

Patient barriers and facilitators of colonoscopy use: A rapid systematic review and thematic synthesis of the qualitative literature

Robert S. Kerrison, Dahir Sheik-Mohamud, Emily McBride, Katriina L. Whitaker, Colin Rees, Stephen Duffy, Christian von Wagner



PII: S0091-7435(20)30444-8

DOI: <https://doi.org/10.1016/j.ypped.2020.106413>

Reference: YPMED 106413

To appear in: *Preventive Medicine*

Received date: 7 September 2020

Revised date: 3 December 2020

Accepted date: 30 December 2020

Please cite this article as: R.S. Kerrison, D. Sheik-Mohamud, E. McBride, et al., Patient barriers and facilitators of colonoscopy use: A rapid systematic review and thematic synthesis of the qualitative literature, *Preventive Medicine* (2021), <https://doi.org/10.1016/j.ypped.2020.106413>

This is a PDF file of an article that has undergone enhancements after acceptance, such as the addition of a cover page and metadata, and formatting for readability, but it is not yet the definitive version of record. This version will undergo additional copyediting, typesetting and review before it is published in its final form, but we are providing this version to give early visibility of the article. Please note that, during the production process, errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

**Patient barriers and facilitators of colonoscopy use: a rapid systematic review and thematic synthesis of the qualitative literature.**

**Authors:** Robert S Kerrison PhD<sup>1\*</sup>, Dahir Sheik-Mohamud MSc<sup>1</sup>, Emily McBride CPsychol<sup>1</sup>, Katriina L Whitaker PhD<sup>2</sup>, Colin Rees FRCP<sup>3,4</sup>, Stephen Duffy MSc<sup>4</sup> and Christian von Wagner PhD<sup>1</sup>

**Affiliations:** <sup>1</sup>Department of Behavioural Science and Health, University College London, London, UK; <sup>2</sup>School of Health Sciences, University of Surrey, Surrey, UK; <sup>3</sup>Population Health Sciences Institute, Newcastle University Centre for Cancer, Newcastle University, Newcastle Upon Tyne, UK; <sup>4</sup>Department of Gastroenterology, South Tyneside NHS Foundation Trust, South Shields, UK; <sup>5</sup>Wolfson Institute, Queen Mary University London, London, UK.

**\*Corresponding author:** Dr Robert S Kerrison, Department of Behavioural Science and Health, University College London, London, WC1E 7HB, UK; E-mail: Robert.Kerrison.13@ucl.ac.uk; Phone: +44 (0)20 76791723

**Key words:** Colonoscopy; Screening; Surveillance; Diagnosis; Barriers; Facilitators; Thematic Synthesis; Review.

**Abstract word count:** 250; **Main word count:** ~4,500; **Figures:** 2, **Tables:** 3

**ABSTRACT** (250 words)

Colonoscopy is the gold standard test in the diagnosis of colorectal cancer. Despite this, many people across the world decline the procedure when invited for screening, surveillance or diagnostic evaluation. The aim of this review was to characterise the barriers and facilitators of colonoscopy use described in the qualitative literature.

We searched PubMed and PsychInfo for studies that explored barriers and facilitators of colonoscopy use. To determine the eligibility of studies, we first reviewed titles, then abstracts, and finally the full paper. We started with a narrow search, which we expanded successively, until the number of new publications eligible after abstract review was <1% of the total number of publications identified. Papers were eligible if they: 1) focussed on an adult population, 2) used a qualitative research design and, 3) described at least one patient-related theme regarding colonoscopy use. We then extracted qualitative data from eligible papers and analysed using thematic synthesis.

Fifty-seven studies met the inclusion criteria. Most explored barriers and facilitators of screening colonoscopy (n=53, 93.0%) and were conducted in the USA (n=48, 84.2%). Key psychological and social factors included: 'fear of pain and discomfort', 'concerns about doing the bowel preparation', and whether the test was recommended by the patient's physician. Key practical factors included cost, and whether colonoscopy was covered by the patient's healthcare insurance.

Studies mostly focussed on screening colonoscopy in the USA, where there is no universal healthcare coverage. To better understand the barriers and facilitators in other contexts, further research is needed.

### **Abbreviations**

CRC – Colorectal cancer

ENTREQ – Enhancing Transparency in Reporting the Synthesis of Quantitative Research

FIT – Faecal immunochemical test

FS – Flexible Sigmoidoscopy

PRISMA – Preferred Reporting Items for Systematic Reviews and Meta-Analyses

### **1. Introduction.**

Colonoscopy is widely considered the gold standard procedure in the investigation of colorectal cancer (CRC, also referred to as 'bowel cancer'; Cancer Research UK., 2018). It is recommended for both the diagnosis and surveillance of malignancy by several national and international organisations, including the United States Preventive Services Task Force (Levin et al., 2008), the Asia Pacific Colorectal Cancer Working Group (Sung et al., 2008; Sung et al., 2015) and the Council of the European Union (The Council of the European Union., 2003). Colonoscopy is also recommended as a screening modality in many countries, including Austria, Germany, Norway, Argentina, the USA and China (Schreuders et al., 2015).

Despite being widely recommended, colonoscopy is often underutilised. A recent international survey of screening programmes found the mean proportion of participants with a positive faecal immunochemical test (FIT) who complete colonoscopy was only 79% (Selby et al., 2020). Results were similar for a review of studies exploring compliance with surveillance colonoscopy, which found that compliance ranged from 52% in a large Midwestern US health maintenance organisation, to 85% in the state of Florida (Rapuri et al., 2008).

Not attending colonoscopy is associated with a range of adverse health outcomes, including increased risk of CRC, advanced stage at diagnosis, and CRC death (Beshara et al., 2019; Corley et al., 2017; Lee et al., 2017). As a result, there has been much interest in understanding the barriers and facilitators of colonoscopy use. Indeed, there have been a number of qualitative reviews on the topic (e.g. Guessous et al., 2010; McLachlan et al., 2012; Honein-AbouHaidar et al., 2016; Bromley et

al., 2015; Lim et al., 2020). Several of these reviews have synthesised findings from studies exploring the use of colonoscopy, as well as other CRC investigations (e.g. FIT), limiting the extent to which they can be used to explain modality-specific barriers and facilitators of colonoscopy (Honein-AbouHaidar et al., 2016; Guessous et al., 2010). Others have focussed exclusively on screening colonoscopy, either in the general population (McLachlan et al., 2015), or among African American men and women, specifically (i.e. Bromley et al., 2015), and thus omitted studies exploring the barriers and facilitators of other indications, such as surveillance and follow-up of abnormal screening results.

A very recent review has, for the first time, attempted to synthesise the barriers and facilitators towards colonoscopy across multiple indications (Lim et al., 2020). This review, however, synthesised findings from studies conducted with healthcare providers, as well as patients, without differentiating between them. As such, the findings may not reflect the barriers and facilitators as they are perceived by patients. Furthermore, a number of potentially relevant papers were not included (e.g. Sultan et al., 2017 and Wong et al., 2013), including an important study by L'enberg and colleagues (2005), which included a large number of decliners: a group that other studies have found difficult to recruit (e.g. Bie and Brodesen, 2018). Finally, the age limit ( $\geq 45$  years), which was based on screening guidelines proposed by the American Society of Colon and Rectal Surgeons (Surgeons 2020), may have prohibited the inclusion of several others, which include younger adults (e.g. Enumah et al., 2018; Sly et al., 2013; Thompson et al., 2011).

In summary, the existing evidence base does not include a focused synthesis of studies specifically exploring barriers and facilitators toward colonoscopy, from the patients' perspective. The aim of this review, therefore, was to address this gap.

As an answer to our research question was required within a relatively short timeframe (the review was conducted as part of a fellowship, funded by Cancer Research UK [Ref: C68512/A28209], with three months allocated to the literature review stage), a rapid review method was employed (Kerrison et al., 2020).

## **2. Methods**

Rather than using the customary search strategy associated with systematic reviews, we began with a narrow search and expanded successively (by adding additional terms using the Boolean operator 'OR'), until the number of new publications eligible for inclusion after title and abstract review was <1% of the total (see Table 1). The major assumption being that, if successive searches yield diminishing numbers of potentially eligible publications, and the most recent expansion yields a relatively small addition to the pool, stopping the expansion is unlikely to lead to a major loss of information. This strategy has previously been used by Duffy and colleagues (2017), who found that the majority of papers (92%; 60/65) were identified prior to reference list searches (Duffy et al., 2017).

### *2.1. Search strategy and study selection*

The search string was split into three components: the reason for the test (e.g. surveillance), the study design (e.g. focus groups), and the study outcome (e.g. compliance). In the initial search (run in PubMed), three key words were included for each of the three categories (see Table 1). Successive searches then expanded the search string by adding one additional term to each of the categories (the search terms used were informed by previous reviews; the term 'colorectal cancer' was deliberately omitted from the searches to minimise the number of irrelevant publications requiring title and abstract review; i.e. those relating to other CRC screening tests, such as FIT). The combination and order in which search terms were added to the search string was based on the total number of publications identified in PubMed (see <https://osf.io/6de7b/>), with the combination identifying the largest number of publications (at a given stage) being the combination selected (this was to ensure we did not stop expanding the search prematurely, i.e. due to a small number of papers being identified and assessed). The titles and abstracts of newly identified publications were then screened, prior to expanding the search further. This process of expanding the search terms and screening the titles and abstracts of publications continued until the number of new publications eligible on abstract review, for the most recent search, was <1% of the total number of publications identified (Table 2). The search string used in the final search was also used in PsychInfo, to encompass additional relevant publications not available on PubMed. All searches were performed in April 2020.

**Table 1.** Results of successively broadening the search terms until newly identified papers potentially eligible on abstract review was < 1% of the total papers found by the search.

<b>PubMed Search String<sup>a</sup>:</b>	<b>Number of Publications:</b>	<b>Number of publications selected by one or two reviewers on title review:</b>	<b>New publications selected by one or two reviewers on abstract review:</b>	<b>% of publications eligible:</b>
<b>Search 1.</b> ((Colonoscopy) AND (Screening OR Surveillance OR Follow-up)) AND (Interviews OR Focus Groups) AND (Barriers OR Facilitators))	53	38	23	43%
<b>Search 2.</b> ((Colonoscopy) AND (Screening OR Surveillance OR Follow-up OR symptoms) AND (Interviews OR Focus Groups OR Discussion) AND (Barriers OR Facilitators OR Participation))	100	50	5	5%
<b>Search 3.</b> ((Colonoscopy) AND (Screening OR Surveillance OR Follow-up OR symptoms OR Diagnostic) AND (Interviews OR Focus Groups OR Discussion OR Interview) AND (Barriers OR Facilitators OR Participation OR Adherence))	160	80	4	3%

<b>Search 4.</b> ((Colonoscopy) AND (Screening OR Surveillance OR Follow-up OR symptoms OR Diagnostic OR Emergency) AND (Interviews OR Focus Groups OR Discussion OR Interview OR Qualitative) AND (Barriers OR Facilitators OR Participation OR Adherence OR Compliance))	196	94	6	3%
<b>Search 5.</b> ((Colonoscopy) AND (Screening OR Surveillance OR Follow-up OR symptoms OR Diagnostic OR Emergency OR Referral) AND (Interviews OR Focus Groups OR Discussion OR Interview OR Qualitative OR Mixed Methods) AND (Barriers OR Facilitators OR Participation OR Adherence OR Compliance OR Reasons))	222	103	1	<1%

## 2.2. Inclusion / exclusion criteria

Publications were eligible for inclusion if they: 1) focussed on an adult population (18+) eligible or referred for surveillance, diagnostic, or screening colonoscopy, 2) used a qualitative research design, or included primary qualitative data that could be extracted (e.g. from mixed-methods research), 3) described at least one-patient-related theme regarding colonoscopy participation / non-participation and, 4) were published in a peer-reviewed journal available in English. Publications were excluded if they: 1) only included the views of healthcare professionals or commissioners (e.g. policymakers), 2) used descriptive data recorded in patient medical records (e.g. electronic health records data recorded by administrators / healthcare professionals) or 3) reported themes in such a way that the source or test was not clear (some papers explored the views of both patients and healthcare professionals, while others explored patient views toward multiple CRC screening tests).

Further clarification regarding the eligibility criteria for publications is provided in Table 2.

**Table 2.** PICOS eligibility criteria (Higgins et al., 2019)

P	Population	Adults, aged 18 years or older, who were invited for or eligible for a screening, surveillance or diagnostic colonoscopy
I	Intervention, prognostic factor, or Exposure	N/A

C	Comparison	N/A
O	Outcome you would like to measure or achieve	Qualitative data reporting barriers and facilitators of colonoscopy use
S	Study design	Qualitative and mixed methods study designs
	Other	Published in a peer reviewed journal, available in English

### 2.3. Screening

Titles and abstracts were screened by two reviewers (RK and DSM). Each reviewer assigned publications a value of 1 ('include') or 0 ('exclude'). Inter-rater agreement between reviewers was assessed using Cohen's Kappa (Cohen et al., 1960). As Cohen's Kappa was only 0.64, which is considered 'moderate agreement' (McHugh, 2012), the reviewers decided to assess the full text of all publications assigned a score of 1 by either reviewer (thereby minimising the risk of excluding potentially relevant papers). As with titles and abstracts, each reviewer assigned the full texts of publications a value of 1 or 0. Unlike title and abstract review, however, disagreements regarding the full-text were resolved through discussion and, where necessary, independent assessment and discussion with a neutral arbitrator (EM). The reference lists of selected publications were then searched for further publications that, in turn, were subject to title, abstract and full paper assessment. The same process of searching the reference lists of selected papers was applied to relevant reviews (Bromley et al., 2015; Dalton et al., 2017; Guessous et al., 2010; Honein-AbouHaidar et al., 2016; McLachlan et al., 2012; Rapuri et al., 2008) detected through the searches. As Lim and colleagues (2020) review was not published until after the searches and thematic synthesis had been completed, the reference list of their review was not searched as part of the process.

