CRC Screening Benefits and Barriers Scale scores revealed mean subscale scores of 9.04±2.18 for FOBT benefits, 19.06±4.42 for FOBT barriers, 11.86±2.64 for COL benefits, and 34.01±6.58 for COL barriers. The distribution of subscale scores is shown in Figure 1. Participants' perceived barriers to COL were notably higher than the scores for all other subscales.

Table 3. CRC screening benefits and barriers scale scores

	No. of items	Mean±SD	Median (min-max)
FOBT Benefits	3	9.04±2.18	9 (3-12)
FOBT Barriers	9	19.06±4.42	20 (9-36)
COL Benefits	4	11.86±2.64	12 (4-16)
COL Barriers	15	34.01±6.58	34 (16-60)

Mean±SD: Mean±standard deviation; Min-max: Minimum-maximum
CRC: Colorectal cancer; FOBT: Fecal occult blood test; COL: Colonoscopy.

In comparisons by sex, men's FOBT barriers scores were significantly higher than those of women ($p<0.01$). No statistically significant difference was found between men and women for any other subscale ($p>0.05$).

No significant association was found between age or BMI and any subscale score ($p>0.05$).

When participants were grouped by education level, the FOBT benefits subscale scores differed significantly according to education level ($p=0.001$; $p<0.01$). University graduates, in particular, had higher FOBT benefits scores than illiterate individuals and primary school graduates ($p=0.002$ and $p=0.024$, respectively; $p<0.05$). As shown in Figure 1, FOBT benefits scores increased consistently with rising education level.

Similarly, COL benefits subscale scores also differed significantly by education level ($p=0.009$; $p<0.01$). University graduates had higher COL benefits scores than illiterate individuals ($p=0.035$; $p<0.05$). Figure 1 shows a trend of increasing COL benefits scores with higher education level.

In contrast, no statistically significant difference was found in FOBT barriers or COL barriers subscale scores according to education level ($p>0.05$). These findings indicate that education level increases individuals' perceptions of the benefits of CRC screening but does not appear to have a marked effect on perceived barriers.

Figure 1 presents the distribution of CRC Screening Benefits and Barriers Scale subscale scores, the comparison of FOBT barriers scores by sex, and the comparison of benefits subscale scores by education level.

Mean subscale scores of the CRC Screening Benefits and Barriers Scale were 9.04±2.18 for FOBT benefits, 19.06±4.42 for FOBT barriers, 11.86±2.64 for COL benefits, and 34.01±6.58 for COL barriers. The distribution of subscale scores is presented in Table 3. The findings indicate that perceived barriers to COL were higher than perceptions of barriers or benefits on all other subscales.

Comparisons of CRC Screening Benefits and Barriers Scale scores according to descriptive characteristics are presented in Table 4.

In comparisons by sex, men's FOBT barriers scores were significantly higher than those of women ($p=0.003$; $p<0.01$).

