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# Socioeconomic differences in expected discomfort from colonoscopy and colon capsule endoscopy

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## ABSTRACT

Individual income and educational level are associated with participation rates in colorectal cancer screening. We aimed to investigate the expected discomfort from the endoscopic diagnostic modalities of colonoscopy and colon capsule endoscopy in different socioeconomic groups as a potential barrier for participation. In a randomized clinical trial within the Danish colorectal cancer screening program, we distributed questionnaires to 2031 individuals between August 2020 and December 2022 to investigate the expected procedural and overall discomfort from investigations using visual analogue scales. Socioeconomic status was determined by household income and educational level. Multivariate continuous ordinal regressions were performed to estimate the odds of higher expected discomfort. The expected procedural and overall discomfort from both modalities were significantly higher with increasing educational levels and income, except for procedural discomfort from colon capsule endoscopy between income quartiles. The odds ratios for higher expected discomfort increased significantly with increasing educational level, whereas the differences between income groups were less substantial. Bowel preparation contributed most to expected discomfort in colon capsule endoscopy, whereas in colonoscopy, the procedure itself was the largest contributor. Individuals with prior experiences of colonoscopy reported significantly lower expected overall but not procedural discomfort from colonoscopy. The threshold for acceptable discomfort between subgroups is unknown, but the expected discomfort in colon capsule endoscopy and colonoscopy was higher in higher socioeconomic subgroups, suggesting that expected discomfort is not a significant contributor to the inequalities in screening uptake.

## 1. Introduction

Socioeconomic and demographic differences in colorectal cancer screening participation are present worldwide. (Mosquera et al., 2020) The differences in uptake may potentially lead to social inequalities in incidence and prognosis of colorectal cancer. Efforts to decrease these inequalities have been tested and no efficient strategy has been identified. Reminders by letter or phone, general practitioner endorsements, pre-invitation notifications, social media and public campaigns increase participation. (Elepano et al., 2021; Koivogui et al., 2020; Oyalowo et al., 2022; Senore et al., 2015; Libby et al., 2011; Raine et al., 2017; Deding et al., 2019) However, these initiatives often have the greatest effect in

the least deprived, thereby unintentionally increasing the inequalities in participation. Some barriers to participation must be more prevalent in some subgroups of the population than in others. These could be barriers such as transportation issues, perceived risk of disease, unwillingness to collect faecal sample, perceived discomfort from bowel preparation or colonoscopy, fear of sedation or result/disease, and invasiveness of the investigation. (Komanduri et al., 2022; Issaka et al., 2022; Dolatkhah et al., 2022; Bell-Brown et al., 2022; Bie and Brodersen, 2018; Nielsen et al., 2021) These are all known barriers to screening uptake, but their possible role in the social inequalities in screening uptake is unknown. Use of less painful modalities, such as colon capsule endoscopy or CT colonography, may help increase participation in subgroups with high

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expected discomfort if fear of the colonoscopy plays a role. We aimed to investigate the expected discomfort from colonoscopy and colon capsule endoscopy between socioeconomic subgroups.

## 2. Methods

In a large randomized trial (CFC2015) in the Danish colorectal cancer screening program, participants in the intervention arm were offered the choice between colon capsule endoscopy and standard colonoscopy if their initial faecal immunochemical test was positive (threshold of 100 ng haemoglobin/mL buffer). Details of the CFC2015 protocol and interim analyses are provided elsewhere (Deding et al., 2021; Deding et al., 2022; Kaalby et al., 2020). This current study included those undergoing colon capsule endoscopy. Prior to the colon capsule endoscopy, participants were asked to fill out a questionnaire regarding their expected discomfort from colon capsule endoscopy and from standard colonoscopy as well as their educational level, household income and whether they previously had undergone colonoscopy. We used a think-aloud test as a qualitative validation act before using the questionnaire in the study (Duncker, 1945; Nielsen et al., 2002). In a population similar to that of our study, consecutive endoscopy patients answered the questionnaire while talking about their understanding of the task, and irrespective of their order of handling the two processes, we heard whether the questions were understood the way we intended. Rounds of testing were conducted, each time adjusting the questionnaire to mitigate the problems identified. After six rounds and a total of 38 patients, no misunderstandings occurred.

### 2.1. Expected discomfort

Questions regarding expected discomfort were answered by marking a visual analogue scale (VAS) ranging from 'No discomfort' to 'A very high degree of discomfort' (Fig. 1). Five questions were asked regarding colon capsule endoscopy and colonoscopy respectively, targeting discomfort expected from bowel cleansing, transportation to investigation, procedure, the rest of the day, and the following three days. The questions were provided in Danish but a naive translation has been prepared for this publication (Appendix A).

### 2.2. Socioeconomic status

Socioeconomic status was defined both by the highest achieved educational level and by household income. Educational level was divided into groups of elementary school, high school or vocational education, short higher education, and long higher education. Income was divided into annual household incomes of 300.000 DKK or less (46.130 USD), 300.000–500.000 DKK (46.130–76.884 USD), 500.000–700.000 DKK (76.884–107.638 USD), and >700.000 DKK (107.638 USD). The subgroups were arbitrarily set in the questionnaire, although reflecting the range of the income in the target population as determined previously (Deding et al., 2017).

