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Why people do not get screened for colorectal cancer

Socio-psychological antecedents of screening intention and possible interventions

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Table of contents

List of abbreviations

CRC: colorectal cancer

EBBS: emotional barriers to bowel screening

FIT: faecal immunochemical test

FOBT: faecal occult blood test

PBC: perceived behavioural control

Introduction

Colorectal cancer (CRC) is the third most diagnosed malignancy worldwide and the second most fatal (Sung et al., 2021). Screening at the recommended rates can decrease its incidence through the removal of pre-cancerous polyps (Sung et al., 2021), and its mortality, because CRC is often curable when diagnosed early (Danese et al., 2020). However, screening attendance rates are still far from being acceptable and rarely achieve the European Union recommended threshold of 65% of the target population (Danese et al., 2020).

Across the 27 European Union countries, less than half of the citizens who should be screened have attended CRC screening (Eurostat, 2021). Many European countries have removed practical obstacles: exams are free of charge, and invasive tests (e.g., colonoscopy) have been replaced with faecal collection tests such as the Faecal Immunochemical Test and the Faecal Occult Blood Test (European Commission, 2017). Nevertheless, people keep avoiding CRC screening exams. In Italy, where this research project took place, CRC screening is the mass screening programme with the lowest attendance rate: 40% of the invited population, versus 41% for cervical screening, and 58% for mammography (Associazione Italiana di Oncologia Medica, 2021a). This cannot be explained by the presence of both genders in the target population because low-adherence trends do not regard only men, but also women. Indeed, Italian women who attend other mass screening programmes are still not getting tested for CRC (Bocci et al., 2017). Nor can it be explained by different levels of knowledge, because CRC turned out to be better known than breast and cervical cancer (Genovese et al., 2021).

Trying to change a health behaviour, such as CRC screening avoidance, must start by investigating which factors encourage or deter it (Fishbein et al., 2001), and we can do that using social and health psychology theoretical basis. This branch of studies can provide

instruments to analyse a health behaviour predictors and to project intervention strategies (Conner & Norman, 2005). However, among the three cited mass screening programmes, CRC screening seems to be the least studied by psychologists: a search in the database "PsychInfo" (28th November 2022) revealed 1,977 studies about breast screening, 1,451 studies about cervical screening, and 1,367 studies about CRC screening.

Since CRC screening, among the most common mass screening programmes, has the highest benefits (Sharma et al., 2020), but it is the least attended and least studied, the current thesis was devoted to investigating the socio-psychological antecedents of the intention to screen for CRC, and potential interventions to foster such intention.

In the last twenty years, research on health behaviours shifted from a deeply cognitive approach to paying more attention to emotions, creating new bases for effective behaviour-change interventions (D. M. Williams et al., 2018). For instance, the model that –among the traditional motivational theories– showed the clearest definition of constructs and the best predictive validity, the Theory of planned behaviour (Ajzen, 1985), was criticised for failing to consider the impact of affective variables on the likelihood to adopt health behaviours (Conner et al., 2015). Conner et al. (2015) suggested a reformulation of the theory of planned behaviour that added how one *feels* when thinking of engaging in the behaviour in question (i.e., anticipated affective reactions), and the *affective* positive or negative evaluations of the behaviour in question (i.e., anticipated attitudes), to the traditional cognitive predictors of intention and behaviour (i.e., attitudes, subjective norms, perceived behavioural control). In line with this new theoretical approach focused on the role of emotions, and in appliance of Conner et al. (2015)'s reformulation of the theory of planned behaviour, we studied the impact of negative affects (i.e., disgust, embarrassment, and fear; Reynolds et al., 2018) on CRC screening attendance, taking into account also cognitive predictors, which allowed us to keep under control fundamental factors of the screening decision-making process (Brown-

Kramer & Kiviniemi, 2015). This theoretical framework is described in Chapter 1.

In the present dissertation, we are not suggesting that refusing to screen is an unacceptable choice, but it should be an informed decision. In contrast, negative emotions can hinder the formation of informed choices and generate avoidance before one can consider the benefits and drawbacks of screening (Korfage et al., 2018).