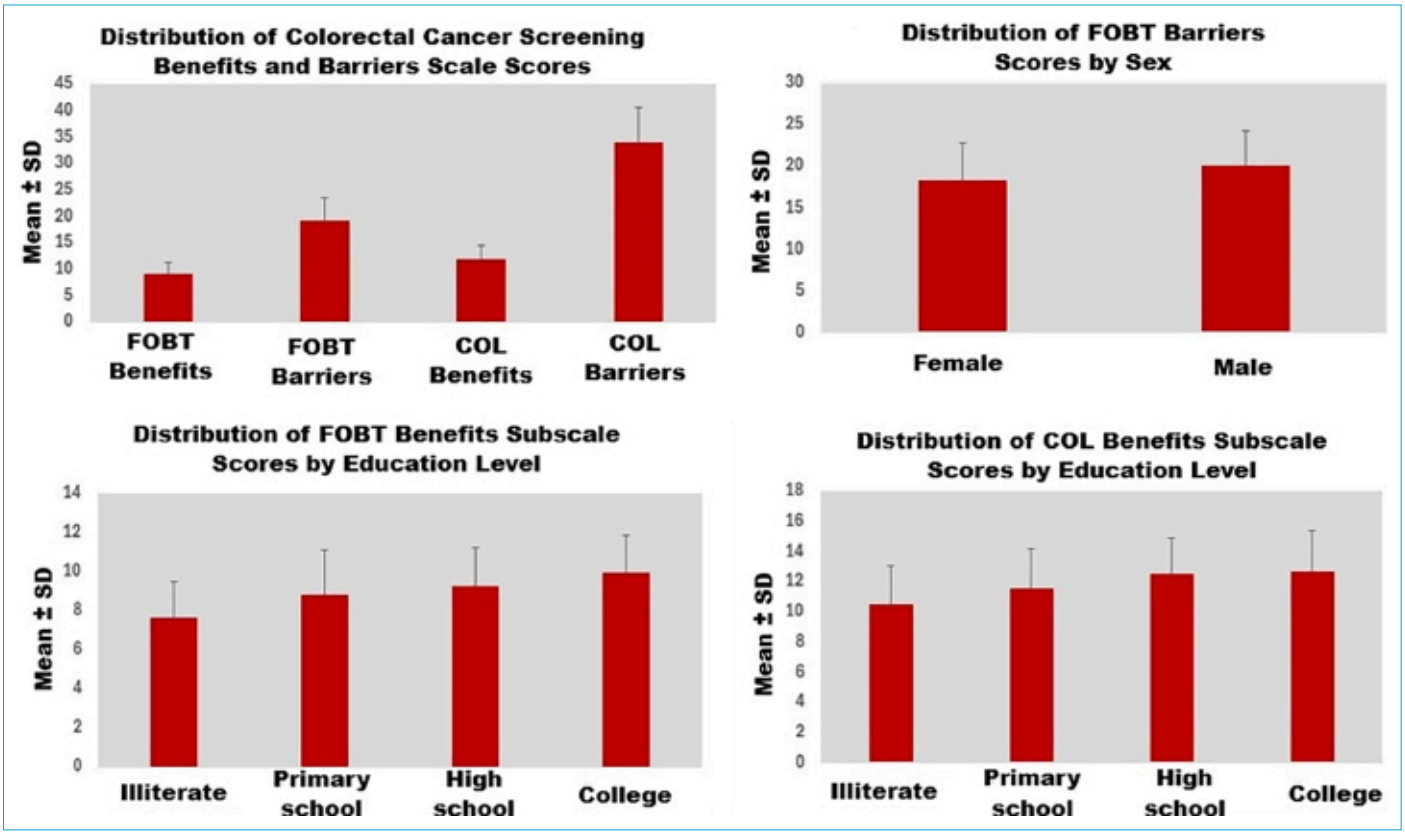

Figure 1. FOBT benefits and COL benefits scores increased with increasing education level, while FOBT barriers scores were higher in men.

FOBT: Fecal occult blood test; Mean±SD: Mean±standard deviation.

No significant difference was found between the sexes for any other subscale ($p>0.05$).

No significant association was identified between age or BMI and any subscale score ($p>0.05$). When participants were grouped by education level, FOBT benefits and COL benefits scores differed significantly ($p=0.001$ and $p=0.009$, respectively). University graduates had higher benefits scores than individuals with lower education levels. In contrast, no significant difference was found in barriers scores by education level ($p>0.05$). No statistically significant differences in subscale scores were detected according to place of residence, smoking, alcohol use, or presence of comorbidity ($p>0.05$).

Comparisons of CRC Screening Benefits and Barriers Scale scores according to patient-related characteristics are presented in Table 5.

No statistically significant differences in any subscale score were found according to personal history of cancer, family history of colon cancer, family history of cancer, dietary habits, or daily water consumption ($p>0.05$). When bowel habits were examined, individuals with constipation had significantly higher COL benefits subscale scores than those without constipation ($p=0.013$; $p<0.05$). In comparisons based on screening history, significant differences were found in FOBT benefits scores ($p=0.020$; $p<0.05$) and COL barriers scores ($p=0.001$; $p<0.01$). Individuals who had undergone COL or both FOBT and COL had higher perceived benefits and lower perceived barriers than those who had never been screened.