### 2.3. Statistics and covariates

VAS scores were treated as continuous ordinal variables with severely skewed distributions described by mean and median. Therefore, non-parametric tests were applied. Univariate comparisons were performed using the Kruskal-Wallis rank sum test. Continuous ordinal regression models were conducted in order to test differences in VAS

scores (Heller et al., 2016; Manuguerra and Heller, 2010) between educational levels or between income quartiles, while adjusting for age, sex and previous colonoscopy experience. Age (49–59, 60–70, >70 years), sex (male, female) and previous colonoscopy experience (yes, no) were included as categorical variables. The assumption of normally distributed residuals was tested and confirmed for each regression model outcome (appendix B). The log-odds ratio estimates were then converted to odds ratios (OR) using the exponential function (Manuguerra et al., 2020) in order to ease the interpretation of the estimates. As the proportion of participants who had previously undergone colonoscopy was substantial, the multivariate regression models were repeated in the subsample with no prior experience. Data management and statistical analyses were performed in SAS (SAS Institute Inc. SAS 9.4. Cary, North Carolina, USA) and RStudio statistical software package, Version 1.2.5019 (R Core Team, 2017). Analyses and visualizations performed in R were completed using the ordinalCont and Publish packages (Manuguerra et al., 2020; Gerds and Ozenne, 2021). The significance level was set at 5%, and 95% confidence intervals (CI) were calculated. Non-responders were excluded from analysis.

### 2.4. Ethics

The study was approved by the Regional Health Research Ethics committee (journal number S-20190100), was registered with the Regional Data Protection Agency (journal number 19/29858), as well as with ClinicalTrials (identifier NCT04049357). All participants received verbal and written study information prior to participation and signed informed consent was obtained from each individual. The study was conducted in accordance with the declaration of Helsinki.

## 3. Results

All participants ( $n = 2031$ ) were handed the questionnaire and 2017 (99.3%) responded, although 308 (15.2%) and 16 (0.8%) did not answer the questions regarding socioeconomic status and prior colonoscopy respectively. Therefore, complete exposure response was obtained from 1693 (83.4%), while 1312 (64.6%) marked their expected procedural discomfort from colon capsule endoscopy and colonoscopy, and 1273 (62.7%) marked all the VAS regarding expected discomfort (Fig. 2).

The expected procedural discomfort from colon capsule endoscopy was significantly higher in participant with higher educational levels compared to lower, and in females compared to males. No significant differences were seen according to income, prior colonoscopy experience or age groups. The expected overall discomfort from colon capsule endoscopy was significantly higher in higher educational levels compared to lower, in higher income groups compared to lower, and in females compared to males. No significant differences were seen according to prior colonoscopy experience or age groups.

The expected procedural discomfort from colonoscopy was significantly higher in higher educational levels compared to lower, in higher income groups compared to lower, in females compared to males, and lower with lower age. No significant differences were seen according to prior colonoscopy experience. The expected overall discomfort from colonoscopy was significantly higher in higher educational levels compared to lower, in higher income groups compared to lower, in females compared to males, and in individuals with no previous colonoscopy experience. No significant differences were seen according to age groups (Table 1).

From multivariate continuous ordinal regressions, we found

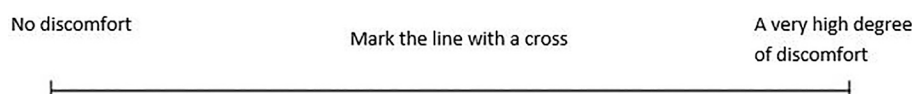
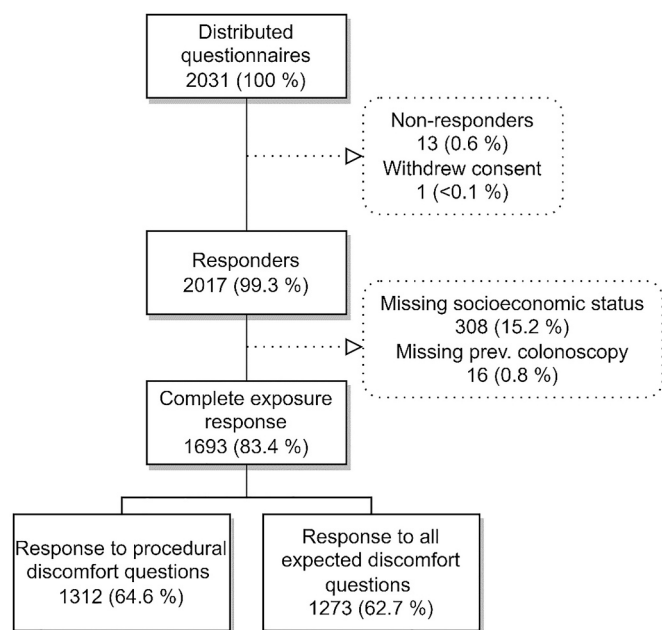


Fig. 1. Visual analogue scale applied in the study. Denmark (2020–2022).