In the first phase of the present research, we analysed with a meta-analytical approach a specific emotional barrier to CRC screening that could explain why citizens avoid this test and not others: disgust. This emotion seems particularly relevant in the context of faecal collection tests and colonoscopy, as these examinations involve two of its most common elicitors, respectively: the handling of body waste and the violation of the physical envelope (Reynolds et al., 2018). In Chapter 2 we present our systematic literature review and meta-analysis, which supports the hypothesis that disgust hinders the intention to attend CRC screening and actual participation. However, this review also showed that there are other emotional barriers deserving to be considered. Measuring only disgust might hide the actual nature of CRC screening avoidance (Reynolds et al., 2018).

This is why we searched for an instrument to measure the emotions associated with CRC screening in a comprehensive way. We chose the Emotional Barriers to Bowel Screening scale (EBBS scale; Reynolds et al., 2012, 2018) because, to the best of our knowledge, it is the only instrument specifically developed to analyse the emotions of disgust, embarrassment and fear associated with CRC screening. We adapted this instrument to the Italian context (the procedure is described in Chapter 3), which also allowed us to investigate the impact of these emotions on Italians' CRC screening avoidance (Study 1).

This adapted version of the EBBS scale was then used to measure negative emotions in the following experiments. Since the communication domain is an integral part of screening programmes and can provide several levers to achieve a better rate of CRC

screening compliance, we tested several interventions of communication to boost CRC screening intention. The questions we started with were: can persuasive communication improve the *coping* or the *regulation* of emotional barriers and foster intention to screen? Can these interventions reduce the perception of such emotions? To answer these questions, we analysed I) how the wording about CRC screening invitation can be improved to evoke less negative emotions (Study 2), II) whether the effects of affective and cognitive claims promoting CRC screening depends on individual characteristics (Study 3), and III) whether narrative persuasion is more effective than didactic persuasion or a no treatment condition in convincing people to get screened for CRC (Study 4). The first experiment (Study 2), described in Chapter 4, reduced the repetition of bodily waste expression in a real invitation letter, and explored whether this intervention could change the salience of negative emotions (i.e., disgust, embarrassment, and fear) and positive cognitive associations (i.e., attitudes, subjective norms and perceived behavioural control). The second experiment (Study 3), described in Chapter 5, investigated whether matching a message including cognitive and/or affective levers with two opposite emotion regulation strategies (i.e., reappraisal and situation selection) could improve CRC screening intention. Finally, the third experiment (Study 4), described in Chapter 6, tested whether the use of a video with two people talking about their experience with CRC screening could decrease the perception of negative emotions about its procedure, boost the perception of self-efficacy and, ultimately, increase participants' willingness to screen. Our intention was to test three interventions that could ideally involve different media, such as the invitation letter, text messages (e.g., leaflets), and audio-visual channels (e.g., social media). Thus, the research project aimed to provide suggestions for the design of an integrated communication plan promoting CRC screening.

In the seventh and final chapter, we comprehensively discuss the results of the present research and draw conclusions on its theoretical and applicative contribution. We highlight

the limitations of the performed studies and pose questions that are still open for further research.

Chapter 1

Theoretical Background and Framework

CRC screening and the Italian context

Worldwide, cancer is one of the leading causes of death, and CRC contributes greatly to this record, since it is the second most fatal malignancy and the third most commonly diagnosed (Sung et al., 2021). This concerning high grade of mortality and incidence rates makes CRC one of the global major public health issues (Danese et al., 2020). Thus, in the last 20 years, many countries started to organise mass screening programmes (G. P. Young et al., 2019). Most CRC cases follow a specific pattern of events, starting with the formation of a non-malignant adenoma (i.e., polyps) that progresses to a carcinoma state in approximately 10 years (Mármol et al., 2017), thus screening is fundamental to diagnose the presence of these precancerous adenoma polyps and remove them even before they can turn into cancer.