### 2.4. Data extraction

Data on the barriers and facilitators of colonoscopy were extracted from selected papers by one reviewer (DSM), with a proportion (10%) checked for quality assurance by a second reviewer (RK). Data on the author, year of publication, study setting, programme type, design, sample size, analysis, reason for colonoscopy and ethnicity, sex, age and colonoscopy status of participants were also extracted. All data were extracted using customised Excel templates.

### 2.5. Data analysis

Data on the barriers and facilitators of colonoscopy were analysed using thematic synthesis (Thomas & Harden, 2008). Two authors (RK and DSM) coded the results section of each included article (using line by line coding) and developed descriptive themes through inductive analysis, involving comparison, re-examination, and grouping of codes. Descriptive themes were shared with and considered by all authors to ensure they were consistent and apposite. Descriptive themes were

grouped and analytical themes were developed through an iterative process of reflection on, and interpretation of the descriptive themes within and across studies. The number of papers in which themes were identified was also reported, to help assess the extent to which they might be important.

### *2.6. Rigour*

Interpretive validity was achieved through the use of two independent reviewers (RK and DSM) in the data extraction phase (Thomas & Harden, 2008). After each stage of data synthesis, two reviewers (RK and DSM), plus a third reviewer (EM), discussed the thematic findings and resolved disagreements to help maintain theoretical validity (i.e. reliability of data interpretation; Sandelowski et al., 2006). Pragmatic validity (i.e. efficacy and transferability of findings) was improved by the inclusion of study characteristic tables, which provide the context around the studies, allowing readers to judge the usefulness of findings (Thomas & Harden, 2008).

### *2.7 Transparency*

The reporting of this rapid systematic review and qualitative synthesis follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ) guidelines (Appendix 1) (Tong et al., 2012). All decisions regarding the eligibility of studies are documented in the appendices for further transparency (see <https://osf.io/6de7b/3>). An audit trail detailing the thematic synthesis process is also provided (see <https://osf.io/6de7b/>).

## **3. Results.**

### *3.1. Study results*

After title and abstract review, 42 papers from the database searches were deemed eligible. On full paper review, 10 were subsequently excluded. From the reference lists of the remaining 32 papers, and the 6 identified review papers, a further 25 articles were added, bringing the total number of papers included to 57 (see Figure 1 for PRISMA flowchart).

**Figure 1.** PRISMA flowchart.

### *3.2. Study characteristics*

A summary of the basic attributes of the studies is presented in Table 3 (for a detailed description of each individual study, please see Table 4). A total of 3,595 participants were included across the 57 studies. The majority of papers reported studies that were performed in the USA (n=48, 84.2%), examined barriers and facilitators of screening colonoscopy (n=53, 93.0% [predominantly within the context of opportunistic screening programmes: n=49, 85.60%]), used either focus groups (n=27, 47.35%) or interviews (n=22, 38.60%) as the sole means to collect qualitative data, included both



individuals who had attended or not attended a colonoscopy (n=44, 77.20%), and a mix of men and women (n=51, 89.5%), as well as a mix of ethnic groups (n=23, 40.35%; Tables 3 and 4).

**Table 3.** Summary of articles included in the review

Design feature	Number of studies	References
<b>Country</b>		
USA	48 (84.20%)	Bass et al., 2011; Beeker et al., 2000; Calderwood et al., 2020; Clark et al., 2008; Denberg et al., 2005; Dominic et al., 2012; Dyer et al., 2019; Enumah et al., 2018; Fernandez et al., 2018; Francois et al., 2009; Friedeman-Sanchez et al., 2006; Fyffe et al., 2008; Getrich et al., 2012; Goldsmith and Chairou 2008; Goodman et al., 2006; Green et al., 2008; Greiner et al., 2012; Greiner et al., 2005; Griesinger et al., 2006; Hatcher et al 2011; Hennelly et al., 2014; Holt et al., 2004; James et al., 2013; Jilcott-Pitts et al., 2013; Jones et al., 2010; Jung et al., 2017; Katz et al., 2004; Kimura et al., 2014; Lewis et al., 2006; May et al., 2015; Muthukrishnan et al., 2019; Palmer et al., 2008; Palmer et al., 2010; Rawl et al., 2000; Ruffin et al., 2009; Salas-Lopez et al., 2007; Shaw et al., 2007; Sly et al., 2013; Sultan et al., 2017; Tarasenko & Schoenberg 2011; Tarasenko et al 2011; Tessaro et al., 2006; Verla et al., 2010; Wackerhart et al., 2005; Weaver et al., 2015; Winterich et al., 2009; Winterich et al., 2011; Wong et al., 2013
Canada	5 (8.80%)	Goel et al., 2004; Hoffman-Goetz et al., 2008; Llovet et al., 2018;
New Zealand	2 (3.50%)	McGarragle 2019, Ritvo et al., 2013
Denmark	1 (1.75%)	Bong & Cool 2011, Thompson et al., 2011
Singapore	1 (1.75%)	Bie & Brodersen 2018
Tan et al., 2017		
<b>Programme type</b>		
Opportunistic	49 (85.97%)	Bass et al., 2011; Beeker et al., 2000; Clark et al., 2008; Denberg et al., 2005; Dominic et al., 2012; Dyer et al., 2019; Enumah et al., 2018; Fernandez et al., 2018; Francois et al., 2009; Friedeman-Sanchez et al., 2006; Fyffe et al., 2008; Getrich et al., 2012; Goldsmith and Chairou 2008; Goel et al., 2004; Goodman et al., 2006; Green et al., 2008; Greiner et al., 2012; Greiner et al., 2005; Griesinger et al., 2006; Hatcher et al 2011; Hennelly et al., 2014; Hoffman-Goetz et al., 2008; Holt et al., 2004; James et al., 2013; Jilcott-Pitts et al., 2013; Jones et al., 2010; Jung et al., 2017; Katz et al., 2004; Kimura et al., 2014; Lewis et al., 2006; May et al., 2015; Muthukrishnan et al., 2019; Palmer et al., 2008; Palmer et al., 2010; Rawl et al., 2000; Ruffin et al., 2009; Salas-Lopez et al., 2007; Shaw et al., 2007; Sly et al., 2013; Sultan et al., 2017; Tarasenko & Schoenberg 2011; Tarasenko et al 2011; Tessaro et al., 2006; Verla et al., 2010; Wackerhart et al., 2005; Weaver et al., 2015; Winterich et al., 2009; Winterich et al., 2011; Wong et al., 2013
Organised	5 (8.77%)	Bie & Brodersen, 2018; Llovet et al., 2018; McGarragle et al., 2019;
None	2 (3.51%)	Ritvo et al., 2013; Tan et al., 2017
Not reported	1 (1.75%)	Bong & Cool, 2011; Thompson et al., 2011
Calderwood et al., 2020;		
<b>Colonoscopy reason</b>		
Screening colonoscopy	53 (93.00%)	Bass et al., 2011; Beeker et al., 2000; Bong & Cool 2011; Clark et al., 2008; Denberg et al., 2005; Dominic et al., 2012; Dyer et al., 2019;

		Enumah et al., 2018; Fernandez et al., 2018; Francois et al., 2009; Friedeman-Sanchez et al., 2006; Fyffe et al., 2008; Getrich et al., 2012; Goel et al., 2004; Goldsmith and Chairo 2008; Goodman et al., 2006; Green et al., 2008; Greiner et al., 2012; Greiner et al., 2005; Griesinger et al., 2006; Hatcher et al 2011; Hennelly et al., 2014; Hoffman-Goetz et al., 2008; Holt et al., 2004; James et al., 2013; Jilcott-Pitts et al., 2013; Jones et al., 2010; Jung et al., 2017; Katz et al., 2004; Kimura et al., 2014; Lewis et al., 2006; May et al., 2015; McGarragle 2019; Muthukrishnan et al., 2019; Palmer et al., 2008; Palmer et al., 2010; Rawl et al., 2000; Ritvo et al., 2013; Ruffin et al., 2009; Salas-Lopez et al., 2007; Shaw et al., 2007; Sly et al., 2013; Tan et al., 2017; Tarasenko & Schoenberg 2011; Tarasenko et al 2011; Tessaro et al., 2006; Thompson et al., 2011; Verla et al., 2010; Wackerhart et al., 2005; Weaver et al., 2015; Winterich et al., 2009; Winterich et al., 2011; Wong et al., 2013
Diagnostic colonoscopy	2 (3.50%)	Bie & Brodersen 2018; Llovet et al., 2018
Surveillance colonoscopy	1 (1.75%)	Calderwood et al., 2020
Multiple reasons	1 (1.75%)	Sultan et al., 2017
<b>Colonoscopy status</b>		
Both had colonoscopy and never had colonoscopy	44 (77.20%)	Bass et al., 2011; Beeker et al., 2000; Bong & Cool 2011; Dyer et al., 2019; Enumah et al., 2018; Fernandez et al., 2018; Fyffe et al., 2008; Getrich et al., 2012; Goel et al., 2004; Goldsmith and Chairo 2008; Goodman et al., 2006; Green et al., 2008; Greiner et al., 2005; Griesinger et al., 2006; Hatcher et al 2011; Hennelly et al., 2014; Holt et al., 2004; James et al., 2013; Jilcott-Pitts et al., 2013; Jones et al., 2010; Jung et al., 2017; Katz et al., 2004; Kimura et al., 2014; Lewis et al., 2006; May et al., 2015; McGarragle 2019; Muthukrishnan et al., 2019; Palmer et al., 2008; Palmer et al., 2010; Rawl et al., 2000; Ritvo et al., 2013; Ruffin et al., 2009; Shaw et al., 2007; Sultan et al., 2017; Tan et al., 2017; Tarasenko & Schoenberg 2011; Tarasenko et al 2011; Tessaro et al., 2006; Verla et al., 2010; Wackerhart et al., 2005; Weaver et al., 2015; Winterich et al., 2009; Winterich et al., 2011; Wong et al., 2013
Not specified	8 (14.05%)	Calderwood et al., 2020; Clark et al., 2008; Dominic et al., 2012; Francois et al., 2009; Friedeman-Sanchez et al., 2006; Hoffman-Goetz et al., 2008; Salas-Lopez et al., 2007; Thompson et al., 2011
Offered but declined	5 (8.75%)	Bie & Brodersen 2018; Denberg et al., 2005; Greiner et al., 2012; Llovet et al., 2018; Sly et al., 2013
<b>Gender of participants</b>		
Males only	5 (8.75%)	Fyffe et al., 2008; James et al., 2013; Sultan et al., 2017; Winterich et al., 2009; Winterich et al., 2011
Females only	1 (1.75%)	Clark et al., 2008
Mixed	51 (89.5%)	Bass et al., 2011; Beeker et al., 2000; Bong & Cool 2011; Bie & Brodersen 2018; Calderwood et al., 2020; Denberg et al., 2005; Dominic et al., 2012; Dyer et al., 2019; Enumah et al., 2018; Fernandez et al., 2018; Francois et al., 2009; Friedeman-Sanchez et al., 2006; Getrich et al., 2012; Goel et al., 2004; Goldsmith and Chairo 2008; Goodman et al., 2006; Green et al., 2008; Greiner et al., 2012; Greiner et al., 2005; Griesinger et al., 2006; Hatcher et al 2011; Hennelly et al., 2014; Hoffman-Goetz et al., 2008; Holt et al., 2004; Jilcott-Pitts et al., 2013; Jones et al., 2010; Jung et al., 2017; Katz et al., 2004; Kimura et al., 2014; Lewis et al., 2006; Llovet et al., 2018; May et al., 2015; McGarragle 2019; Muthukrishnan et al., 2019; Palmer et al., 2008; Palmer et al., 2010; Rawl et al., 2000; Ritvo et al., 2013; Ruffin et al., 2009; Salas-Lopez et al., 2007; Shaw et al., 2007; Sly et al., 2013; Tan et al., 2017; Tarasenko & Schoenberg 2011; Tarasenko et al 2011;

Tessaro et al., 2006; Thompson et al., 2011; Verla et al., 2010;  
Wackerhart et al., 2005; Weaver et al., 2015; Wong et al., 2013

<b>Ethnicity of participants</b>		
Mixed	23 (40.35%)	Beeker et al., 2000; Clark et al., 2008; Denberg et al., 2005; Dyer et al., 2019; Enumah et al., 2018; Friedeman-Sanchez et al., 2006; Goldsmith and Chairó 2008; Greiner et al., 2012; Griesinger et al., 2006; Holt et al., 2004; Jilcott-Pitts et al., 2013; Jones et al., 2010; McGarragle 2019; Muthukrishnan et al., 2019; Ruffin et al., 2009; Shaw et al., 2007; Sultan et al., 2017; Tarasenko et al 2011; Thompson et al., 2011; Wackerhart et al., 2005; Weaver et al., 2015; Winterich et al., 2009; Winterich et al., 2011
Not specified	8 (14.05%)	Bie & Brodersen 2018; Goel et al., 2004; Green et al., 2008; Hatcher et al 2011; Hoffman-Goetz et al., 2008; Llovet et al., 2018; Ritvo et al., 2013; Tan et al., 2017
African American	9 (15.80%)	Bass et al., 2011; Fyffe et al., 2008; Greiner et al., 2005; Katz et al., 2004; May et al., 2015; Palmer et al., 2008; Palmer et al., 2010; Sly et al., 2013; Wong et al., 2013
American Indian	1 (1.75%)	James et al., 2013
Chinese and Korean	1 (1.75%)	Jung et al., 2017
American Vietnamese	1 (1.75%)	Kimura et al., 2014
American Chinese	1 (1.75%)	Bong & Cool 2011
White	5 (8.80%)	Calderwood et al., 2020; Lewis et al., 2006; Rawl et al., 2000; Tarasenko & Schoenberg 2011; Tessaro et al., 2006;
Hispanic / Latino	7 (12.25%)	Dominic et al., 2012; Fernandez et al., 2018; Getrich et al., 2012; Goodman et al., 2006; Hennelly et al., 2014; Salas-Lopez et al., 2007; Verla et al., 2010;
Haitian	1 (1.75%)	Francois et al., 2009
<b>Study design</b>		
Focus groups	27 (47.35%)	Bass et al., 2011; Beeker et al., 2000; Calderwood et al., 2020; Clark et al., 2008; Dominic et al., 2012; Dyer et al., 2019; Enumah et al., 2018; Fernandez et al., 2018; Francois et al., 2009; Friedeman-Sanchez et al., 2006; Fyffe et al., 2008; Goel et al., 2004; Goldsmith and Chairó 2008; Goodman et al., 2006; Greiner et al., 2005; Griesinger et al., 2006; Hatcher et al 2011; Holt et al., 2004; James et al., 2013; Jilcott-Pitts et al., 2013; Kimura et al., 2014; May et al., 2015; Rawl et al., 2000; Salas-Lopez et al., 2007; Sultan et al., 2017; Verla et al., 2010; Weaver et al., 2015
Interviews	22 (38.60%)	Bie & Brodersen 2018; Bong & Cool 2011; Denberg et al., 2005; Getrich et al., 2012; Green et al., 2008; Greiner et al., 2012; Hennelly et al., 2014; Hoffman-Goetz et al., 2008; Lewis et al., 2006; Llovet et al., 2018; McGarragle 2019; Palmer et al., 2008; Palmer et al., 2010; Ritvo et al., 2013; Sly et al., 2013; Tan et al., 2017; Tarasenko & Schoenberg 2011; Tarasenko et al 2011; Thompson et al., 2011; Wackerhart et al., 2005; Winterich et al., 2009; Winterich et al., 2011
Mixed methods	7 (12.30%)	Jones et al., 2010; Jung et al., 2017; Katz et al., 2004; Ruffin et al., 2009; Shaw et al., 2007; Tessaro et al., 2006; Wong et al., 2013
Survey	1 (1.75%)	Muthukrishnan et al., 2019