The distribution of CRC Screening Benefits and Barriers Scale subscale scores by bowel habits and screening history is shown in Figure 2.

When bowel habits were examined, individuals with constipation had significantly higher COL benefits subscale scores ($p=0.013$; $p<0.05$). No significant differences were found in FOBT benefits, FOBT barriers, or COL barriers subscale scores ($p>0.05$).

In further analysis based on screening history, FOBT benefits scores differed significantly across the groups ($p=0.020$; $p<0.05$). Individuals who had undergone both FOBT and COL had higher scores than those who had never been screened ($p=0.048$; $p<0.05$). COL barriers scores also differed significantly by screening history ($p=0.001$; $p<0.01$). Individuals who had undergone FOBT only and those who had never been screened had higher COL barriers scores than those who had undergone COL.

The results of multiple linear regression analyses conducted to assess the effect of descriptive characteristics on CRC

Table 4. Comparisons of CRC screening benefits and barriers scale scores according to descriptive characteristics

	FOBT benefits		FOBT barriers		COL benefits		COL barriers	
	Mean±SD	Median (min-max)	Mean±SD	Median (min-max)	Mean±SD	Median (min-max)	Mean±SD	Median (min-max)
Sex								
Female	8.96±2.28	9 (3-12)	18.21±4.55	19 (9-30)	11.86±2.76	12 (4-16)	33.55±6.91	34 (16-57)
Male	9.14±2.06	9 (3-12)	20.03±4.08	20 (9-36)	11.85±2.52	12 (7-16)	34.53±6.19	34 (18-60)
[a]p	**0.569**		**0.003****		**0.981**		**0.293**	
Age								
r	-0.046		-0.048		-0.041		0.094	
p	**0.512**		**0.498**		**0.563**		**0.184**	
BMI								
r	-0.090		0.060		-0.075		0.054	
p	**0.205**		**0.401**		**0.293**		**0.446**	
Education level								
Illiterate	7.60±1.84	8 (5-11)	18.20±3.61	18 (12-24)	10.47±2.50	10 (8-16)	33.33±6.21	33 (19-42)
Primary school	8.82±2.25	9 (3-12)	19.55±4.33	20 (9-36)	11.53±2.63	12 (4-16)	34.28±6.61	35 (18-60)
High school	9.24±1.99	9 (5-12)	19.19±4.96	20 (9-33)	12.46±2.36	12 (8-16)	33.16±7.55	33 (16-52)
University	9.93±1.89	10 (3-12)	18.07±4.34	18 (9-28)	12.63±2.69	12 (7-16)	34.30±5.87	33 (24-48)
[b]p	**0.001****		**0.258**		**0.009****		**0.794**	
Place of residence								
Village	9.07±2.16	9 (4-12)	18.71±4.00	19.5 (9-24)	11.68±2.78	12 (7-16)	35.29±6.7	35 (19-57)
District center	9.63±2.50	9 (3-12)	18.33±3.85	17 (11-25)	12.79±3.23	12.5 (4-16)	34.42±8.1	34 (16-52)
Urban center	8.95±2.12	9 (3-12)	19.25±4.59	20 (9-36)	11.74±2.5	12 (6-16)	33.7±6.31	33 (18-60)
[b]p	**0.367**		**0.582**		**0.181**		**0.483**	
Smoking								
No	9.03±2.22	9 (3-12)	18.96±4.35	20 (9-36)	11.82±2.66	12 (4-16)	34.3±6.42	34 (18-60)
Yes	9.08±2.1	9 (4-12)	19.28±4.59	20 (9-33)	11.94±2.64	12 (6-16)	33.39±6.94	33.5 (16-52)
[a]p	**0.882**		**0.636**		**0.765**		**0.363**	
Alcohol use								
No	9.07±2.12	9 (3-12)	18.89±4.32	20 (9-36)	11.86±2.66	12 (4-16)	33.89±6.6	34 (16-60)
Yes	8.64 ± 3.07	9 (3-12)	22.00 ± 5.35	20 (15-33)	11.82±2.56	12 (8-16)	36±6.2	33 (30-52)
[c]p	**0.771**		**0.102**		**0.899**		**0.532**	
Comorbidity								
No	9.24±1.73	9 (5-12)	18.9±4.13	20 (9-28)	12.09±2.54	12 (7-16)	34.18±6.82	34 (18-57)
Yes	8.91±2.44	9 (3-12)	19.18±4.62	19 (9-36)	11.70±2.71	12 (4-16)	33.89±6.45	34 (16-60)
[a]p	**0.283**		**0.667**		**0.308**		**0.758**	