**Fig. 2.** Flow of respondents. Participants included from colorectal cancer screening participants, Denmark (2020–2022).

significant differences in odds ratios for higher VAS score dependent on socioeconomic measures. Short higher, and long higher education were associated with a significant increase in odds of higher procedural discomfort expected from capsule endoscopy compared to elementary school (OR 1.52, and 1.67), whereas the odds of expected higher overall discomfort was significant for all educational levels compared to elementary school (OR 1.57, 1.83, and 1.93).

All educational levels were associated with a significant increase in odds of higher procedural discomfort from colonoscopy compared to elementary school (OR 1.52, 1.94, and 2.34), whereas the odds of higher overall discomfort was significant only in short higher, and long higher educational levels compared to elementary school (OR 1.74, and 1.77) (Fig. 3). Repeating the regression models for the subsample with no prior colonoscopy experience ( $n = 878$  for procedural discomfort,  $n = 852$  for overall discomfort) resulted in very similar estimates, although with less statistical power (Appendix C, Fig. C1).

Income level was not associated with significant differences in odds of expected procedural or overall discomfort from colon capsule endoscopy. High income level was associated with an increased odds of higher expected procedural and overall discomfort from colonoscopy (OR 1.46, and 1.62) compared to elementary school. (Fig. 4). Repeating the regression models for the subsample with no prior colonoscopy experience ( $n = 878$  for procedural discomfort,  $n = 852$  for overall discomfort) resulted in very similar estimates, although with less statistical power (Appendix C, Fig. C2). In all four models estimating odds ratios according to educational level there was a trend of higher odds ratio with each step of higher educational level (Fig. 3). In the models estimating odds ratios according to income there was a trend of similar odds in the three lowest groups and higher odds in the highest income group, with the exception of overall discomfort from colonoscopy (Fig. 4).

The median expected overall discomfort from both investigation modalities was higher with each educational level, with the exception of colonoscopy expectation in long higher educational level. The median expected overall discomfort from both investigation modalities was higher with each income level, with the exception of colon capsule endoscopy expectation in the lowest income levels.

The expected discomfort from bowel cleansing contributed the most to overall expected discomfort in colon capsule endoscopy, followed by

procedure, transport, the rest of the day, and the following three days, in that order. For colonoscopy, the main contributor was the procedure, followed by bowel cleansing, and the rest of the day. Transport and the following three days contributed the least (Fig. 5).

#### 4. Discussion

We aimed to investigate the expected discomfort from colonoscopy and colon capsule endoscopy between socioeconomic subgroups. Overall, the expected discomfort from the endoscopic modalities was higher with increasing socioeconomic status. This is the opposite of what we expected if the discrepancies in expected discomfort from the procedures should be a contributing factor to inequalities in screening uptake. This pattern may be caused by selection, as all individuals responding to our questionnaire participated in screening and have indicated a preference for colon capsule endoscopy. We only know the expected discomfort from individuals to whom the discomfort was not a barrier significant enough to keep them from participating. If the threshold of the level of discomfort accepted by patients also varies between socioeconomic strata, our result may be measures of acceptable discomfort levels. The mean VAS score of non-participants could be even higher. It would have been interesting to compare the socioeconomic and demographic composition of those choosing colon capsule endoscopy to those who chose colonoscopy. As the latter group have not given consent for participation, such analyses will have to await register-based follow-up.

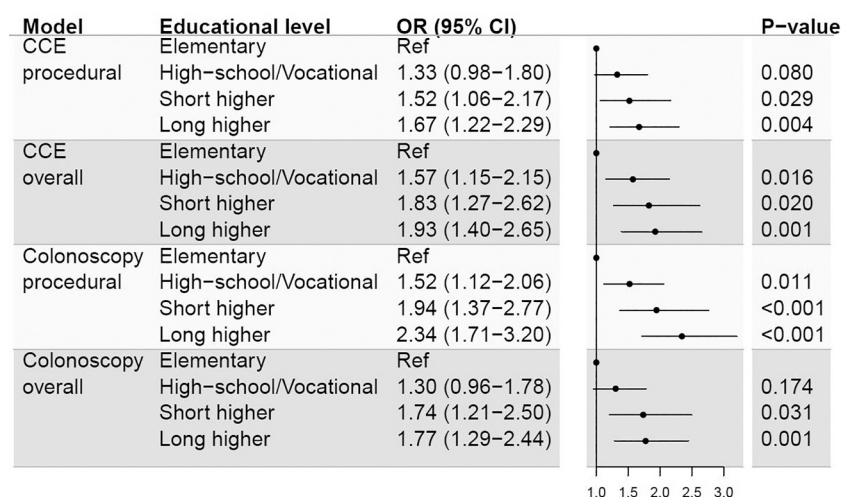
An American trial by Jonas et al. investigated colonoscopy patients' willingness-to-pay to avoid the discomfort and time spent from bowel preparation and the procedure. Those with a longer education (4-year college or more) were willing to pay more money to avoid the discomfort and time spent, compared to those with a shorter degree. (Jonas et al., 2010) This could indicate that those with a longer education expect a higher discomfort or inconvenience from colonoscopy than individuals of shorter educational level, or merely be because those of greater wealth have a higher willingness-to-pay in general. Ghanouni et al. reported that the most deprived individuals in the UK bowel screening programme more often experienced the colonoscopy as more uncomfortable than they expected, compared to the least deprived. They also experienced pain after discharge more often than the least deprived. (Ghanouni et al., 2016) There may be some misalignment of the expectations to colonoscopy and the experience for those of lower socioeconomic status in our trial as well. Whether this lack of congruence is due to e.g. the information material distributed in the screening programme or differing sources of information between socioeconomic strata is unknown. Even though the majority of screened individuals reported they felt that they had understood the risk of the colonoscopy procedure, the most deprived more commonly had not in the UK screening programme. (Ghanouni et al., 2016) In the end, we should strive to achieve agreement between expected and experienced discomfort, no matter the socioeconomic characteristics of the population, to make sure that the participants have understood what they agree to partake in.