**Table 4.** Detailed overview of articles included in the review

Publicat	Country	Progra	Colon	Colon	Age	Gend	Ethnicit	Study	Sample	Analysi
----------	---------	--------	-------	-------	-----	------	----------	-------	--------	---------

Author	(Region)	Study type	Screening reason	Screening Status of Participants	Age range of Participants	Gender of Participants	Ethnicity of Participants	Study design	Sample Size.	Analysis
Bass et al. 2011	USA (Philadelphia)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	50-64	Mixed	African-American	Focus groups	23 Participants.	Consensus and triangulation
Beeker et al. 2000	USA (Georgia, Kansas and Philadelphia)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	50+	Mixed	Mixture of Ethnicities	Focus groups ('Focus Group Interviews')	14 focus groups consisting of 10 or 11 participants.	Thematic analysis
Bie & Brodersen 2018	Denmark (Zealand)	Organised	Follow-up colonoscopy among people with a positive iFOBT	Offered Colonoscopy but declined	51-75	Mixed	Not Specified	Interviews ('Semi-structured, qualitative, single interviews')	13 Participants	Thematic analysis
Bong and Cool 2011	New Zealand (not specified)	None	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	44-74	Mixed	Chinese	In depth one-on-one, semi-structured interviews	25 Participants	Grounded theory
Calderwood et al. 2020	USA (Vermont)	Not reported	Surveillance colonoscopy	Not Specified	75-89	Mixed	White	Focus groups ('Semi-structured focus groups')	20 participants	Thematic analysis
Clark et al. 2008	USA (Rhode Island)	Opportunistic	Screening colonoscopy	Not Specified	40-75	Women	Mixture of Ethnicities	Focus groups	28 Participants	Thematic analysis

Denberg et al. 2005	USA (Colorado)	Opportunistic	Screening colonoscopy	Offered Colonoscopy but declined	50+	Mixed	Mixture of Ethnicities	Interviews ('Telephone interviews')	52 Participants	Thematic analysis
Dominic et al. 2012	USA (Pennsylvania)	Opportunistic	Screening colonoscopy	Not Specified	26-77	Mixed	Hispanic /Latino	Focus Group Discussions	82 Participants	Content analysis
Dyer et al. 2019	USA (Michigan)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	50-75	Mixed	Mixture of Ethnicities	Focus groups	45 Participants	constant comparative method +Thematic analysis
Enumah et al. 2018	USA (Maryland)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	30-93	Mixed	Mixture of Ethnicities	Focus groups ('Focus Group Discussions')	127 participants	Thematic analysis
Fernandez et al. 2008	USA (Texas)	Opportunistic	Screening Colonoscopy	Both had colonoscopy and never had colonoscopy	50-91	Mixed	Hispanic / Latino	Focus Group Discussions	92 Participants	Thematic analysis
Francois et al. 2009	USA (New York)	Opportunistic	Screening colonoscopy	Not Specified	41-83	Mixed	Haitian	Focus Group Interviews	45 Participants	Inductive analysis
Friedeman-Sanchez et al 2006	USA (Minnesota)	Opportunistic	Screening colonoscopy	Not Specified	50-75	Mixed	Mixture of Ethnicities	Focus groups ('Focus group interviews')	70 Participants	Grounded and Interpretative text analysis.
Fyffe et al. 2008	USA (New Jersey)	Opportunistic	Screening colonoscopy	Both had colonoscopy	22-85	Men	African-American	Focus Group Discuss	24 Participants	Immersion/crystall

			scopy	scopy and never had colono scopy				ions		ization approach.
Getrich et al. 2012	USA (New Mexico)	Opportunistic	Screening colono scopy	Both had colono scopy and never had colono scopy	50+	Mixed	Hispanic /Latino	Interviews ('Interview-based, exploratory qualitative research design')	52 Participants	Iterative analytic process.
Goel et al. 2004	Canada (Ontario)	Opportunistic	Screening colono scopy	Both had colono scopy and never had colono scopy	30-79	Mixed	Not Specified	Focus Group Discussions	41 Participants	Thematic analysis
Goldsmith and Chaira 2008	USA (Arkansas)	Opportunistic	Screening colono scopy	Both had colono scopy and never had colono scopy	Not Specified (Average-56)	Mixed	Mixture of Ethnicities	Focus Group Discussions	15 Participants	Thematic analysis
Goodman et al 2006	USA (Mid-Atlantic)	Opportunistic	Screening colono scopy	Both had colono scopy and never had colono scopy	50-80	Mixed	Hispanic /Latino	Focus groups ('Focus Group Discussions')	70 participants	Thematic analysis
Green et al 2008	USA (Massachusetts)	Opportunistic	Screening colono scopy	Both had colono scopy and never had colono scopy	53-70	Mixed	Not Specified	Interviews ('Semi-structured face to face interview')	40 participants	Content analysis

				scopy				ews')		
Greiner et al. 2012	USA (Mid-West)	Opportunistic	Screening Colonoscopy	Offered Colonoscopy but declined	50-78	Mixed	Mixture of Ethnicities	Semi-structured Interviews	50 Participants	Triangulation and thematic analysis
Greiner et al. 2005	USA (Mid-West)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	Not Specified (Average-56)	Mixed	African-American	Focus groups ('Focus Group Discussions')	55 participants	Thematic analysis
Griesinger et al. 2006	USA (Texas, Houston)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	50-81	Mixed	Mixture of Ethnicities	Focus groups ('Focus Group Discussions')	42 Participants	Thematic analysis
Hatcher et al. 2011	USA (Kentucky)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	60+	Mixed	Not Specified	Focus Group Discussions	17 Participants	Content analysis
Hennelly et al. 2014	USA (not specified)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	51-65	Mixed	Hispanic/Latino	Interviews (Individual in-depth interviews)	12 Participants	Grounded theory
Hoffman-Goetz et al. 2008	Canada (Ontario)	Opportunistic	Screening colonoscopy	Not Specified	50-90	Mixed	Not Specified	Interviews ('Semi-structured interviews')	100 participants	Content analysis
Holt et al. 2009	USA (Alabama)	Opportunistic	Screening colonoscopy	Both had colonoscopy and	Not Specified (Average-63)	Mixed	Mixture of Ethnicities	Focus Group Discussions	165 Participants	Close-textual analysis

				never had colonoscopy						
James et al. 2013	USA (not specified)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	50+	Men	American Indian (Native)	Focus Group Discussions	29 Participants	Community-participatory approach
Jilcott-Pitts et al. 2013	USA (North Carolina)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	Not Specified	Mixed	Mixture of Ethnicities	Focus Group Discussions	45 Participants	Thematic analysis
Jones et al. 2010	USA (Virginia)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	50+	Mixed	Mixture of Ethnicities	Survey + Focus groups	40 Participants (Focus Groups) + 660 Participants (Survey)	Coding of open-ended question, regression analysis and descriptive coding
Jung et al. 2017	USA (Washington DC)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	50-85	Mixed	Chinese and Korean American	Survey, focus groups and Interviews	120 Participants (Focus Groups + Survey) + 17 Participants (Interviews)	T-tests, chi-square d tests and bivariate analysis. Thematic analysis for qualitative data.
Katz et al. 2004	USA (North Carolina)	Opportunistic	Screening colonoscopy	Both had colonoscopy and	50+	Mixed	African American	Survey + Focus groups	45 Participants (Focus Group)	Logistic regression, Wald test,



				never had colonoscopy					+ 397 (survey)	Hosmer-Lemeshow Goodness of Fit test and thematic analysis.
Kimura et al. 2014	USA (Washington State)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	50-79	Mixed	Vietnamese American	Semi-structured focus groups	19 Participants	inductive and iterative process for our qualitative analysis and thematic analysis.
Lewis et al. 2006	USA (North Carolina)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	60+	Mixed	White	Semi-structured Interviews	116 Participants	Fishers exact test and Thematic analysis
Llovet et al. 2018	Canada (Ontario)	Organised	Follow-up colonoscopy among people with a +ive FOBt	Offered Colonoscopy but declined	50-74	Mixed	Not Specified	Interviews ('Semi-structured interviews')	30 participants	Content analysis
May et al. 2015	USA (California)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	45-75	Mixed	African American	Semi-structured focus groups	38 Participants	Thematic analysis+ descriptive statistics.
McGarragle	Canada (British Columbia)	Organised	Screening	Both had	Not Specific	Mixed	Mixture of	Interviews		Thematic

(2019)	Columbia, Ontario and Quebec)		colono scopy	colono scopy and never had colono scopy	ed (Avera ge-54)		Ethniciti es	and focus groups (‘Telep hone intervi ews and focus groups )	25 particip ants	analysi s
Muthuk rishnan et al. 2019	USA (Missour i)	Opport unistic	Screen ing colono scopy	Both had colono scopy and never had colono scopy	Not Specifi ed (Avera ge-57)	Mixed	Mixture of Ethniciti es	Survey and an open- ended questi on	202 Particip ants (qualitat ive questio n) + 483 (Survey)	Chi square d tests and inducti ve and deducti ve coding
Palmer et al. 2008	USA (Washin gton DC)	Opport unistic	Screen ing colono scopy	Both had colono scopy and never had colono scopy	50-76	Mixed	African America n	In- depth person al intervi ews	36 Particip ants	Thema tic analysi s
Palmer et al. 2010	USA (Washin gton DC)	Opport unistic	Screen ing colono scopy	Both had colono scopy and never had colono scopy	50-76	Mixed	African America n	In- depth person al intervi ews	60 Particip ants	Thema tic analysi s
Rawl et al (2000)	USA (Midwes t)	Opport unistic	Screen ing colono scopy	Both had colono scopy and never had colono scopy	Not Specifi ed (Avera ge-44)	Mixed	White	Focus Group Discuss ions	22 Particip ants	Thema tic analysi s
Ritvo et al. 2013	Canada (Ontario )	Organi sed	Screen ing colono scopy	Both had colono scopy and never had colono scopy	50-84	Mixed	Not Specifie d	Intervi ews (‘Semi- structu red intervi ews’)	81 particip ants	Thema tic analysi s

Ruffin et al. 2009	USA (Michigan)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	Not Specified (Average-60)	Mixed	Mixture of Ethnicities	Focus groups and interviews ('Focus Group Interviews + Survey')	93 participants	Chi-Square d analysis + t test + Thematic analysis
Salas-Lopez et al. 2007	USA (New Jersey)	Opportunistic	Screening colonoscopy	Not Specified	Not Specified (Average-41)	Mixed	Hispanic /Latino	Focus groups	40 Participants	Thematic analysis
Shaw et al. 2012	USA (Massachusetts)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	Not Specified	Mixed	Mixture of Ethnicities	Survey + In-depth interviews+ Focus Groups + Diaries + Home observations.	97 Participants	2 Correlation matrices+ thematic analysis
Sly et al. 2013	USA (not specified)	Opportunistic	Screening colonoscopy	Offered colonoscopy but declined	Not Specified (Average-61)	Mixed	African American	Semi-structured interviews	16 Participants	Thematic content analysis
Sultan et al. 2017	USA (Florida)	Opportunistic	Surveillance, diagnostic evaluation of symptoms or a positive faecal occult blood test, or high-risk screen	Both had colonoscopy and never had colonoscopy	51-83	Men	Mixture of Ethnicities	Semi-structured focus groups	44 participants	Thematic analysis

			ing due to a positive family history							
Tan et al. 2017	Singapore	Organised	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	40-85	Mixed	Not Specified	Interviews ('Semi-structured Interviews')	81 participants	Thematic analysis
Tarasenko & Schoenberg 2011	USA (Kentucky)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	50-76	Mixed	White	Interviews ('Semi-structured interviews')	41 participants	Thematic analysis
Tarasenko et al. 2011	USA (not specified)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	58+	Mixed	Mixture of Ethnicities	Semi-focussed interviews	96 Participants	PRECEDE-PROCEED Framework
Tessaro et al. 2006	USA (Western Virginia)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	50+	Mixed	White	Survey and Focus group discussion	839 Participants. (survey) + 205 Participants (focus groups)	Frequencies and Chi-square analysed analyses - Qualitative methods for focus group data analysis. Thematic analysis

Thompson et al. 2011	New Zealand (Auckland)	None	Screening colonoscopy	Not Specified	40-70	Mixed	Mixture of Ethnicities	In-depth personal interviews	80 Participants	Thematic analysis
Varela et al. 2010	USA (New York)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	Not Specified (Average range 60-70)	Mixed	Hispanic /Latino	Focus Group Discussions	35 Participants	Thematic analysis
Wackerbarth et al. 2005	USA (Not specified)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	48-55	Mixed	Mixture of Ethnicities	Semi-structured Interviews	30 Participants	Thematic analysis
Weaver et al. 2015	USA (North Carolina)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	50-75	Mixed	Mixture of Ethnicities	Focus groups	26 Participants	Thematic content analysis
Winterich et al. 2009	USA (North Carolina)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	40-64	Men	Mixture of Ethnicities	Semi-structured Interviews	64 Participants	Thematic analysis
Winterich et al. 2011	USA (North Carolina)	Opportunistic	Screening colonoscopy	Both had colonoscopy and never had colonoscopy	40-64	Men	Mixture of Ethnicities	Semi-structured Interviews	65 participants	Thematic analysis
Wong et al (2013)	USA (New York)	Opportunistic	Screening colonoscopy	Both had colonoscopy and	50-87	Mixed	African American	Mixed-methods (including	29 participants	Thematic analysis

				never had colonoscopy				semi-structured interviews)		
--	--	--	--	-----------------------	--	--	--	-----------------------------	--	--

### 3.3. Thematic synthesis results

Three main types of barriers and facilitators were identified: Social, Psychological and Practical (see Figure 2). Psychological and social factors centred on intrinsic factors, such as cultural taboos, previous personal experiences, concerns about the procedure, and knowledge about CRC. Conversely, practical factors centred on more extrinsic factors, such as the cost of colonoscopy, difficulties getting to the hospital, and family and work commitments. The following provides a brief overview of the barriers and facilitators identified (see Table 5 for a comprehensive list of the number of studies, and the corresponding references, for which each barrier and facilitator identified).