[a]p: Mann-Whitney U test p value; [b]p: Kruskal-Wallis test p value; [c]p: Mann-Whitney U test. **: P value, BMI: Body mass index; FOBT: Fecal occult blood test; Mean±SD: Mean±standard deviation; Min-max: Minimum-maximum; COL: Colonoscopy.

Screening Benefits and Barriers Scale subscale scores are presented in Table 6.

Among the variables predicting FOBT benefits scores, education level (β=0.292; p=0.001) and the presence of constipation (β=0.145; p=0.033) were found to have significant and positive effects. The model explained 10.4% of the variance in FOBT benefits scores (R^2=0.104). In the model for FOBT barriers scores, male sex (β=0.143; p=0.046) increased perceived barriers, while the presence of constipation.

Discussion

This study has provided a comprehensive assessment of individuals' perceived benefits of and barriers to CRC screening and the factors influencing these perceptions. The findings showed that more than half of the participants (57.7%) had never undergone any form of CRC screening. This result is consistent with the low screening participation rates reported in both national and international studies, indicating that individual-level uptake remains limited

Table 5. Comparisons of CRC screening benefits and barriers scale scores according to patient-related characteristics

	FOBT benefits		FOBT barriers		COL benefits		COL barriers	
	Mean±SD	Median (min-max)	Mean±SD	Median (min-max)	Mean±SD	Median (min-max)	Mean±SD	Median (min-max)
Personal history of cancer								
No	9.01±2.2	9 (3-12)	19.23±4.39	20 (9-36)	11.8±2.64	12 (4-16)	34.06±6.55	34 (18-60)
Yes	9.54±1.71	9 (7-12)	16.62±4.31	17 (9-22)	12.69±2.72	12 (8-16)	33.31±7.28	33 (16-42)
[c]p	**0.570**		**0.056**		**0.321**		**0.867**	
Family history of colon cancer	9.03±2.12	9 (3-12)	19.25±4.34	20 (9-36)	11.80±2.63	12 (4-16)	34.22±6.5	34 (16-60)
No								
Yes	9.16±2.71	9 (3-12)	17.26±4.89	17 (9-27)	12.42±2.8	12 (7-16)	32.00±7.22	33 (18-47)
[a]p	**0.812**		**0.062**		**0.329**		**0.163**	
Family history of cancer	9.02±2.16	9 (3-12)	19.48±4.09	20 (9-36)	11.70±2.60	12 (7-16)	34.98±5.76	35 (19-60)
No								
Yes	9.07±2.21	9 (3-12)	18.44±4.83	19 (9-33)	12.09±2.71	12 (4-16)	32.54±7.47	33 (16-57)
[a]p	**0.873**		**0.102**		**0.594**		**0.080**	
Dietary habits								
Predominantly vegetable-based	9.01±2.35	9 (3-12)	18.88±4.58	19 (9-33)	11.86±2.82	12 (4-16)	33.39±6.61	33 (16-57)
Predominantly meat-based	9.11±1.86	9 (4-12)	19.35±4.15	20 (12-36)	11.85±2.35	12 (7-16)	34.97±6.47	35 (20-60)
Balanced[†]	9.00±0.00	9 (9-9)	20.50±4.95	20.5(17-24)	12.00±0.00	12 (12-12)	39.5±4.95	39.5 (36-43)
[a]p	**0.747**		**0.475**		**0.971**		**0.105**	
Water consumption								
>2 liters	9.11±2.34	9 (4-12)	19.19±4.1	20 (9-30)	11.61±2.63	12 (6-16)	34.94±6.22	35 (18-52)
<2 liters	9.01±2.09	9 (3-12)	19.00±4.59	19 (9-36)	11.98±2.65	12 (4-16)	33.51±6.74	33 (16-60)
[a]p	**0.741**		**0.777**		**0.345**		**0.142**	
Bowel habits - constipation								
No	8.89±2.17	9 (3-12)	19.44±4.00	20 (9-36)	11.61±2.60	12 (4-16)	34.46±5.70	34.5 (18-60)
Yes	9.60±2.14	9 (3-12)	17.67±5.55	18 (9-33)	12.74±2.66	12 (8-16)	32.37±9.02	33 (16-57)
[a]p	**0.057**		**0.056**		**0.013***		**0.156**	
Screening history								
FOBT only	8.93±2.00	9 (3-12)	18.80±3.99	20 (9-27)	11.82±2.46	12 (8-16)	34.61±5.56	35 (19-45)
COL only	9.84±1.68	9 (7-12)	17.21±3.65	17 (12-23)	12.95±2.12	12 (9-16)	30.68±4.23	31 (22-37)
Both FOBT and COL	10.09±1.90	10 (5-12)	17.86±3.99	18 (9-28)	12.68±2.19	12 (7-16)	31.14±3.34	30.5 (26-38)
Never screened	8.76±2.29	9 (3-12)	19.7±4.66	20 (9-36)	11.53±2.81	12 (4-16)	34.87±7.4	35 (16-60)
[b]p	**0.020***		**0.056**		**0.067**		**0.001****	