The expected overall and procedural discomfort reported were higher in colonoscopy than in colon capsule endoscopy. However, direct comparison between the modalities' discomforts should be made with caution as all participants indicated a preference for colon capsule endoscopy prior to participation. Therefore, it may not be surprising that colonoscopy received a higher expected discomfort score from included individuals than colon capsule endoscopy did. What is interesting though is that the main contributor to expected overall discomfort in colonoscopy is the procedure itself, whereas in colon capsule endoscopy it is the bowel cleansing. The bowel cleansing was rated similar in both modalities and contributed substantially to the overall expected discomfort in both. Beebe et al. found the bowel cleansing to be the most troublesome part experienced by the patients, while insertion came in second with pain and embarrassment being further down the list. (Beebe

**Table 1**

Visual analogue scale score by subgroups, stratified by expected procedural and overall discomfort, and by investigation modality. Participants included from colorectal cancer screening participants, Denmark (2020–2022),  $n = 1312$  for procedural discomfort,  $n = 1273$  for overall discomfort.

Colon capsule endoscopy						
Subgroup	n (%)	Procedural discomfort (mean/ median)	p-value	n (%)	Overall discomfort (mean/ median)	p-value
Highest achieved educational level						
Basic school	190 (14.5)	32.8 / 21		183 (14.4)	157.1 / 138	
High school or vocational	451 (34.4)	35.7 / 29		443 (34.8)	180.1 / 164	
Short higher education	201 (15.3)	39.8 / 30		192 (15.1)	197.7 / 176.5	
Long higher education	470 (35.8)	41.5 / 34	<0.001	455 (35.7)	203.7 / 188	<0.001
Annual household income						
Low	294 (22.4)	37.8 / 32		283 (22.2)	182.7 / 164	
Medium-low	377 (28.7)	36.2 / 27		367 (28.8)	176.9 / 157	
Medium-high	290 (22.1)	37.9 / 30.5		282 (22.2)	194.4 / 175	
High	351 (26.8)	40.0 / 32	0.176	341 (26.8)	198.6 / 190	0.023
Previous colonoscopy						
No	878 (66.9)	37.2 / 30		852 (66.9)	186.7 / 168	
Yes	434 (33.1)	39.5 / 31	0.466	421 (33.1)	190.2 / 171	0.839
Gender						
Females	590 (45.0)	43.3 / 34		570 (44.8)	210.1 / 194.5	
Males	722 (55.0)	33.6 / 27	<0.001	703 (55.2)	169.9 / 152	<0.001
Age						
49–59	544 (41.5)	36.8 / 29		531 (41.7)	187.3 / 168	
60–70	539 (41.1)	39.9 / 32		522 (41.0)	196.0 / 181.5	
> 70	229 (17.5)	36.4 / 30	0.368	220 (17.3)	169.8 / 145	0.052
Colonoscopy						
Subgroup	n (%)	Procedural discomfort (mean/ median)	p-value	n (%)	Overall discomfort (mean/median)	p-value
Highest achieved educational level						
Elementary school	190 (14.5)	69.0 / 74		183 (14.4)	226.1 / 218	
High school or vocational	451 (34.4)	79.3 / 89		443 (34.8)	244.0 / 242	
Short higher education	201 (15.3)	93.4 / 107		192 (15.1)	286.9 / 287	
Long higher education	470 (35.8)	98.6 / 112	<0.001	455 (35.7)	293.9 / 286	<0.001
Annual household income						
Low	294 (22.4)	77.8 / 80.5		283 (22.2)	247.7 / 241	
Medium-low	377 (28.7)	84.2 / 97		367 (28.8)	254.7 / 248	
Medium-high	290 (22.1)	87.9 / 100		282 (22.2)	269.9 / 268.5	
High	351 (26.8)	96.6 / 109	<0.001	341 (26.8)	289.1 / 282	0.002
Previous colonoscopy						
No	878 (66.9)	88.9 / 104		852 (66.9)	276.9 / 276.5	
Yes	434 (33.1)	82.8 / 92.5	0.076	421 (33.1)	243.1 / 236	<0.001
Gender						
Females	590 (45.0)	97.8 / 115		570 (44.8)	300.2 / 301	
Males	722 (55.0)	78.0 / 80	<0.001	703 (55.2)	237.8 / 232	<0.001
Age						
49–59	544 (41.5)	92.2 / 107		531 (41.7)	267.7 / 260	
60–70	539 (41.1)	85.6 / 97		522 (41.0)	270.6 / 267.5	
> 70	229 (17.5)	77.3 / 81	<0.001	220 (17.3)	249.4 / 246	0.223



**Fig. 3.** Odds ratios of having a higher expected procedural and overall discomfort from colon capsule endoscopy and colonoscopy based on educational level\*. Participants included from colorectal cancer screening participants, Denmark (2020–2022),  $n = 1312$  for procedural discomfort,  $n = 1273$  for overall discomfort.