**Figure 2.** Tree diagram showing the relationships between themes, higher order themes and superordinate themes. Themes in red (squares) represent barriers of colonoscopy, themes in yellow (hexagons) represent themes which could be either barriers or facilitators of colonoscopy, and themes in green (ovals) represent facilitators of colonoscopy. Themes that were identified most frequently are listed first within their respective groups. Themes highlighted in grey are specific to a particular context, indication or demographic (labelled accordingly).

**Table 5:** Number and average number of studies in which each theme and higher order theme (respectively) was identified (presented in ascending order, categorised by superordinate theme).

Superordinate theme	Higher order theme (average number of studies per theme)	Theme (number of studies)	Sources
<b>Social factors</b>	The power of positive relationships, social networks and other influences (14)	<i>Test recommended/not recommended by doctor</i> (n=16)	Calderwood et al., 2020; Dyer et al., 2019; Enumah et al., 2018; Fernandez et al., 2008; Green et al., 2008; Hennelly et al., 2015; Hoffman-Goetz et al., 2008; Holt et al., 2009; Katz et al., 2004; Lewis et al., 2006; Llovet et al., 2018; McGarragle et al., 2019; Palmer et al., 2008; Shaw et al., 2012; Winterich et al., 2011; Wong et al., 2013
		<i>Previous conversations with patient provider</i> (n=16)	Bie & Broderson 2018; Calderwood et al., 2020; Denberg et al., 2005; Dyer et al., 2019; Enumah et al., 2018; Fernandez et al., 2008; Goel et al., 2004; James et al., 2013; Katz et al., 2004; Kimura et al., 2014; Llovet et al., 2018; Shaw et al., 2012; Sly et al., 2013; Tan et al., 2007; Varela et al., 2010; Wackerbarth et al., 2005

		<i>Patient-Provider relationship</i> (n=14)	Bie & Broderson 2018; Calderwood et al., 2020; Dyer et al., 2019; Enumah et al., 2018; Getrich et al., 2012; Goel et al., 2004; Hennelly et al., 2015; Jones et al., 2010; Kimura et al., 2014; Llovet et al., 2018; Muthukrishnan et al., 2019; Palmer et al., 2008; Varela et al., 2010; Winterich et al., 2011
		<i>Support/lack of support from local community and social networks</i> (n=10)	Bong & Cool 2011; Enumah et al., 2018; Green et al., 2008; Grenier et al., 2012; Ruffin et al., 2009; Sly et al., 2013; Tan et al., 2017; Thompson et al., 2017; Varela et al., 2010; Wong et al., 2013
	Cultural taboos and perceptions of masculinity (9.7)	<i>Perceived threat of bodily invasion to masculinity<sup>A</sup></i> (n=13)	Bass et al., 2011; Enumah et al., 2018; Getrich et al., 2012; Goodman et al., 2006; Hennelly et al., 2015; Jillcott-Pitts et al., 2013; Palmer et al., 2008; Rivo et al., 2013; Salas-Lopez et al., 2007; Thompson et al. 2011; Winterich et al., 2009; Winterich et al., 2011; Wong et al., 2013
		<i>Colonoscopy not 'manly'<sup>A</sup></i> (n=11)	Bass et al., 2011; Enumah et al., 2018; Francois et al., 2009; Goodman et al., 2006; Hennelly et al., 2015; Salas-Lopez et al., 2007; Thompson et al. 2011; Varela et al., 2010; Winterich et al., 2009; Winterich et al., 2011; Wong et al., 2013
		<i>Colonoscopy as a taboo topic<sup>B</sup></i> (n=5)	Getrich et al., 2012; Goodman et al., 2006; Hennelly et al., 2015; McGarragle et al., 2019; Tan et al., 2017
	Past experiences and experiences of important others (7.5)	<i>Healing other people's experiences with colonoscopy</i> (n=10)	Dyer et al., 2019; Friedmann-Sanchez et al., 2007; Griesinger et al., 2006; Hatcher et al., 2011; Hennelly et al., 2015; Kimura et al., 2014; Llovet et al., 2018; McGarragle et al., 2019; Shaw et al., 2012; Varela et al., 2010
		<i>Previous personal experiences with colonoscopy</i> (n=5)	Bie & Broderson 2018; Dyer et al., 2019; Goel et al., 2004; Greiner et al., 2005; Shaw et al., 2012
<b>Practical Factors</b>	Competing priorities and accessibility issues (9.3)	<i>Cost of colonoscopy<sup>C</sup></i> (n=11)	Denberg et al., 2005; Enumah et al., 2018; Goodman et al., 2006; Green et al., 2008; Hatcher et al., 2011; Hennelly et al., 2015; James et al., 2013; Muthukrishnan et al., 2019; Ruffin et al., 2009; Tan et al., 2017; Varela et al., 2010
		<i>Colonoscopy not covered by health insurance<sup>C</sup></i> (n=11)	Enumah et al., 2018; Fernandez et al., 2008; Goel et al., 2004; Griesinger et al., 2006; Holt et al., 2009; Jones et al., 2010; Muthukrishnan et al., 2019; Rawl et al., 2000; Ruffin et al., 2009; Tessaro et al., 2006; Wackerbarth et al., 2005
		<i>Family and work</i>	Denberg et al., 2005; Griesinger et al., 2006;

		<i>commitments</i> (n=10)	McGarragle et al., 2019; Muthukrishnan et al., 2019; Rawl et al., 2000; Sly et al., 2013; Tan et al., 2017; Tarasenko et al., 2011; Varela et al., 2010; Wong et al., 2013
		<i>Difficulties arranging an appointment</i> (n=9)	Denberg et al., 2005; Green et al., 2008; Hennelly et al., 2015; Llovet et al., 2018; McGarragle et al., 2019; Muthukrishnan et al., 2019; Sly et al., 2013; Varela et al., 2010; Wong et al., 2013
		<i>Difficulties getting to the appointment</i> (n=9)	Bie & Broderson 2018; Denberg et al., 2005; Dyer et al., 2019; Green et al., 2008; Grenier et al., 2012; Llovet et al., 2018; Muthukrishnan et al., 2019; Ruffin et al., 2009; Sultan et al., 2017
		<i>Existing health conditions as a competing priority</i> (n=6)	Bie & Broderson 2018; Denberg et al., 2005; Hennelly et al., 2015; Llovet et al., 2018; Shaw et al., 2012; Sultan et al., 2017;
<b>Psychological Factors</b>	Concerns about the procedure (17.5)	<i>Concerns about doing bowel preparation</i> (n=28)	Becker et al., 2000; Bie & Broderson 2018; Clarke et al., 2008; Denberg et al., 2005; Dyer et al., 2019; Enumah et al., 2018; Friedemann-Sanchez et al., 2007; Goel et al., 2004; Green et al., 2008; Grenier et al., 2012; Griesinger et al., 2006; Hatcher et al., 2011; Hennelly et al., 2015; Jilcott-Pitts et al., 2013; Jones et al., 2010; Kimura et al., 2014; Llovet et al., 2018; McGarragle et al., 2019; Rawl et al., 2000; Ritvo et al., 2013; Sly et al., 2013; Sultan et al., 2017; Tan et al., 2017; Tarasenko & Schoenberg 2011; Varela et al., 2010; Wackerbarth et al., 2005; Weaver et al., 2015; Winterich et al., 2011
		<i>Fear about pain and discomfort</i> (n=27)	Bie & Broderson 2018; Denberg et al., 2005; Dominic et al., 2012; Dyer et al., 2019; Fyffe et al., 2008; Goel et al., 2004; Goldman & Chairou 2008; Goodman et al., 2006; Green et al., 2008; Griesinger et al., 2006; Hennelly et al., 2015; Hoffman-Goetz et al., 2008; Jones et al., 2010; Llovet et al., 2018; May et al., 2015; Palmer et al., 2008; Rawl et al., 2000; Ritvo et al., 2013; Ruffin et al., 2009; Shaw et al., 2012; Tan et al., 2017; Tessaro et al., 2006; Varela et al., 2010; Wackerbarth et al., 2005; Weaver et al., 2015; Winterich et al., 2011; Wong et al., 2013
		<i>Concerns about perforation and procedural risks</i> (n=19)	Bass et al., 2011; Bie & Broderson 2018; Denberg et al., 2005; Dyer et al., 2005; Enumah et al., 2018; Francois et al., 2009; Getrich et al., 2012; Goel et al., 2004; Green et al., 2008; Jilcott-Pitts et al., 2013; Jones et al., 2010; Jung et al., 2017; Kimura et al., 2014; Llovet et al., 2018; McGarragle et al., 2019;



		Palmer et al., 2010; Rawl et al., 2000; Ritvo et al., 2013; Sultan et al., 2017
	<i>Shame and Embarrassment</i> (n=18)	Bass et al., 2011; Beeker et al., 2000; Bie & Broderson 2018; Denberg et al., 2005; Dominic et al., 2012; Dyer et al., 2019; Enumah et al., 2018; Getrich et al., 2012; Goodman et al., 2006; Griesinger et al., 2006; Hennelly et al., 2015; Jillcott-Pitts et al., 2013; Jung et al., 2017; Ritvo et al., 2013; Tan et al., 2017; Thompson et al., 2011; Varela et al., 2010; Winterich et al., 2009
	<i>Concerns about test invasiveness</i> (n=17)	Beeker et al., 2000; Bie & Broderson 2018; Dyer et al., 2019; Enumah et al., 2018; Goel et al., 2004; Grenier et al., 2005; Hatcher et al., 2011; Llovet et al., 2018; May et al., 2015; McGarragle et al., 2019; Rawl et al., 2000; Ruffin et al., 2009; Sly et al., 2013; Tan et al., 2017; Tarasenko et al., 2011; Varela et al., 2010; Winterich et al., 2009
	<i>Concerns about availability and necessity of sedation</i> (n=15)	Bass et al., 2011; Clarke et al., 2008; Enumah et al., 2018; Friedmann-Sanchez et al., 2007; Fyffe et al., 2008; Green et al., 2008; Hennelly et al., 2015; Jones et al., 2010; Jung et al., 2017; Ritvo et al., 2013; Ruffin et al., 2009; Sultan et al., 2017; Varela et al., 2010; Wackerbarth et al., 2005; Weaver et al., 2015
	<i>Fear or not knowing</i> (n=12)	Denberg et al., 2005; Dyer et al., 2019; Enumah et al., 2018; Hatcher et al., 2011; James et al., 2013; Llovet et al., 2018; Rawl et al., 2000; Sly et al., 2013; Tan et al., 2017; Wackerbarth et al., 2005; Winterich et al., 2011; Wong et al., 2013
	<i>Existing health conditions interfering with physical ability to do the bowel preparation</i> (n=4)	Green et al., 2008; Grenier et al., 2012; Kimura et al., 2014; Tarasenko & Schoenberg et al., 2011
Enhanced peace of mind (16.5)	<i>Colonoscopy provides long lasting peace of mind<sup>D</sup></i> (n=17)	Enumah et al., 2018; Friedmann-Sanchez et al., 2007; Getrich et al., 2012; Goel et al., 2004; Grenier et al., 2005; Griesinger et al., 2006; Hennelly et al., 2015; Hoffman-Goetz et al., 2008; McGarragle et al., 2019; Rawl et al., 2000; Ritvo et al., 2013; Ruffin et al., 2009; Shaw et al., 2012; Tan et al., 2017; Tarasenko et al., 2011; Varela et al., 2010; Wong et al., 2013
	<i>Colonoscopy examines the whole bowel<sup>D</sup></i>	Bass et al., 2011; Calderwood et al., 2020; Dyer et al., 2019; Friedmann-Sanchez et al., 2007; Goel et al., 2004; Grenier et al., 2005; Griesinger et al., 2006; Jones et al., 2010;