[a]p: Student t-test p value; [b]p: one-way ANOVA plus Bonferroni test p value; [c]p: Mann-Whitney U test p value. *: p<0.05; **: p<0.01. [†]: the "balanced" diet group was excluded from analyses due to insufficient observations. Mean±SD: Mean±standard deviation; FOBT: Fecal occult blood test; COL: Colonoscopy.

despite the availability of screening services.[6,8] One review identified lack of knowledge, embarrassment, fear, and problems accessing health services as the primary barriers to participation in CRC screening.[12] The low participation rate in Türkiye, despite the availability of a national free CRC screening program, suggests that individuals are influenced by health literacy, education, personal awareness, fear of the procedure, and psychosocial factors.

The finding that men had higher perceived FOBT barriers than women is noteworthy. This may be explained by men's more limited use of health services, lower engagement in preventive health behaviors, and greater reluctance to undergo invasive procedures.[9] The literature frequently highlights that men participate less in screening programs and tend to delay health-seeking behaviors. The primary barriers to screening in men include fear of receiving a diagnosis, low risk perception, lack of time, and concerns related to perceptions of masculinity. However, it has been reported that awareness of the benefits of screening and partner support can increase screening participation among men.[13]

In this study, education level was found to significantly increase the perceived benefits of both FOBT and COL. This

Figure 2. COL benefits scores were higher in individuals with constipation; furthermore, FOBT benefits scores were higher in individuals who had undergone both FOBT and COL, while COL barriers scores were higher in those who had never been screened.

COL: Colonoscopy; FOBT: Fecal occult blood test.

finding strongly supports the determining role of health literacy in screening behaviors. It is well established that as education level rises, individuals' disease knowledge, risk awareness, and attitudes toward preventive health services improve accordingly.[8] This is consistent with the effect of perceived benefits on behavior within the framework of the health belief model.[7] Greater access to health-related information and higher awareness of the importance of early detection among more educated individuals may positively influence screening behaviors. However, the fact that education level did not significantly reduce perceived barriers in our study suggests that an increase in knowledge alone is insufficient to eliminate emotional barriers, such as fear, anxiety, and privacy concerns.