\*Models adjusted for income, prior colonoscopy experience, sex and age.  
CCE; colon capsule endoscopy.



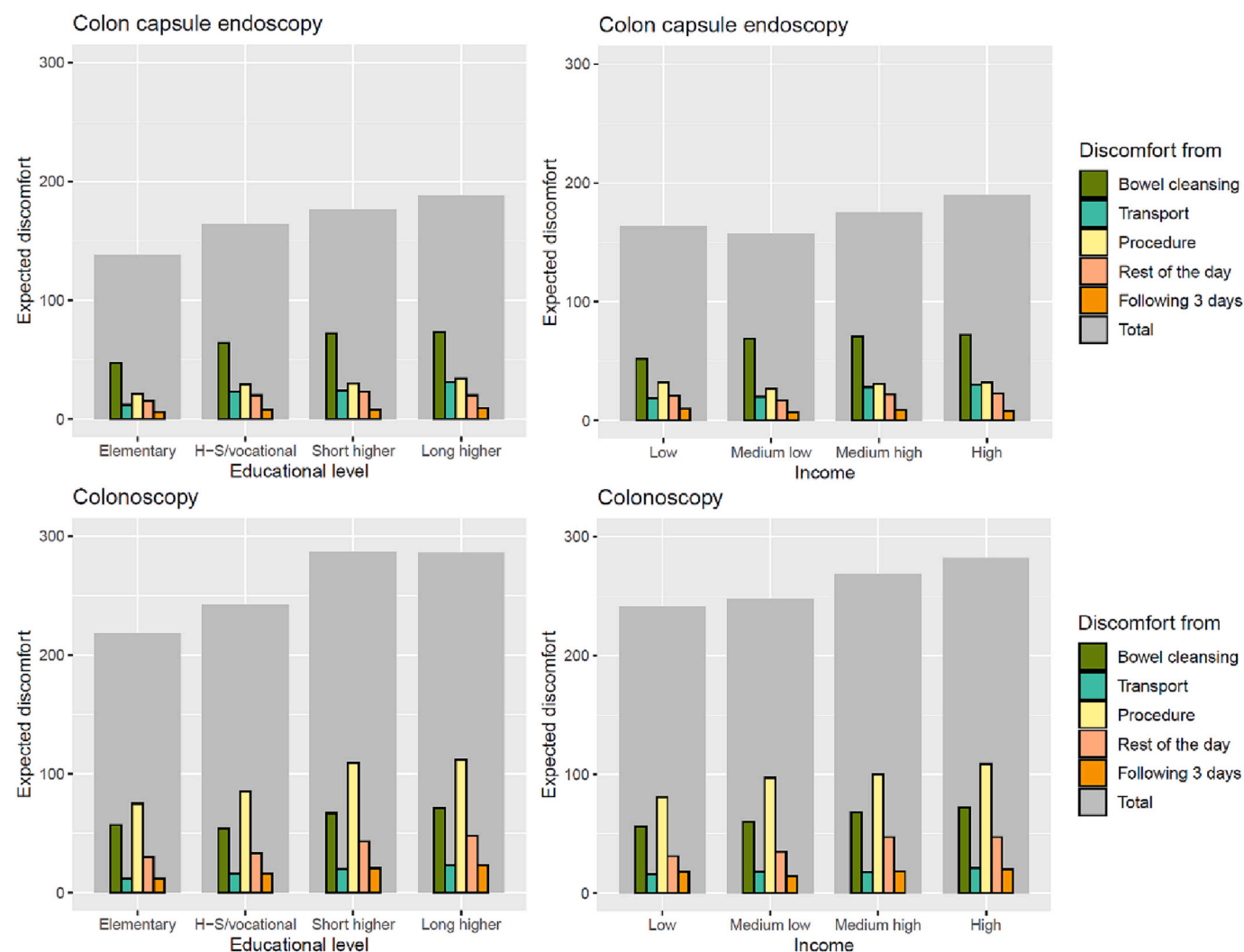
Model	Income	OR (95% CI)	P-value
CCE procedural	Low	Ref	
	Medium-Low	0.88 (0.66–1.16)	0.359
	Medium-High	1.04 (0.77–1.40)	0.817
	High	1.19 (0.87–1.62)	0.279
CCE overall	Low	Ref	
	Medium-Low	0.83 (0.63–1.10)	0.393
	Medium-High	1.11 (0.82–1.51)	0.725
	High	1.18 (0.87–1.62)	0.049
Colonoscopy procedural	Low	Ref	
	Medium-Low	1.15 (0.87–1.52)	0.344
	Medium-High	1.18 (0.88–1.59)	0.282
	High	1.46 (1.08–1.99)	0.022
Colonoscopy overall	Low	Ref	
	Medium-Low	1.07 (0.81–1.43)	0.909
	Medium-High	1.34 (0.99–1.83)	0.235
	High	1.62 (1.18–2.21)	0.024