		(n=16)	Palmer et al., 2010; Rawl et al., 2000; Ruffin et al., 2009; Tessaro et al., 2006; Varela et al., 2009; Wackerbarth et al., 2005; Winterich et al., 2009; Winterich et al., 2011
Knowledge about CRC and screening (15)		<i>Lack of understanding that bowel cancer can be an asymptomatic disease</i> (n=16)	Bie & Broderson 2018; Calderwood et al., 2020; Denberg et al., 2005; Enumah et al., 2018; Getrich et al., 2012; Goel et al., 2004; Hennelly et al., 2015; Kimura et al., 2014; McGarragle et al., 2019; Palmer et al., 2008; Rawl et al., 2000; Ritvo et al., 2013; Tan et al., 2017; Thompson et al., 2011; Varela et al., 2010; Wong et al., 2013
		<i>Awareness and understanding / Lack of awareness and understanding of the colonoscopy procedure</i> (n=14)	Bie & Broderson 2018; Fernandez et al., 2008; Friedmann-Sanchez et al., 2007; Green et al., 2008; Griesinger et al., 2006; Hennelly et al., 2015; Kimura et al., 2014; McGarragle et al., 2019; Palmer et al., 2008; Sly et al., 2013; Tan et al., 2017; Varela et al., 2010; Winterich et al., 2011; Wong et al., 2013
Attitudes towards health (8.5)		<i>Lack of interest and Procrastination</i> (n=10)	Bie & Broderson 2018; Enumah et al., 2018; Francis et al., 2009; Green et al., 2008; Hennelly et al., 2015; Jones et al., 2010; McGarragle et al., 2019; Ritvo et al., 2013; Tan et al., 2017; Wong et al., 2013
		<i>Proactive desire to stay healthy</i> (n=7)	Calderwood et al., 2020; Getrich et al., 2005; Grenier et al., 2005; Hennelly et al., 2015; Palmer et al., 2008; Sultan et al., 2017; Varela et al., 2010
Perceived risk and perceived mortality (6.5)		<i>Cancer fear</i> (n=12)	Calderwood et al., 2020; Denberg et al., 2005; Enumah et al., 2018; Friedmann-Sanchez et al., 2007; Getrich et al., 2012; Green et al., 2008; Hennelly et al., 2015; McGarragle et al., 2019; Palmer et al., 2008; Rawl et al., 2000; Tan et al., 2017; Varela et al., 2010;
		<i>Perceived mortality and potential to benefit from colonoscopy</i> (n=7)	Calderwood et al., 2020; Enumah et al., 2018; Getrich et al., 2012;; Hoffman-Goetz et al., 2008; McGarragle et al., 2019; Sultan et al., 2017; Tan et al., 2017
		<i>Having CRC symptoms<sup>D</sup></i> (n=5)	Enumah et al., 2018; McGarragle et al., 2019; Tan et al., 2017; Varela et al., 2010; Wong et al., 2013
		<i>Having a family history of CRC<sup>D</sup></i> (n=2)	Enumah et al., 2018; Varela et al., 2010
Post hoc rationalisation of abnormal		<i>Providing an alternative explanation for</i>	Bie & Broderson 2018; Llovet et al., 2018

	screening results (2)	test results <sup>E</sup> (n=2)	
		<i>Distrust in the screening result</i> <sup>E</sup> (n=2)	Bie & Broderson 2018; Llovet et al., 2018
<sup>A</sup> Hispanic and Latin American men, only <sup>B</sup> Hispanic, African American and Latin American men, only <sup>C</sup> USA and Screening colonoscopy, only <sup>D</sup> Screening colonoscopy <sup>E</sup> Diagnostic colonoscopy only			

### 3.4. Social factors

#### 3.4.1. The power of positive relationships, social networks and other influencers

For some, the primary care provider played an important role in the decision to attend / not attend colonoscopy, both in terms of having previously had conversations about colonoscopy (n=16; Bie & Broderson 2018; Calderwood et al., 2020; Denberg et al., 2005; Dyer et al., 2019; Enumah et al., 2018; Fernandez et al., 2008; Goel et al., 2004; James et al., 2013; Katz et al., 2004; Kimura et al., 2014; Llovet et al., 2018; Shaw et al., 2012; Sly et al., 2013; Tan et al., 2007; Varela et al., 2010; Wackerbarth et al., 2005) and in terms of receiving a recommendation to have the test (n=16; Calderwood et al., 2020; Dyer et al., 2019; Enumah et al., 2018; Fernandez et al., 2008; Green et al., 2008; Hennelly et al., 2015; Hoffman-Goetz et al., 2008; Holt et al., 2009; Katz et al., 2004; Lewis et al., 2006; Llovet et al., 2018; McGarragle et al., 2019; Palmer et al., 2008; Shaw et al., 2012; Winterich et al., 2011; Wong et al., 2013); “*My doctor recommended colonoscopy, so I did it in an attempt to have good health*” (Palmer et al., 2008). For others, however, it was support (or a lack thereof) from local community groups / social networks that was important (n=10; Bong & Cool 2011; Enumah et al., 2018; Green et al., 2008; Grenier et al., 2012; Ruffin et al., 2009; Sly et al., 2013; Tan et al., 2017; Thompson et al., 2017; Varela et al., 2010; Wong et al., 2013). This particularly related to overcoming practical and emotional barriers to having the procedure, such as anxiety about having the test alone and difficulties in getting to the hospital: “*I don't drive long distances and have no one to take me*” (Muthukrishnan et al., 2019).

#### 3.4.2. Cultural taboos and perceptions of masculinity

Colonoscopy was considered a ‘taboo topic’ in Latin American and Hispanic populations (n=5; Getrich et al., 2012; Goodman et al., 2006; Hennelly et al., 2015; McGarragle et al., 2019; Tan et al., 2017): “*...in my father's side of the family, things like this [colonoscopy] are not discussed*” (McGarragle et al., 2019). This was especially true for male Latin American / Hispanic adults, who additionally perceived the invasiveness of the test as a ‘threat to their masculinity’ and, more specifically, their sexuality (n=13[10]; Enumah et al., 2018; Getrich et al., 2012; Goodman et al., 2006; Hennelly et al., 2015; Jillcott-Pitts et al., 2013; Ritvo et al., 2013; Salas-Lopez et al., 2007; Thompson et al. 2011; Winterich

et al., 2009; Winterich et al., 2011): “*There was no way in the world I was going to [have a colonoscopy]. I was taught that sticking something in your butt [means] you are gay*” (Wong et al., 2013). African American men also perceived the test as a threat to their masculinity (n=13[3]; Bass et al., 2011; Palmer et al., 2008; Wong et al., 2013); however, they did not report colonoscopy as a ‘taboo topic’. The perception of colonoscopy as a threat to masculinity was exacerbated by the view that colonoscopy was ‘not manly’. Both African American and Latin American / Hispanic men strongly felt that colonoscopy was not something men in their cultures willingly do (n=11[6]; Bass et al., 2011; Goodman et al., 2006; Hennelly et al., 2015; Salas-Lopez et al., 2007; Varela et al., 2010; Wong et al., 2013). These views were echoed by female African American and Latin American / Hispanic adults (i.e. that colonoscopy was not something the men in their culture willingly do), who were more willing to have the test themselves: “*For males, the machismo factor, in terms of colonoscopy screening. They don’t want to have a camera go up their rectum. It takes away from their cultural attitude of being machismo*” (Salas-Lopez et al., 2007).

#### 3.4.3. Past experiences and experiences of important others

Having previously had a colonoscopy was reported to be both a barrier and a facilitator to attending colonoscopy in the future. People who previously had a positive colonoscopy experience cited colonoscopy as ‘nothing to worry about’, while people who had a negative experience (in some cases more than 20 years ago) described it as something they would not want to go through again’ (n=5; Bie & Broderson 2018; Dyer et al., 2019; Goel et al., 2004; Greiner et al., 2005; Shaw et al., 2012). Other people’s experiences of colonoscopy were also reported to be influential when considering whether to attend colonoscopy for the first time. Negative stories were described as ‘horror stories’, inducing fear (‘it was scary when they talked about it’) about the procedure, while positive stories alleviated concerns, and often depicted the test as ‘easy’ and that ‘they went to sleep, so they didn’t know anything’ (n=10; Dyer et al., 2019; Friedmann-Sanchez et al., 2007; Griesinger et al., 2006; Hatcher et al., 2011; Hennelly et al., 2015; Kimura et al., 2014; Llovet et al., 2018; McGarragle et al., 2019; Shaw et al., 2012; Varela et al., 2010).

### 3.5. Practical factors

#### 3.5.1. Competing priorities and accessibility issues

In the USA, the financial cost of colonoscopy was reported to be a major barrier to screening (n=11; Denberg et al., 2005; Enumah et al., 2018; Goodman et al., 2006; Green et al., 2008; Hatcher et al., 2011; Hennelly et al., 2015; James et al., 2013; Muthukrishnan et al., 2019; Ruffin et al., 2009; Tan et al., 2017; Varela et al., 2010): “*I’d like to have it done, but I do not have the money*” (Goodman et al., 2006). This was almost always mentioned in relation to the test not being fully covered by a person’s health insurance (n=11; Enumah et al., 2018; Fernandez et al., 2008; Goel et al., 2004; Griesinger et al., 2006; Holt et al., 2009; Jones et al., 2010; Muthukrishnan et al., 2019; Rawl et al., 2000; Ruffin et al., 2009; Tessaro et al., 2006; Wackerbarth et al., 2005): “*I’ve wanted to have a colonoscopy ever since I turned 50, but don’t have the insurance or money until I get Medicare*” (Muthukrishnan et al., 2019). The cost of the procedure was a particularly prominent theme in studies conducted with Latin

American / Hispanic populations (Goodman et al., 2006; Hennelly et al., 2015), but did not feature in studies conducted with African American (Bass et al., 2011; Fyffe et al., 2008; Greiner et al., 2005; Katz et al., 2004; May et al., 2015; Palmer et al., 2008; Palmer et al., 2010; Sly et al., 2013; Wong et al., 2013) or White populations (Calderwood et al., 2020; Lewis et al., 2006; Rawl et al., 2000; Tarasenko & Schoenberg 2011; Tessaro et al., 2006). In one study, which coded free text survey responses to conduct statistical analysis, Muthukrishnan and colleagues (2019) found evidence for a significant association between reporting cost as a barrier and increased socioeconomic deprivation (Muthukrishnan et al., 2019). This association was reflected by quotes in the qualitative literature. For example, in one study, a participant who really wanted a colonoscopy stated it was a choice between 'colonoscopy and other necessities, such as food and medication' (Green et al., 2008).

In the USA and Canada, difficulty arranging an appointment was expressed as another barrier to colonoscopy (n=9; Denberg et al., 2005; Green et al., 2008; Hennelly et al., 2015; Llovet et al., 2018; McGarragle et al., 2019; Muthukrishnan et al., 2019; Sly et al., 2013; Varela et al., 2010; Wong et al., 2013), one which was easily addressed, however, by patient navigators, who several patients reported 'scheduled an appointment for them' (Hennelly et al., 2015). The issue of arranging an appointment was particularly pertinent among those who had one or more existing health conditions. Such individuals indicated that they found it difficult to make time for 'another appointment that required 24 hours of preparation' (n=6; Bie & Broderick 2018; Denberg et al., 2005; Hennelly et al., 2015; Llovet et al., 2018; Shaw et al., 2012; Sultan et al., 2017).

In addition to finding it difficult to schedule an appointment, patients in the USA and Canada often expressed difficulty getting to the hospital (n=9; Bie & Broderick 2018; Denberg et al., 2005; Dyer et al., 2019; Green et al., 2008; Grenier et al., 2012; Llovet et al., 2018; Muthukrishnan et al., 2019; Ruffin et al., 2009; Sultan et al., 2017). Again, this was a particularly dominant theme for people with an existing health condition, many of whom faced unique challenges in getting to the appointment. As one person put it: "*the distance up here is a problem, because I do have urological problems [...] I do have to go to the bathroom quite often and that becomes a hardship to sit in a van [...] it's really a serious problem*" (Sultan et al., 2017).

Family and work commitments were also reported as barriers to colonoscopy (n=10; Denberg et al., 2005; Griesinger et al., 2006; McGarragle et al., 2019; Muthukrishnan et al., 2019; Rawl et al., 2000; Sly et al., 2013; Tan et al., 2017; Tarasenko et al., 2011; Varela et al., 2010; Wong et al., 2013). Work commitments appeared to be particularly problematic for deprived communities, who reported not having time off work as a key advantage of the FIT: "*We do not have to take off work to do the test [FIT test]. Attendance is very important to keep our jobs at work. We have to work to support our families*" (Dominic et al., 2012).

### 3.6. Psychological factors

#### 3.6.1. Concerns about procedure

Across studies, a wide range of concerns about the procedure were expressed. Some related to the bowel preparation required to have the test (e.g. 'existing health conditions interfering with physical

ability to do the bowel preparation'; n=4; Green et al., 2008; Grenier et al., 2012; Kimura et al., 2014; Tarasenko & Schoenberg et al., 2011), while others related to experiential aspects of the procedure itself (e.g. 'fear about pain and discomfort'; Bie & Broderson 2018; Denberg et al., 2005; Dominic et al., 2012; Dyer et al., 2019; Fyffe et al., 2008; Goel et al., 2004; Goldman & Chaira 2008; Goodman et al., 2006; Green et al., 2008; Griesinger et al., 2006; Hennelly et al., 2015; Hoffman-Goetz et al., 2008; Jones et al., 2010; Llovet et al., 2018; May et al., 2015; Palmer et al., 2008; Rawl et al., 2000; Ritvo et al., 2013; Ruffin et al., 2009; Shaw et al., 2012; Tan et al., 2017; Tessaro et al., 2006; Varela et al., 2010; Wackerbarth et al., 2005; Weaver et al., 2015; Winterich et al., 2011; Wong et al., 2013). In some instances, the option to have sedation was sufficient to alleviate patients' concerns about the procedure: "*After hearing that you could be on sedation for the colonoscopy, I changed my mind*" (Friedmann-Sanchez et al., 2007). In other instances, however, individuals did not want to be 'put to sleep'; for example, because they wanted to 'watch the camera during the procedure' (Enumah et al., 2018).