The finding that individuals with constipation had higher perceived COL benefits suggests that the presence of symptoms acts as a trigger for health-seeking behaviors. Previous studies have similarly reported that symptoms heighten individuals' risk perception and strengthen their inclination toward screening behaviors.[6] This finding underscores the importance of raising screening awareness among asymptomatic individuals. Those with symptoms may perceive CRC screening tests not merely as a preventive measure but also as a diagnostic tool that could help identify the cause of their existing complaints. This suggests that the importance of CRC screening for asymptomatic individuals is not sufficiently recognized, since the primary aim of CRC screening programs is to detect the disease before it develops or at an early stage.

The observation that individuals who had previously undergone screening perceived higher benefits and lower barriers reflects the transformative effect of experience on perceptions. It is well established that factors such as fear, embarrassment, and anticipated pain associated with invasive procedures like COL negatively affect screening behaviors.[9] Making individuals' first screening experience as positive as possible may therefore increase future screening participation. Among those who have already under-

Table 6. Multiple linear regression analysis of the effect of descriptive characteristics on crc screening benefits and barriers scale subscale scores

Dependent variable	Independent variable	β	t	p	F	Model (p)	R^2
FOBT benefits	Education level	0.292	4.267	**0.001****	7.657	**0.001****	0.104
	Bowel habits - constipation (+)	0.145	2.145	**0.033***			
	Screening history	-0.105	-1.528	**0.128**			
FOBT barriers	Sex (male)	0.143	2.012	**0.046***	4.901	**0.001****	0.091
	Alcohol use	0.119	1.707	**0.089**			
	Personal history of cancer	-0.126	-1.836	**0.068**			
	Family history of colon cancer	-0.060	-0.831	**0.407**			
	Family history of cancer	-0.083	-1.148	**0.252**			
	Bowel habits - constipation (+)	-0.146	-2.115	**0.036***			
	Screening history	0.078	1.102	**0.272**			
COL benefits	Education level	0.258	3.753	**0.001****	5.481	**0.001****	0.101
	Place of residence	-0.030	-0.436	**0.663**			
	Bowel habits - constipation (+)	0.184	2.707	**0.007****			
	Screening history	-0.103	-1.479	**0.141**			
COL barriers	Age	0.119	1.697	**0.091**	2.892	**0.010***	0.083
	Family history of cancer (+)	-0.163	-2.314	**0.022***			
	Dietary habits	0.113	1.622	**0.106**			
	Water consumption	-0.079	-1.119	**0.265**			
	Bowel habits - constipation (+)	-0.104	-1.454	**0.148**			
	Screening history	0.073	1.044	**0.298**			

Data are presented as standardized beta coefficients (β); FOBT benefits, FOBT barriers, COL benefits, and COL barriers scores were treated as dependent variables; independent variables were entered into the model simultaneously; model fit was assessed using the F-test and explained variance is reported as R2. *: Statistically significant at $p<0.05$; **: Statistically significant at $p<0.01$. FOBT: Fecal occult blood test; COL: Colonoscopy.

gone screening, the reduction of misconceptions about the procedure and the realization that it is more tolerable than expected may positively shape future screening behaviors. The guidance of health professionals and positive health experiences, in particular, may play an important role in sustaining CRC screening behaviors.

In multivariate regression analysis, education level and constipation status were identified as significant predictors of perceived benefits, while male sex was a significant predictor of perceived barriers. In addition, the finding that a family history of cancer reduced perceived COL barriers supports the role of risk awareness in shaping behavior. This suggests that targeted educational and counseling interventions may be particularly effective in high-risk groups. According to the health belief model, as individuals' perceived risk of disease increases, their engagement in protective health behaviors also increases.[14] Personalized counseling and risk-based awareness efforts targeting individuals with a family history of cancer may therefore be expected to increase CRC screening participation.

The findings of the present study indicate that the primary barriers to the uptake of COL screening are insufficient knowledge, fear of cancer detection, and reluctance to undergo an invasive procedure. The increase in perceived benefits with higher education level supports the conclusion that lack of knowledge is a significant barrier. The literature similarly reports that among individuals with insufficient knowledge about COL, misconceptions regarding pain, complications, and the bowel preparation process reduce screening participation.[9] Furthermore, fear of cancer detection stands out as a significant psychological barrier that leads individuals to avoid screening. The higher perceived barriers found among men may be linked to privacy concerns and reluctance to use health services. In contrast, the finding that a family history of cancer reduces perceived barriers suggests that risk awareness can partially offset these fears.