0.5 1.0 1.5 2.0

**Fig. 4.** Odds ratios of having a higher expected procedural and overall discomfort from colon capsule endoscopy and colonoscopy based on income\*. Participants included from colorectal cancer screening participants, Denmark (2020–2022),  $n = 1312$  for procedural discomfort,  $n = 1273$  for overall discomfort.

\*Models adjusted for educational level, prior colonoscopy experience, sex and age.

CCE; colon capsule endoscopy.



**Fig. 5.** Median expected discomfort from each of the five elements included in the overall expected discomfort VAS score<sup>†</sup>, stratified by investigation modality and socioeconomic measure. Participants included from colorectal cancer screening participants, Denmark (2020–2022),  $n = 1273$ .

<sup>†</sup> expected discomfort for each element can range from 0 to 150 and the maximum total reportable value was therefore 750.

et al., 2007) A reduction of the bowel preparation regimens or interventions aimed at limiting possible anxiety to bowel preparation could be a reasonable way of minimizing expected discomfort in patients. We found a statistically significant difference between expected discomfort between women and men, but as expectations will partly be formed by earlier experiences, this result must not wonder. It seems evident, that females experience more pain than males.(Pieretti et al., 2016) Further, in our study, individuals who had previously undergone colonoscopy reported significantly lower expected discomfort than those who had not. The experienced discomfort is therefore probably lower than the expected. This discrepancy between experienced and expected discomfort indicates an information gap where the word on the street is an exaggeration of the experience. If indeed colon capsule endoscopy holds a lower expected discomfort in the screening population, an offer of this investigation may potentially increase the overall uptake. However, with our results, it seems unlikely that it will decrease the social inequality.

## 5. Conclusion

Procedural and overall expected discomfort from colonoscopy and colon capsule endoscopy were higher with increasing socioeconomic status as measured by educational level. When estimating socioeconomic status by income, only the highest income quartile differed significantly from lowest income quartile. Individuals with prior colonoscopy experience reported significantly lower expected overall discomfort from colonoscopy. In contrast to our hypothesis prior to the study, the expected discomfort was lower in lower socioeconomic strata. Therefore, the expected discomfort from endoscopic procedures does not seem to be a significant contributing factor to the social inequalities in colorectal cancer screening uptake. Although, the generalizability of the results may be limited, as only individuals who preferred colon capsule endoscopy were included.

## Funding and conflicts of interest

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## Appendix A

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## CRediT authorship contribution statement

**Ulrik Deding:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. **Henrik Bøggild:** Formal analysis, Methodology, Software, Supervision, Validation, Visualization, Writing – review & editing. **Gunnar Baatrup:** Conceptualization, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Writing – review & editing. **Lasse Kaalby:** Data curation, Funding acquisition, Investigation, Methodology, Software, Supervision, Validation, Writing – review & editing. **Jacob Hjelmberg:** Data curation, Formal analysis, Methodology, Software, Supervision, Validation, Visualization, Writing – review & editing. **Marianne Kirstine Thygesen:** Conceptualization, Investigation, Methodology, Supervision, Writing – review & editing. **Benedicte Schelde-Olesen:** Investigation, Methodology, Resources, Writing – review & editing. **Morten Kobaek-Larsen:** Conceptualization, Funding acquisition, Investigation, Methodology, Project administration, Supervision, Writing – review & editing.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

The authors do not have permission to share data.



## THESE QUESTIONS ARE REGARDING THE COLON CAPSULE ENDOSCOPY



**Block 4. We would like to know more about your experience and expectations for colon capsule endoscopy.**

For the following questions, you are asked to mark each line with a cross indicating the degree of discomfort you expect.

**1. What degree of physical and mental discomfort do you expect overall from the bowel cleansing?**

No discomfort

Mark the line with a cross

A very high degree  
of discomfort



**2. What degree of physical and mental discomfort do you expect overall from the transportation to the hospital?**

No discomfort

Mark the line with a cross

A very high degree  
of discomfort



**3. What degree of physical and mental discomfort do you expect overall from the capsule investigation from ingestion and until excretion of the capsule?**

No discomfort

Mark the line with a cross

A very high degree  
of discomfort



**4. What degree of physical and mental discomfort do you expect during the rest of the day?**

No discomfort

Mark the line with a cross

A very high degree  
of discomfort



**5. What degree of physical and mental discomfort do you expect during the following three days?**

No discomfort

Mark the line with a cross

A very high degree  
of discomfort



**Fig. A1.** Questions providing the visual analogue scale scores from the participants regarding colon capsule endoscopy (translated for this publication from Danish)