Concerns about the bowel preparation were the most common (n=27); Beeker et al., 2000; Bie & Broderson 2018; Clarke et al., 2008; Denberg et al., 2005; Dyer et al., 2019; Enumah et al., 2018; Friedmann-Sanchez et al., 2007; Goel et al., 2004; Green et al., 2008; Grenier et al., 2012; Griesinger et al., 2006; Hatcher et al., 2011; Hennelly et al., 2015; Jilcott-Pitts et al., 2013; Jones et al., 2010; Kimura et al., 2014; Llovet et al., 2018; McParragle et al., 2019; Rawl et al., 2000; Ritvo et al., 2013; Sly et al., 2013; Sultan et al., 2017; Tan et al., 2017; Tarasenko & Schoenberg 2011; Varela et al., 2010; Wackerbarth et al., 2005; Weaver et al., 2015; Winterich et al., 2011), and included the taste of the solution, which was described by those who had previously completed colonoscopy as: "foul tasting", "nasty" and "hideous" (Wackerbarth et al. 2005; Enumah et al., 2018; Griesinger et al. 2006), as well as the volume, which was described as a "large quantity" and a "challenge" (Wackerbarth et al. 2005; Rawl et al., 2000). Not being able to be 'more than thirty feet from the toilet' (which was considered "burdensome"; Tarasenko et al., 2011) and possible side-effects (including nausea and vomiting; Sultan et al., 2017) were also concerns reported about completing the bowel preparation. These issues were a particular concern for people who had previously taken part in colonoscopy (as one person put it: "*The test itself is very simple. It's the prep that's a bitch*" (Friedmann-Sanchez et al., 2007), as well as people with existing health conditions, such as diabetes: "*Before we have the colonoscopy, they all ask us to not eat for a while. There's no sugar or level of sugar in my blood [so it is] very low...I don't know if I can handle it*" (Kimura et al., 2014).

'Shame and embarrassment' appeared to be prominent concerns about the procedure among men (n=18; Bass et al., 2011; Beeker et al., 2000; Bie & Broderson 2018; Denberg et al., 2005; Dominic et al., 2012; Dyer et al., 2019; Enumah et al., 2018; Getrich et al., 2012; Goodman et al., 2006; Griesinger et al., 2006; Hennelly et al., 2015; Jilcott-Pitts et al., 2013; Jung et al., 2017; Ritvo et al., 2013; Tan et al., 2017; Thompson et al., 2011; Varela et al., 2010; Winterich et al., 2009). Women also cited 'shame and embarrassment' as a barrier to colonoscopy, but to a lesser degree; they often compared the test to childbirth, or gynaecological screening, which they stated was 'more embarrassing' than having a colonoscopy: "*To me, they keep you covered up pretty good. To me, it's*



*more embarrassing to go to the gynaecologist and have a pap smear and a pelvic than it is to have a colonoscopy*" (Jillcott-Pitts et al., 2013). The concern ('Shame and Embarrassment') was often mentioned alongside 'test invasiveness' and the idea of 'having something inserted' into a 'private' part of the body (n=17; Beeker et al., 2000; Bie & Broderson 2018; Dyer et al., 2019; Enumah et al., 2018; Goel et al., 2004; Grenier et al., 2005; Hatcher et al., 2011; Llovet et al., 2018; May et al., 2015; McGarragle et al., 2019; Rawl et al., 2000; Ruffin et al., 2009; Sly et al., 2013; Tan et al., 2017; Tarasenko et al., 2011; Varela et al., 2010; Winterich et al., 2009). The 'invasiveness of the test' was additionally linked to 'concerns about perforation and procedural risks', which were endorsed for all indications of the test (n=19; Bass et al., 2011; Bie & Broderson 2018; Denberg et al., 2005; Dyer et al., 2005; Enumah et al., 2018; Francois et al., 2009; Getrich et al., 2012; Goel et al., 2004; Green et al., 2008; Jillcott-Pitts et al., 2013; Jones et al., 2010; Jung et al., 2017; Kimura et al., 2014; Llovet et al., 2018; McGarragle et al., 2019; Palmer et al., 2010; Rawl et al., 2000; Ritvo et al., 2013; Sultan et al., 2017): "... somebody could...rip your colon, or you could get an infection or something else ... you wouldn't run the risk of that" (Ritvo et al., 2013).

'Fear of not knowing' what the procedure involved was also cited as a barrier to having the test that was frequently mentioned across studies (n=12; Denberg et al., 2005; Dyer et al., 2019; Enumah et al., 2018; Hatcher et al., 2011; James et al., 2013; Llovet et al., 2018; Rawl et al., 2000; Sly et al., 2013; Tan et al., 2017; Wackerbarth et al., 2005; Winterich et al., 2011; Wong et al., 2013).

Specifically, people were afraid of not knowing 'what would be happening to them' while they were sedated and 'where all that tubing was going' (Wackerbarth et al., 2005). Better information provision was often mentioned as a possible strategy to alleviate this particular concern: "*Tell me about my colonoscopy. Tell me what you're going to do, tell me what I have to do to prepare, tell me do I have to be there early, tell me the fact that I need somebody to be there with me "... Tell me all that stuff*" (Dyer et al., 2019).

### 3.6.2. Enhanced peace of mind

In the USA, where patients have a choice of CRC screening tests (depending on the cover provided by their specific health insurance package), two key facilitators were cited in the decision to have screening colonoscopy over other exams. The first, was that, unlike other tests, 'colonoscopy examines the whole bowel' (n= 16; Bass et al., 2011; Calderwood et al., 2020; Dyer et al., 2019; Friedmann-Sanchez et al., 2007; Goel et al., 2004; Grenier et al., 2005; Griesinger et al., 2006; Jones et al., 2010; Palmer et al., 2010; Rawl et al., 2000; Ruffin et al., 2009; Tessaro et al., 2006; Varela et al., 2009; Wackerbarth et al., 2005; Winterich et al., 2009; Winterich et al., 2011), while the second, was that 'colonoscopy offers long lasting peace of mind' (n=17; Enumah et al., 2018; Friedmann-Sanchez et al., 2007; Getrich et al., 2012; Goel et al., 2004; Grenier et al., 2005; Griesinger et al., 2006; Hennelly et al., 2015; Hoffman-Goetz et al., 2008; McGarragle et al., 2019; Rawl et al., 2000; Ritvo et al., 2013; Ruffin et al., 2009; Shaw et al., 2012; Tan et al., 2017; Tarasenko et al., 2011; Varela et al., 2010; Wong et al., 2013). Both alluded to the idea that colonoscopy offers 'enhanced peace of mind' over other CRC screening modalities. The former was often used to criticise alternative tests, suggesting that they were 'second rate': "*I don't understand why [you] would have*

[flexible sigmoidoscopy] done because you could miss something higher up. If you're going to go through the prep and the procedure, it just seems to me you should have the whole shebang . . . you may need additional testing such as a colonoscopy anyway" (Jones et al., 2010). The same was true for the latter ('colonoscopy offers long lasting peace of mind'), although it was more frequently stated in relation to FIT than FS: "I would rather pay the expense and go through it once and know that I have ten years control then to take that (fecal occult blood testing) every year and they still not finding cancer for that one year, and then I have to go through the test and everything else. I don't have to deal with me testing my own stool and possibly still having a question" (Grenier et al. 2005). As can be seen from both quotes, participants recognised that alternative tests may require colonoscopy if there are abnormal findings, and so an additional, unnecessary, step is avoided by having colonoscopy to begin with.

### 3.6.3. Knowledge about CRC and screening

For all indications, 'lack of understanding that bowel cancer is a asymptomatic disease' was an important barrier to attendance (n=16; Bie & Broderson 2018; Causerwood et al., 2020; Denberg et al., 2005; Enumah et al., 2018; Getrich et al., 2012; Goel et al., 2014; Hennelly et al., 2015; Kimura et al., 2014; McGarragle et al., 2019; Palmer et al., 2008; Rawl et al., 2000; Ritvo et al., 2013; Tan et al., 2017; Thompson et al., 2011; Varela et al., 2010; Wong et al., 2013). This misconception about bowel cancer and the role of colonoscopy is succinctly captured in the following quote: "I don't think there is anything wrong with my colon. So... I mean, if there's nothing wrong, why should it be examined?" (Bie & Broderson. 2018). 'Awareness and understanding / Lack of awareness and understanding of the colonoscopy procedure' was also an important aspect of CRC knowledge that influenced people's decision to book and attend colonoscopy (n=14; Bie & Broderson 2018; Fernandez et al., 2008; Friedmann-Sanchez et al., 2007; Green et al., 2008; Griesinger et al., 2006; Hennelly et al., 2015; Kimura et al., 2014; McGarragle et al., 2019; Palmer et al., 2008; Sly et al., 2013; Tan et al., 2017; Varela et al., 2010; Winterich et al., 2011; Wong et al., 2013). Specifically, studies found some participants reported 'knowing absolutely nothing about it', despite being recommended the test by friends and family: "I've heard about colonoscopies from my friends, but I always dismissed it. I just didn't know anything about it" (Wong et al. 2013).

Several misconceptions about colonoscopy in relation to other CRC screening modalities were also reported. For example, participants were often unable to explain the differences between FS and colonoscopy. Sometimes they believed that all endoscopies, whether upper or lower, were essentially 'the same' and 'do the same thing' (Friedmann-Sanchez et al., 2007). To overcome these barriers, participants suggested providing patients with more comprehensive information, including 'visual depictions of the colon, polyps, and colonoscopy procedure' (Sly et al., 2013).

### 3.6.4. Attitudes towards health

'Lack of interest' and 'procrastination' were both cited as reasons for not booking and attending colonoscopy (n=10; Bie & Broderson 2018; Enumah et al., 2018; Francois et al., 2009; Green et al., 2008; Hennelly et al., 2015; Jones et al., 2010; McGarragle et al., 2019; Ritvo et al., 2013; Tan et al.,



2017; Wong et al., 2013). Men, in particular, reported procrastination as a reason for not booking a screening colonoscopy, even when the doctor had recommended the test: *"My physician is right in suggesting it....but I keep putting it off..."* (Ritvo et al., 2013). 'Proactive desire to stay healthy', conversely, was cited as a key facilitator for attending initial and subsequent colonoscopies (n=7; Calderwood et al., 2020; Getrich et al., 2005; Grenier et al., 2005; Hennelly et al., 2015; Palmer et al., 2008; Sultan et al., 2017; Varela et al., 2010): *"Polyps are found and I don't want to have cancer, especially if they're precancer. I want to keep a check on them. That's what makes me come back"* (Calderwood et al., 2020).

### 3.6.5. Perceived risk and perceived mortality

Patients with a family history of CRC often appeared to perceive themselves as being at 'increased risk' of CRC and cited this as a reason for regularly booking and attending screening colonoscopy (n=2; Enumah et al., 2018; Varela et al., 2010): *"If somebody else in your family have had colon cancer close like your father, sister or brother; you know you need to be checked"* (Enumah et al., 2018). Similarly, patients who had symptoms also perceived themselves as being at increased risk of CRC and cited this as a reason for attending screening colonoscopy (n=5; Enumah et al., 2018; McGarragle et al., 2019; Tan et al., 2017; Varela et al., 2010; Wong et al., 2013). For example, one participant said he went for screening after *"going to the doctor because [he] was having irregular bowel movements, pain in [his] side."* (Enumah et al., 2018). Cancer fear was often cited as both a barrier and a facilitator for regularly attending screening and surveillance colonoscopy (n=12; Calderwood et al., 2020; Denberg et al., 2005; Enumah et al., 2018; Friedmann-Sanchez et al., 2007; Getrich et al., 2012; Green et al., 2008; Hennelly et al., 2015; McGarragle et al., 2019; Palmer et al., 2008; Rawl et al., 2000; Tan et al., 2017; Varela et al., 2010). Patients regularly attending surveillance colonoscopy often saw it as a choice between 'getting cancer' and 'having a colonoscopy', with colonoscopy being preferable to being diagnosed with cancer (Calderwood et al., 2020). For patients who cited cancer fear as a barrier, however, it was often the case that they would 'prefer not to know' and perceived cancer as a 'killer' (Friedmann-Sanchez et al. 2007). Phrases such as 'ignorance is bliss' were often used in relation to not having a colonoscopy and avoid dealing with a diagnosis (McGarragle et al. 2019). As one person put it: *"What I don't know won't hurt me. No, I want nothing to do with cancer"* (Green et al., 2018).

'Perceived mortality and potential to benefit from colonoscopy' were discussed in relation to screening and surveillance colonoscopy (n=7; Calderwood et al., 2020; Enumah et al., 2018; Getrich et al., 2012;; Hoffman-Goetz et al., 2008; McGarragle et al., 2019; Sultan et al., 2017; Tan et al., 2017). For example, some patients, who believed they would not live much longer, due to existing health conditions, did not believe there was any benefit to having colonoscopy: *"I've got 4 or 5 other things that're going to kill me way before anything going on with my colon"* (Sultan et al., 2017). Conversely, those who were in good health wanted to maintain this and perceived colonoscopy to be more 'worthwhile'.

### 3.6.6. Post hoc rationalisations for abnormal screening results

Finally, individuals offered a colonoscopy, following an abnormal screening result (e.g. FOBt), often challenged whether they really needed the test (n=2; Bie & Broderson 2018; Llovet et al., 2018). These 'post hoc rationalisations' fell into two main groups: 'distrust in the screening result' and 'alternative explanations for the results'. The key difference between these two rationalisations is that, in the former, people believe the results are due to something other than bleeding, often because there was no visible blood in their stool, while, in the latter, people believe the results are due to bleeding, but that they can account for the source. For example: "*My adult son was home at the time of my FOBt, he suffers from irritable bowel syndrome and we have one washroom. So even though my toilet was clean for my test, I found that perhaps there still could be some residue from his blood, so maybe we needed to re-evaluate if this is actually my blood or not*" (Llovet et al., 2018).

## 4. Discussion

### 4.1. Main findings

This review identified three main types of barriers and facilitators of colonoscopy use: social, psychological, and practical. These three main types, or 'superordinate themes', were made up of ten higher-level groups of barriers and facilitators, namely: 'The power of positive relationships, social networks and other influencers', 'cultural taboos and perceptions of masculinity', 'past experiences and experiences of important others', 'competing priorities and accessibility issues', 'concerns about procedure', 'attitudes towards health', 'enhanced peace of mind', 'knowledge about CRC and screening', 'post hoc rationalisations for abnormal screening results' and 'perceived risk and perceived mortality'. Psychological factors appeared to be the most important. Specifically, 'concerns about the procedure' were identified the most frequently ('concerns about doing the bowel preparation' and 'fear about pain and discomfort', in particular), followed by the advantages conferred by colonoscopy over alternate screening methods (i.e. 'enhanced peace of mind') and 'knowledge about CRC and screening' ('understanding that CRC can be an asymptomatic disease', specifically).