Previous studies have shown that the bowel preparation process being perceived as burdensome, concerns about pain during the procedure, fear of sedation, privacy concerns, high screening costs, inadequate health insurance, and lack of knowledge are the most frequently reported barriers negatively affecting CRC screening participation.[6,9,12] It is therefore important that CRC screening programs not only provide technical information but also develop communication strategies aimed at reducing individuals' emotional concerns.

A further point of note is that a considerable proportion of this study's participants reported no intention of undergoing screening in the future. This suggests that public awareness of CRC as a disease that is largely preventable and treatable when detected early is insufficient. However, COL is recognized as both a diagnostic tool and a preventive method capable of preventing cancer development through the removal of polyps. A randomized trial demonstrated that individuals invited to undergo COL screening had a lower 10-year incidence of CRC compared with those not invited to undergo screening.[15] Expanding community-based awareness programs may therefore contribute to reducing CRC-related morbidity and mortality.

Strengths and Limitations

One of the strengths of this study is that CRC screening behaviors were assessed not only in terms of sociodemographic characteristics but also comprehensively across the dimensions of perceived benefits and barriers. The use of a validated and reliable scale further enhanced the internal validity of the findings.

The study also has certain limitations. The cross-sectional design does not allow for causal inferences. The self-report method of data collection may have introduced recall bias and social desirability effects. The single-center setting limits the generalizability of the findings. Furthermore, the use of a sample drawn from a specific patient group or healthcare setting may restrict the applicability of the findings to the broader population.

Conclusion

This study has demonstrated that CRC screening behaviors are closely associated with individuals' perceptions of benefits and barriers. While higher education level and individual health awareness positively influenced screening behaviors, male sex and perceived barriers were found to reduce participation.

In light of these findings, community-based and targeted educational programs need to be developed to increase CRC screening rates. Individuals with low education levels and those who have never been screened should be identified as priority target groups. Strengthening the counseling role of health professionals, ensuring that individuals receive accurate information about the screening process, and reducing fear and misconceptions regarding COL are of particular importance.

Moreover, expanding awareness campaigns and increasing the active involvement of primary healthcare services in this process are recommended to enhance the effectiveness of national screening programs. Future studies planned with prospective and multicenter designs will contribute to establishing causal relationships more robustly.

The findings of this study show that the perceptions shaping CRC screening behaviors are closely tied to education level and individual health awareness. Education level emerged as the most consistent and powerful predictor of perceived benefits for both FOBT and COL. This suggests that initiatives aimed at improving health literacy should constitute a core strategy for promoting screening behaviors.

The finding that constipation was associated with higher perceived benefits of screening tests and lower perceived FOBT barriers is notable. This result indicates that individuals experiencing symptoms perceive screening tests not as obstacles but as tools that may help resolve their health concerns. In contrast, the absence of an independent and significant effect of prior screening experience on perceptions of benefits and barriers suggests that a single screening encounter alone is insufficient to transform perceptions and that perceptions are shaped more by deeply rooted individual factors.

The emergence of family history of cancer as a factor solely reducing perceived COL barriers suggests that risk awareness serves as an important source of motivation in overcoming fears and perceptions of barriers related to invasive procedures. Furthermore, the finding that male sex increased perceived FOBT barriers highlights the need to develop gender-sensitive approaches to improve men's participation in screening tests.

In this context, to increase CRC screening rates, it is recommended that community-based programs aimed at raising education levels and health awareness be strengthened, that screening awareness among asymptomatic individuals, in particular, be improved, and that targeted counseling services for high-risk groups be expanded.

Disclosures

Ethics Committee Approval: The study was approved by the Local Ethics Committee of Recep Tayyip Erdoğan University Faculty of Medicine (no: 2025/473, date: 20.11.2025).

Informed Consent: All participants were informed about the purpose, scope, and procedures of the study, and written informed consent was obtained.

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