## THESE QUESTIONS ARE REGARDING THE COLONOSCOPY



ODU  
Odense Universitetshospital  
Svendborg Sygehus



**Block 5. As some will have to undergo colonoscopy following the capsule endoscopy, we would like to know about your expectations for that type of investigation.**

**1. What degree of physical and mental discomfort do you expect overall from the bowel cleansing?**

No discomfort

Mark the line with a cross

A very high degree  
of discomfort



**2. What degree of physical and mental discomfort do you expect overall from the transportation to the hospital?**

No discomfort

Mark the line with a cross

A very high degree  
of discomfort



**3. What degree of physical and mental discomfort do you expect overall from the procedure?**

No discomfort

Mark the line with a cross

A very high degree  
of discomfort



**4. What degree of physical and mental discomfort do you expect during the rest of the day?**

No discomfort

Mark the line with a cross

A very high degree  
of discomfort



**5. What degree of physical and mental discomfort do you expect during the following three days?**

No discomfort

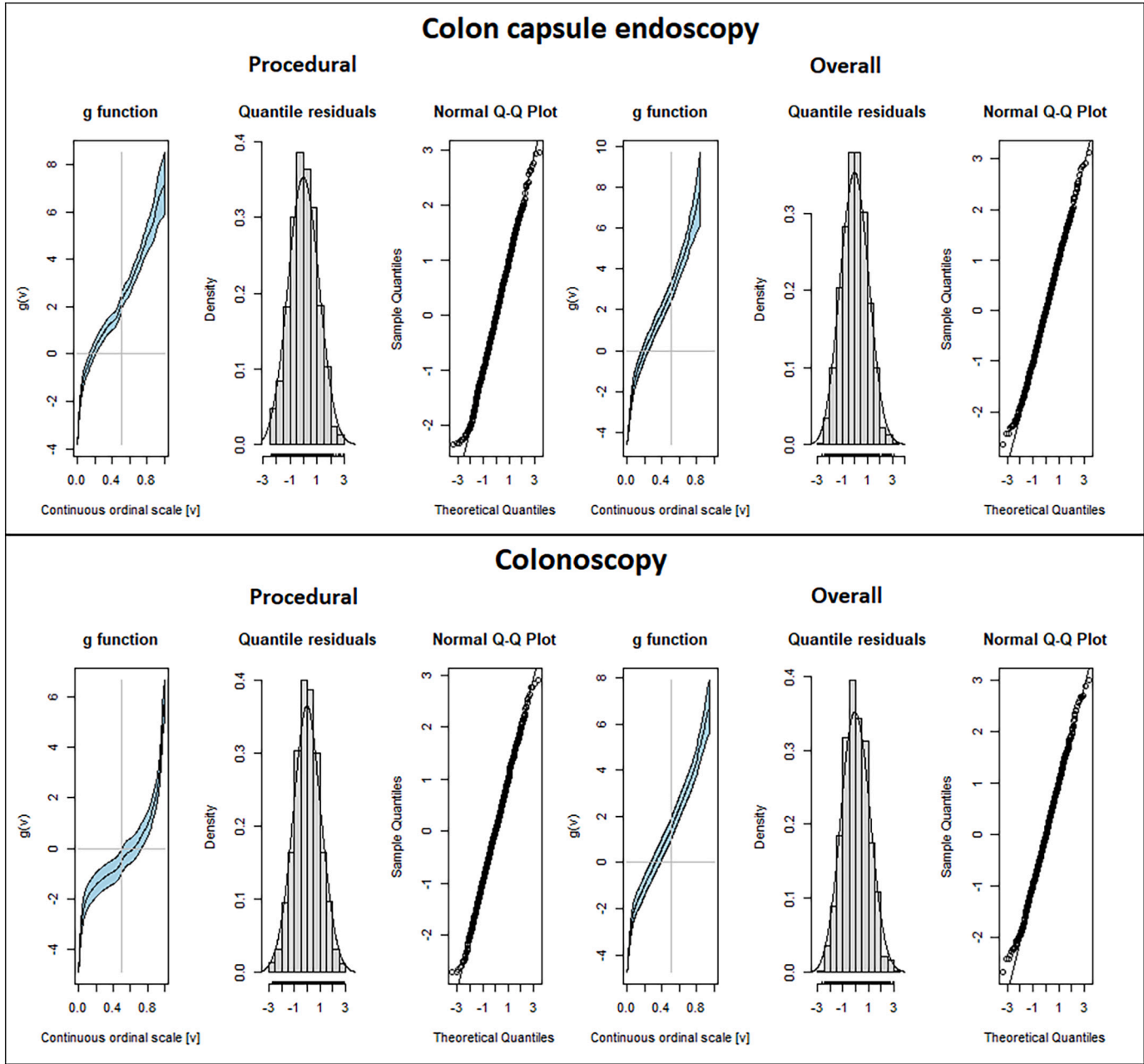
Mark the line with a cross

A very high degree  