Importantly, this review found evidence of barriers and facilitators that were specific to individual types of colonoscopy. For example, 'post hoc rationalisations for abnormal screening results' was specific to follow-up colonoscopy for abnormal screening results. It is possible that these indication-specific barriers and facilitators are more important than some of the general barriers and facilitators, within their respective contexts. However, as only a small number of non-screening colonoscopy articles were identified, it is difficult to confirm this hypothesis.

Finally, this review found several barriers and facilitators that were specific to individual countries and demographic groups. For example, 'perceived threat of bodily invasion to masculinity' was specific to Latin American / Hispanic men, while 'cost of colonoscopy' and 'colonoscopy not covered by health insurance' were specific to the USA. Again, it is possible that these specific barriers are more important in their respective contexts than some of the more general barriers to colonoscopy.

### 4.2. Comparison with existing literature

The findings of this review are similar to those described in a recent review by Lim and colleagues (2020). Both reviews identified a number of common barriers to colonoscopy, including: 'perceived risk', 'bowel preparation' and 'patient-provider relationship'. Importantly, our review identified several additional barriers, not reported by Lim and colleagues. For example, our review identified 'distrust in the screening result' and 'providing an alternative explanation for test results' as barriers to colonoscopy (colonoscopy as a follow-up test for abnormal screening results, specifically). Conversely, Lim and colleagues identified several unique facilitators of colonoscopy use, including 'auto-generation of reminders' and 'open-access colonoscopy scheduling' (Lim et al., 2020), most likely because they included papers exploring barriers and facilitators from the perspective of the healthcare provider.

The findings of this review are also similar to those reported in a recent systematic review exploring the barriers and facilitators of FS screening use among low uptake groups (Travis et al., 2020). This is unsurprising, given the similarities between FS and colonoscopy as endoscopic examinations of the large bowel. Common barriers and facilitators between the tests appear to include: 'shame and embarrassment', 'fear about pain and discomfort' and 'having symptoms'. Facilitators that appear to uniquely drive colonoscopy use, but not FS, include: 'examine whole bowel' and 'provides long lasting peace of mind'.

#### *4.2. Implications for future research*

Our review has several implications for future research. First, it highlights that the majority of studies have focused on the barriers and facilitators of screening colonoscopy, with very little qualitative research exploring the barriers and facilitators of surveillance and follow-up colonoscopy. Second, it highlights that the majority of research has been conducted outside of Europe, within opportunistic screening contexts, with the majority of studies taking place in the USA, where the delivery of screening is very different from the organised programmes offered elsewhere. Third, it highlights a number of potential targets for intervention development, many of which amenable to change (e.g. 'lack of understanding that bowel cancer can be an asymptomatic disease').

#### *4.3. Limitations with the search strategy*

Prior to reference list searches, the database searches detected 32 articles, which equated to 56% of the total. One possible explanation as to why such a large proportion of papers was missed by the database searches is that search terms were restricted to the title and abstracts of papers, and many papers explored barriers and facilitators towards more than one CRC screening test, and consequently did not mention 'colonoscopy' within the title or abstract, specifically. Had we included more general terms, such as 'bowel cancer' and 'colorectal cancer' to our search strategy, or extended search terms beyond the titles and abstracts, it is likely that those papers detected through the reference list searches would have been picked up by the database searches. However, both would have resulted in a substantial increase in the total number of papers requiring review, and thereby prolonged the review process.

#### *4.4. Limitations*

This review has several limitations. Most importantly, the search strategy used was not comprehensive; it was limited to peer-reviewed articles available on PubMed and PsychInfo. Furthermore, several search terms were omitted (e.g. 'non-participation'), due to <1% of articles being identified by the final search. As such, it is possible that our review did not include several relevant studies (although we note that our review identified more papers than the recent review by Lim and colleagues (57 vs. 45), providing some reassurance). This is a common limitation with rapid reviews, one which is often accepted in favour of reviewing the literature in a shorter period, usually because the time and resources required for a fully comprehensive systematic review are not available (Tricco et al., 2015).

Another important limitation of this review is that no formal quality assessment was performed, and results were taken at face value. However, we have reported the characteristics of studies in the tables to enable interpretation (see Table 4).

#### *4.5. Strengths*

This review also has a number of strengths. Most importantly, it contained a large number of articles and had no date restriction imposed, increasing the amount of data synthesised and minimising the number of relevant papers excluded. In addition, it focused entirely on colonoscopy use, solely from the patient's perspective, and did not mix findings with those for other screening tests, such as FS and FIT, as has been done in previous reviews (e.g. Guessous et al., 2014). Finally, it used rigorous methods to review the literature, including the use of two researchers to screen titles and abstracts, as well as a neutral arbitrator.

### **5. Conclusion**

This review identified a range of general and specific barriers and facilitators of colonoscopy use. It highlights a dearth in the qualitative literature with regards to follow-up and surveillance colonoscopy, specifically. Furthermore, it highlights the need for further qualitative research outside of the American Health system, which is set-up differently to many European and Asian countries. Finally, this review provides a basis for intervention development, highlighting a number of barriers and facilitators that are amenable to change.

#### **Conflicts of interest**

The authors have no conflicts of interest to declare.

#### **Acknowledgements**

The authors have no acknowledgements to declare.

#### **Funding**

Robert S Kerrison is supported by a Cancer Research UK Population Research Fellowship [C68512/A28209].

## References (in text citations)

- American Society of Colon and Rectal Surgeons (2020) Screening and Surveillance for Colorectal Cancer. Available from: <<https://fascrs.org/patients/diseases-and-conditions/a-z/screening-and-surveillance-for-colorectal-cancer#:~:text=Colonoscopy%20is%20the%20%E2%80%9Cgold%20standard,a%20colonoscopy%20is%20then%20needed.>> (Accessed: 25<sup>th</sup> August 2020)
- Beshara, A., Ahoroni, M., Comanester, D., Vilkin, A., Boltin, D., Dotan, I., Niv, Y., Cohen, A.D., Levi, Z.J.I.j.o.c., 2020. Association between time to colonoscopy after a positive guaiac fecal test result and risk of colorectal cancer and advanced stage disease at diagnosis. 146:1532-40.
- Bromley, E.G., May, F.P., Federer, L., Spiegel, B.M., van Oijen, M.G.J.P.m., 2015. Explaining persistent under-use of colonoscopic cancer screening in African Americans: a systematic review. 71:40-48.
- Cancer Research UK (2018) Bowel Cancer. Available from: <<https://www.cancerresearchuk.org/about-cancer/bowel-cancer>> (Accessed: 25<sup>th</sup> August 2020)
- Cohen, J.J.E., measurement, p., 1960. A coefficient of agreement for nominal scales. 20:37-46.
- Corley, D.A., Jensen, C.D., Quinn, V.P., Doubeni, C.A., Zauber, A.G., Lee, J.K., Schottinger, J.E., Marks, A.R., Zhao, W.K., et al., 2017. Association between time to colonoscopy after a positive fecal test result and risk of colorectal cancer and cancer stage at diagnosis. 317:1631-41.
- Dalton, A.J.J.o.P.H., 2018. Incomplete diagnostic follow-up after a positive colorectal cancer screening test: a systematic review. 40:e46-e58.
- Denberg, T.D., Melhado, T.V., Coombes, J.M., Beaty, B.L., Berman, K., Byers, T.E., Marcus, A.C., Steiner, J.F., Ahnen, D.J.J.o.g.i.m., 2005. Predictors of nonadherence to screening colonoscopy. 20:989-95
- Duffy, S.W., Myles, J.P., Maroni, R., Mohammad, A.J.J.o.m.s., 2017. Rapid review of evaluation of interventions to improve participation in cancer screening services. 24:127-45.
- Enumah, Z.O., Atnafou, R., Blum, R.W.J.A.J.o.G., 2015. "You Ain't Goin'in There!" Promoters and Barriers to Colonoscopy Screening Among African Americans in East Baltimore Neighborhoods: 1444. 110:S624.
- Guessous, I., Dash, C., Lapin, P., Doroshenk, M., Smith, R.A., Klabunde, C.N., medicine, N.C.C.R.S.A.t.P.T.G.J.P., 2010. Colorectal cancer screening barriers and facilitators in older persons. 50:3-10.
- Higgins, J.P., Thomas, J., Chandler, J., Cumpston, M., Li, T., Page, M.J., Welch, V.A., 2019. Cochrane handbook for systematic reviews of interventions. John Wiley & Sons.

- Honein-AbouHaidar, G.N., Kastner, M., Vuong, V., Perrier, L., Daly, C., Rabeneck, L., Straus, S., Baxter, N.N.J.C.E., Biomarkers, P., 2016. Systematic review and meta-study synthesis of qualitative studies evaluating facilitators and barriers to participation in colorectal cancer screening. 25:907-17.
- Kerrison, R.S., von Wagner, C., Green, T., Gibbins, M., Macleod, U., Hughes, M., Rees, C.J., Duffy, S., McGregor, L.M.J.P.m., 2019. Rapid review of factors associated with flexible sigmoidoscopy screening use. 120:8-18.
- Kerrison, R., Von Wagner, C., Ghanouni, A., Green, T., Macleod, U., Hughes, M., Rees, C.J., Duffy, S., McGregor, L.M.J.S.R.M.C.M., et al., 2020. Lessons learned from conducting a rapid review: a case study examining factors associated with flexible sigmoidoscopy screening use.
- Lee, Y.-C., Li-Sheng Chen, S., Ming-Fang Yen, A., Yueh-Hsia Chen, S., Ching-Yuan Fann, J., Chuang, S.-L., Chiang, T.-H., Chou, C.-K., Chiu, H.-M., et al., 2017. Association between colorectal cancer mortality and gradient fecal hemoglobin concentration in colonoscopy noncompliers. 109.
- Levin, B., Lieberman, D.A., McFarland, B., Andrews, K.C., Brooks, D., Bond, J., Dash, C., Giardiello, F.M., Glick, S., et al., 2008. Screening and surveillance for the early detection of colorectal cancer and adenomatous polyps, 2008: a joint guideline from the American Cancer Society, the US Multi-Society Task Force on Colorectal Cancer, and the American College of Radiology. 134:1570-95.
- Lim, K.T., Ng, C.H., Decruz, G.M., Lim, T.Z., Devi, K., Tan, K.-K., Chong, C.S.J.E.J.o.C.P.t.O.J.o.t.E.C.P.O., 2020. Barriers and facilitators towards colonoscopy: a qualitative systematic review.
- McHugh, M.L.J.B.m.B.m., 2012. Interrater reliability: the kappa statistic. 22:276-82.
- McLachlan, S.-A., Clerhenn, A., Austoker, J.J.P.e., counseling, 2012. Patients' experiences and reported barriers to colonoscopy in the screening context—a systematic review of the literature. 86:137-46.
- Rapuri, S., Spencer, J., Eckels, D.J.I.j.o.c.d., 2008. Importance of postpolypectomy surveillance and postpolypectomy compliance to follow-up screening—review of literature. 23:453-59.
- Schreuders, E.H., Ruco, A., Rabeneck, L., Schoen, R.E., Sung, J.J., Young, G.P., Kuipers, E.J.J.G., 2015. Colorectal cancer screening: a global overview of existing programmes. 64:1637-49.
- Selby, K., Senore, C., Wong, M., May, F.P., Gupta, S., Liang, P.S.J.J.o.M.S., 2020. Interventions to ensure follow-up of positive fecal immunochemical tests: An international survey of screening programs.0969141320904977.

- Sly, J.R., Edwards, T., Shelton, R.C., Jandorf, L.J.H.e., behavior, 2013. Identifying barriers to colonoscopy screening for nonadherent African American participants in a patient navigation intervention. 40:449-57.
- Sultan, S., Partin, M.R., Shah, P., LeLaurin, J., Freytes, I.M., Nightingale, C.L., Fesperman, S.F., Curbow, B.A., Beyth, R.J.J.P.p., et al., 2017. Barriers and facilitators associated with colonoscopy completion in individuals with multiple chronic conditions: a qualitative study. 11:985.
- Sung, J., Lau, J., Young, G.P., Sano, Y., Chiu, H., Byeon, J., Yeoh, K., Goh, K., Sollano, J., et al., 2008. Asia Pacific consensus recommendations for colorectal cancer screening. 57:1166-76.
- Sung, J., Ng, S., Chan, F., Chiu, H., Kim, H., Matsuda, T., Ng, S., Lau, J., Zheng, S., et al., 2015. An updated Asia Pacific Consensus Recommendations on colorectal cancer screening. 64:121-32.
- Tan, K.-K., Lim, T.-Z., Chan, D.K.H., Chew, E., Chow, W.-M., Loo, N., Wong, M.-L., Koh, G.C.-H.J.I.J.o.C.D., 2017. Getting the first degree relatives to screen for colorectal cancer is harder than it seems—patients' and their first degree relatives' perspectives. 32:1065-68.
- Thomas, J., Harden, A.J.B.m.r.m., 2008. Methods for the thematic synthesis of qualitative research in systematic reviews. 8:45.
- Thompson, L., Reeder, T., Abel, G.J.H., 2011. 'I can't get my husband to go and have a colonoscopy': Gender and screening for colorectal cancer. 16:235-49.
- Tong, A., Flemming, K., McInnes, E., Oliver, S., Craig, J.J.B.m.r.m., 2012. Enhancing transparency in reporting the synthesis of qualitative research: ENTREQ. 12:181.
- Travis, E., Ashley, L., Pownall, M., O'Connor, D.B.J.P.o., 2020. Barriers to flexible sigmoidoscopy colorectal cancer screening in low uptake socio-demographic groups: A systematic review. 29:1237-47.
- Tricco, A.C., Antony, J., Zarin, W., Striffler, L., Ghassemi, M., Ivory, J., Perrier, L., Hutton, B., Moher, D., et al., 2015. A scoping review of rapid review methods. 13:224.
- Union, C.o.t.E.U.J.O.J.E., 2003. Council recommendation of 2 December 2003 on cancer screening. 327.
- Wong, C.R., Bloomfield, E.R., Crookes, D.M., Jandorf, L.J.J.o.C.E., 2013. Barriers and facilitators to adherence to screening colonoscopy among African-Americans: a mixed-methods analysis. 28:722-28.