of discomfort



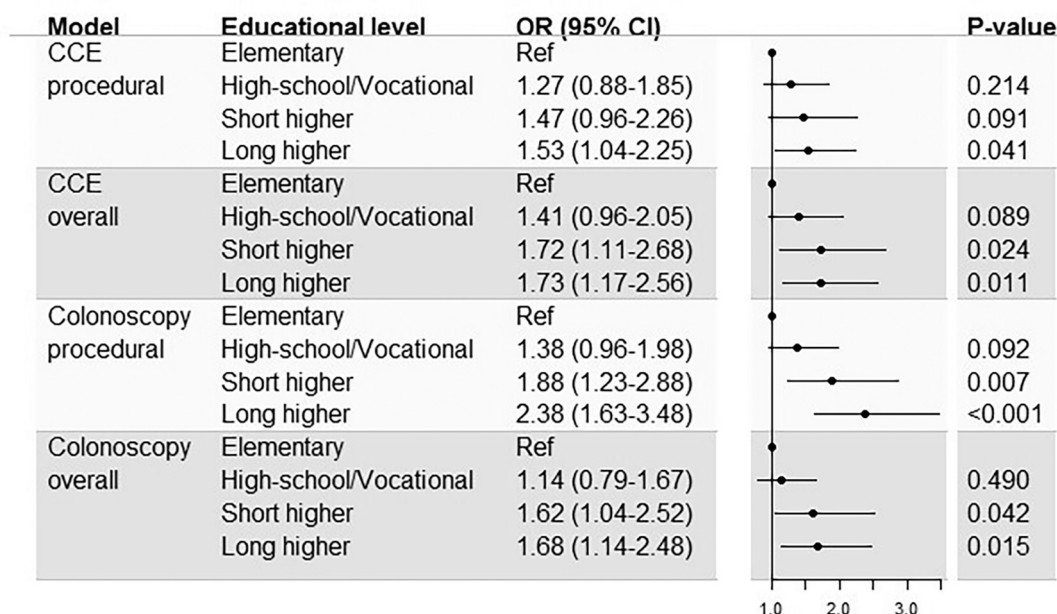
**Fig. A2.** Questions providing the visual analogue scale scores from the participants regarding colonoscopy (translated for this publication from Danish)

Appendix B



**Fig. B1.** Estimated g functions, histograms of quantile residuals and quantile residual normal Q-Q plots for each of the fitted models of VAS scores in colon capsule endoscopy (A) and colonoscopy (B).

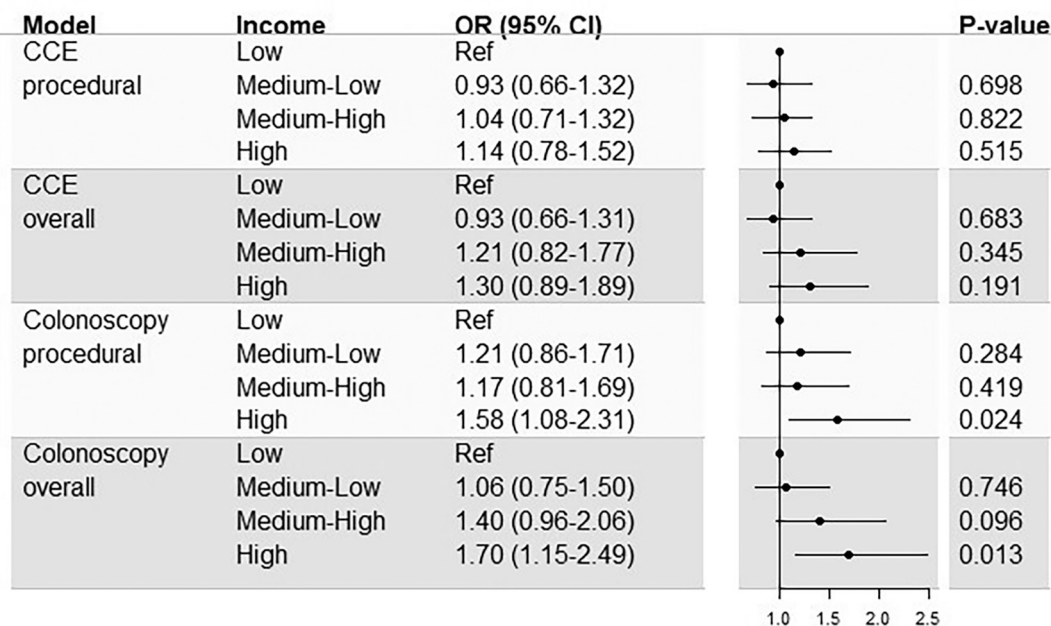
Appendix C



**Fig. C1.** Odds ratios of having a higher expected procedural and overall discomfort from colon capsule endoscopy and colonoscopy based on educational level\*,  $n = 878$  for procedural discomfort,  $n = 852$  for overall discomfort

\*Models adjusted for income, prior colonoscopy experience, sex and age.

CCE; colon capsule endoscopy.



**Fig. C2.** Odds ratios of having a higher expected procedural and overall discomfort from colon capsule endoscopy and colonoscopy based on income\*,  $n = 878$  for procedural discomfort,  $n = 852$  for overall discomfort.

\*Models adjusted for educational level, prior colonoscopy experience, sex and age.

CCE; colon capsule endoscopy.

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