### References (included papers)

- Bass, S.B., Gordon, T.F., Ruzek, S.B., Wolak, C., Ward, S., Paranjape, A., Lin, K., Meyer, B., Ruggieri, D.G.J.J.o.C.E., 2011. Perceptions of colorectal cancer screening in urban African American clinic patients: differences by gender and screening status. 26:121-28.



- Beeker, C., Kraft, J.M., Southwell, B.G., Jorgensen, C.M.J.J.o.c.h., 2000. Colorectal cancer screening in older men and women: qualitative research findings and implications for intervention. 25:263-78.
- Bie, A.K.L., Brodersen, J.J.S.j.o.p.h.c., 2018. Why do some participants in colorectal cancer screening choose not to undergo colonoscopy following a positive test result? A qualitative study. 36:262-71.
- Bong, G., McCool, J.J.N.M.J., 2011. Chinese peoples' perceptions of colorectal cancer screening: a New Zealand perspective. 124:29-38.
- Calderwood, A.H., Cazares, K., O'Connor, S.J.J.o.C.G., 2020. Older adult perspectives toward surveillance colonoscopy: a qualitative study. 54:70-75.
- Clark, M.A., Bonacore, L., Wright, S.J., Armstrong, G., Rakowski, W.J.W., health, 2003. The cancer screening project for women: experiences of women who partner with women and women who partner with men. 38:19-33.
- Denberg, T.D., Melhado, T.V., Coombes, J.M., Beaty, B.L., Berman, K., Byers, T.E., Marcus, A.C., Steiner, J.F., Ahnen, D.J.J.J.o.g.i.m., 2005. Predictors of nonadherence to screening colonoscopy. 20:989-95.
- Dyer, K.E., Shires, D.A., Flocke, S.A., Hawley, S.T., Jones, R.M., Resnicow, K., Shin, Y., Lafata, J.E.J.A.j.o.p.m., 2019. Patient-Reported needs following a referral for colorectal cancer screening. 56:271-80.
- Enumah, Z.O., Atnafou, R., Blum, R.V., A.J.o.G., 2015. "You Ain't Goin'in There!" Promoters and Barriers to Colonoscopy Screening Among African Americans in East Baltimore Neighborhoods: 1444. 110:S624.
- Fernandez, M.E., Wippold, R., Torres-Vigil, I., Byrd, T., Freeberg, D., Bains, Y., Guajardo, J., Coughlin, S.S., Vernon, S.V.J.C.C., et al., 2008. Colorectal cancer screening among Latinos from US cities along the Texas–Mexico border. 19:195-206.
- Francois, F., Elysée, G., Shah, S., Gany, F.J.J.o.i., health, m., 2009. Colon cancer knowledge and attitudes in an immigrant Haitian community. 11:319-25.
- Friedemann-Sánchez, G., Griffin, J.M., Partin, M.R.J.H.E., 2007. Gender differences in colorectal cancer screening barriers and information needs 1. 10:148-60.
- Fyffe, D.C., Hudson, S.V., Fagan, J.K., Brown, D.R.J.J.o.t.N.M.A., 2008. Knowledge and barriers related to prostate and colorectal cancer prevention in underserved black men. 100:1161-67.
- Garcia-Dominic, O., Lengerich, E.J., Wray, L.A., Parrott, R., Aumiller, B., Kluhsman, B., Renderos, C., Dignan, M.J.A.j.o.h.b., 2012. Barriers to CRC screening among Latino adults in Pennsylvania: ACCN results. 36:153-67.



Getrich, C.M., Sussman, A.L., Helitzer, D.L., Hoffman, R.M., Warner, T.D., Sánchez, V., Solares, A., Rhyne, R.L., Research, R.N.C.J.Q.H., 2012. Expressions of machismo in colorectal cancer screening among New Mexico Hispanic subpopulations. 22:546-59.

Goel, V., Gray, R., Chart, P., Fitch, M., Saibil, F., Zdanowicz, Y.J.H.E., 2004. Perspectives on colorectal cancer screening: a focus group study. 7:51-60.

Goldsmith, G., Chiaro, C.J.T.J.o.f.p., 2008. Colorectal cancer screening: how to help patients comply. 57:E2.

Goodman, M.J., Ogdie, A., Kanamori, M.J., Canar, J., O Malley, A.S.J.E., Disease, 2006. Barriers and facilitators of colorectal cancer screening among Mid-Atlantic Latinos: focus group findings. 16:255.

Green, A.R., Peters-Lewis, A., Percac-Lima, S., Betancourt, J.R., Richter, J.M., Janairo, M.-P.R., Gamba, G.B., Atlas, S.J.J.J.o.g.i.m., 2008. Barriers to screening colonoscopy for low-income Latino and white patients in an urban community health center. 23:834-40.

Greiner, K.A., Born, W., Nollen, N., Ahluwalia, J.S.J.J.o.g.i.m., 2005. Knowledge and perceptions of colorectal cancer screening among urban African Americans. 20:977-83.

Greiner, K.A., Geana, M.V., Epp, A., Watson, A., Filippi, M., Daley, C.M., Engelman, K.K., James, A.S., Campbell, M.J.T., et al., 2012. A computerized intervention to promote colorectal cancer screening for underserved populations: Theoretical background and algorithm development. 20:25-35.

Greisinger, A., Hawley, S.T., Bettercourt, J.L., Perz, C.A., Vernon, S.W.J.C.d., prevention, 2006. Primary care patients' understanding of colorectal cancer screening. 30:67-74.

Hatcher, J., Dignan, M.B., Schoenberg, N.J.N.C., 2011. How do rural health care providers and patients view barriers to colorectal cancer screening? Insights from Appalachian Kentucky. 46:181-92.

Hennelly, M.O., Sly, J.P., Villagra, C., Jandorf, L.J.J.o.C.E., 2015. Narrative message targets within the decision-making process to undergo screening colonoscopy among Latinos: a qualitative study. 30:268-76.

Hoffman-Goetz, L., Thomson, M.D., Donelle, L.J.J.o.C.E., 2008. Reasons for declining colorectal cancer screening by older Canadians: a pilot study. 23:32.

Holt, C.L., Shipp, M., Eloubeidi, M., Clay, K.S., Smith-Janias, M.A., Janias, M.J., Britt, K., Norena, M., Fouad, M.N.J.H.e.r., 2009. Use of focus group data to develop recommendations for demographically segmented colorectal cancer educational strategies. 24:876-89.

James, A.S., Filippi, M.K., Pacheco, C.M., Cully, L., Perdue, D., Choi, W.S., Greiner, K.A., Daley, C.M.J.P.c.d., 2013. Barriers to colorectal cancer screening among American Indian men aged 50 or older, Kansas and Missouri, 2006–2008. 10.

- Jilcott Pitts, S.B., Lea, C.S., May, C.L., Stowe, C., Hamill, D.J., Walker, K.T., Fitzgerald, T.L.J.T.J.o.R.H., 2013. "Fault-line of an earthquake": a qualitative examination of barriers and facilitators to colorectal cancer screening in rural, Eastern North Carolina. 29:78-87.
- Jones, R.M., Devers, K.J., Kuzel, A.J., Woolf, S.H.J.A.j.o.p.m., 2010. Patient-reported barriers to colorectal cancer screening: a mixed-methods analysis. 38:508-16.
- Jung, M.Y., Holt, C.L., Ng, D., Sim, H.J., Lu, X., Le, D., Juon, H.-S., Li, J., Lee, S.J.E., et al., 2018. The Chinese and Korean American immigrant experience: a mixed-methods examination of facilitators and barriers of colorectal cancer screening. 23:847-66.
- Katz, M.L., James, A.S., Pignone, M.P., Hudson, M.A., Jackson, E., Oates, V., Campbell, M.K.J.B.p.h., 2004. Colorectal cancer screening among African American church members: a qualitative and quantitative study of patient-provider communication. 4:62.
- Kimura, A., Sin, M.-K., Spigner, C., Tran, A., Tu, S.-P.J.J.o.C.E., 2014. Barriers and facilitators to colorectal cancer screening in Vietnamese Americans: a qualitative analysis. 29:728-34.
- Lewis, C.L., Kistler, C.E., Amick, H.R., Watson, L.C., Dvunin, D.L., Walter, L.C., Pignone, M.P.J.B.g., 2006. Older adults' attitudes about continuing cancer screening later in life: a pilot study interviewing residents of two continuing care communities. 6:10.
- Llovet, D., Serenity, M., Conn, L.G., Bravo, C.A., McCurdy, B.R., Dubé, C., Baxter, N.N., Paszat, L., Rabeneck, L., et al., 2018. Reasons for Lack of Follow-up Colonoscopy Among Persons With A Positive Fecal Occult Blood Test Result: A Qualitative Study. 113:1872.
- May, F.P., Whitman, C.B., Varlyguina, K., Bromley, E.G., Spiegel, B.M.J.J.o.C.E., 2016. Addressing low colorectal cancer screening in African Americans: using focus groups to inform the development of effective interventions. 31:567-74.
- McGarragle, K.M., Hare, C., Holter, S., Facey, D.A., McShane, K., Gallinger, S., Hart, T.L.J.H.C.i.C.P., 2019. Examining intrafamilial communication of colorectal cancer risk status to family members and kin responses to colonoscopy: a qualitative study. 17:16.
- Muthukrishnan, M., Arnold, L.D., James, A.S.J.P.m.r., 2019. Patients' self-reported barriers to colon cancer screening in federally qualified health center settings. 15:100896.
- Palmer, R.C., Midgette, L.A., Dankwa, I.J.C.c., 2008. Colorectal cancer screening and African Americans: findings from a qualitative study. 15:72-79.
- Palmer, R.C., Midgette, L.A., Mullan, I.D.J.J.o.C.E., 2010. Colorectal cancer screening preferences among African Americans: which screening test is preferred? 25:577-81.
- Rawl, S.M., Menon, U., Champion, V.L., Foster, J.L., Skinner, C.S.J.C.P., 2000. Colorectal cancer screening beliefs: focus groups with first-degree relatives. 8:32-37.
- Ritvo, P., Myers, R.E., Paszat, L., Serenity, M., Perez, D.F., Rabeneck, L.J.B.P.H., 2013. Gender differences in attitudes impeding colorectal cancer screening. 13:500.

Ruffin, M.T., Creswell, J.W., Jimbo, M., Fetters, M.D.J.J.o.c.h., 2009. Factors influencing choices for colorectal cancer screening among previously unscreened African and Caucasian Americans: findings from a triangulation mixed methods investigation. 34:79-89.

Salas-Lopez, D., Mouzon, D., Marks, J., Kothari, N., Natale-Pereira, A.J.P.i.c.h.p.r., education, action, 2007. Perspectives on cancer screening among Latino community members and internal medicine residents. 1:241-48.

Shaw, S.J., Vivian, J., Orzech, K.M., Torres, C.H., Armin, J.J.J.o.C.E., 2012. Consistency in attitudes across cancer screenings in medically underserved minority populations. 27:165-71.

Sly, J.R., Edwards, T., Shelton, R.C., Jandorf, L.J.H.e., behavior, 2013. Identifying barriers to colonoscopy screening for nonadherent African American participants in a patient navigation intervention. 40:449-57.

Sultan, S., Partin, M.R., Shah, P., LeLaurin, J., Freytes, I.M., Nightingale, C.L., Fesperman, S.F., Curbow, B.A., Beyth, R.J.J.P.p., et al., 2017. Barriers and facilitators associated with colonoscopy completion in individuals with multiple chronic conditions: a qualitative study. 11:985.

Tan, K.-K., Lim, T.-Z., Chan, D.K.H., Chew, E., Chov, W.-M., Luo, N., Wong, M.-L., Koh, G.C.-H.J.I.J.o.C.D., 2017. Getting the first degree relatives to screen for colorectal cancer is harder than it seems—patients' and their first degree relatives' perspectives. 32:1065-68.

Tarasenko, Y., Schoenberg, N., 2011. Colorectal cancer screening among rural Appalachian residents with multiple morbidities.

Tarasenko, Y.N., Wackerbarth, S.B., Love, M.M., Joyce, J.M., Haist, S.A.J.J.o.C.E., 2011. Colorectal cancer screening: patients' and physicians' perspectives on decision-making factors. 26:285-93.

Tessaro, I., Mangone, C., Pappalardo, I., Pawar, V.J.P.C.D., 2006. Peer reviewed: knowledge, barriers, and predictors of colorectal cancer screening in an appalachian church population. 3.

Thompson, L., Reeder, T., Abel, G.J.H., 2012. 'I can't get my husband to go and have a colonoscopy': Gender and screening for colorectal cancer. 16:235-49.

Varela, A., Jandorf, L., DuHamel, K.J.J.o.C.E., 2010. Understanding factors related to Colorectal Cancer (CRC) screening among urban Hispanics: use of focus group methodology. 25:70-75.

Wackerbarth, S.B., Peters, J.C., Haist, S.A.J.Q.H.R., 2005. "Do We Really Need All That Equipment?": Factors Influencing Colorectal Cancer Screening Decisions. 15:539-54.

Weaver, K.E., Ellis, S.D., Denizard-Thompson, N., Kronner, D., Miller, D.P.J.J.m., uHealth, 2015. Crafting appealing text messages to encourage colorectal cancer screening test completion: a qualitative study. 3:e100.

Winterich, J.A., Quandt, S.A., Grzywacz, J.G., Clark, P., Dignan, M., Stewart, J.H., Arcury, T.A.J.A.j.o.h.b., 2011. Men's knowledge and beliefs about colorectal cancer and 3 screenings: education, race, and screening status. 35:525-34.

Winterich, J.A., Quandt, S.A., Grzywacz, J.G., Clark, P.E., Miller, D.P., Acuña, J., Arcury, T.A.J.A.j.o.m.s.h., 2009. Masculinity and the body: how African American and White men experience cancer screening exams involving the rectum. 3:300-09.

Wong, C.R., Bloomfield, E.R., Crookes, D.M., Jandorf, L.J.J.o.C.E., 2013. Barriers and facilitators to adherence to screening colonoscopy among African-Americans: a mixed-methods analysis. 28:722-28.

Journal Pre-proof