The European Union (2010) recommends screening at least 65% of the target population (inclusion criteria are primarily based on citizens' age, with European programmes typically recommending screening for people aged 50−74 years; Gini et al., 2020). The faecal occult blood test (FOBT) is recommended as the first-line test of the screening programme, and a follow-up colonoscopy is recommended after an abnormal (i.e., positive) FOBT result (Moss et al., 2012). The FOBT is a stool-based assay that involves the collection of two stool samples, from three different bowel movements, and placing them in a cardboard box (Chambers, Callander, et al., 2016). Nowadays, it is often replaced by the faecal immunochemical test (FIT), which differs from the FOBT mainly because it includes a sampling stick and a plastic test tube where concealing only one faecal sample (Chambers, Callander, et al., 2016; G. P. Young et al., 2019). The FIT is a more accurate exam and is generally associated with higher attendance rates than the FOBT (Danese et al., 2020). The

stool samples collected at home (either with the FOBT or the FIT) are then analysed in a laboratory to test for the presence of human haemoglobin (Danese et al., 2020). Colonoscopy is an endoscopic procedure that allows the examination of the entire large bowel and the removal of polyps (Bretthauer et al., 2022).

In Italy, where this research project took place, most of the local CRC screening programmes offer a free of charge biennial faecal collection test to all citizens aged 50–69 years, and a free of charge colonoscopy if this test reveals an abnormal result (Associazione Italiana di Oncologia Medica, 2021b). A typical procedure starts with recruiting citizens for screening through an invitation letter. This letter must be brought to a pharmacy to collect the faecal collection kit and, after the collection of the sample, the kit must be brought where it was collected, so the pharmacy can send it to the laboratory. Finally, the laboratory test the stool sample for the presence of blood.

Screening with faecal collection tests can reduce CRC mortality by 22% (Associazione Italiana di Oncologia Medica, 2021b), and now it has become clearer than ever that delays in CRC screening programmes and the reluctance of patients to screen increase the risk of diagnosing CRC at advanced stages (Rottoli et al., 2022). Indeed, the COVID-19 pandemic has been a major obstacle for worldwide health care systems and for oncologic procedures. In Italy, between March 2020 and May 2021, CRC screening uptake decreased by 34.3% for a double reason: the temporary stop of screening procedures dictated by the pandemic and an increased patients' avoidance of screening exams and general medical care (Rottoli et al., 2022). Such a backlog allowed Rottoli et al. (2022) to calculate the risk of not engaging in CRC screening. The authors found that, during the reference period, the number of patients who received a diagnosis of metastatic disease increased by 8.6%. Thus, considering the 50,000 new cases of CRC diagnosed every year in Italy, CRC screening decreases the risk of metastasis for around 4,500 patients (Rottoli et al., 2022).

However, in Italy less than half of the screening target attend the exams (Associazione Italiana di Oncologia Medica, 2021a). Social and health psychology can provide the theoretical basis for understanding the avoidance of CRC screening and, ultimately, these disciplines can provide intervention strategies (Conner & Norman, 2005).

Cancer screening as a health behaviour

Cancer screening is an example of health behaviour, since it includes patterns and actions aimed at restoring, maintaining or improving health (D. M. Williams et al., 2018). In particular, cancer screening is classified as a detection behaviour (Conner et al., 2015), which is a behaviour aimed at finding potential health issues (Conner & Norman, 2019). Health behaviours can also be preventive (preserving one's health, e.g., eating vegetables; Conner & Norman, 2019) or curative (adhering to illness treatment, e.g., physiotherapy; Conner & Norman, 2019). Risky behaviours (menacing one's health, e.g., smoking, Conner et al., 2015) are considered health behaviours as well.

Studying health behaviours, such as CRC screening, is crucial to changing or promoting those behaviours (Conner & Norman, 2019). Indeed, the theoretical constructs identified as precursors of the attendance or avoidance of health behaviours can be used as levers to design interventions that impact on the outcome of interest (R. M. Williams et al., 2018). Hence, unsurprisingly this is one of the most important research topics in health psychology (Conner & Norman, 2019). Health psychology is an applied science that integrates different branches of psychology, such as cognitive and social theories, to study psychological and physical well-being, states of illness, and health care (Morrison & Bennett, 2009). The principal goals of health psychology are promoting health, both with prevention and with patients' adherence to medical treatment; identifying interventions that can reduce the costs of adopting positive health behaviours; supporting health policies and health care systems; understanding the causes of particular patients' vulnerabilities and risky behaviours

(Morrison & Bennett, 2009).

To investigate the determinants of health behaviours, health psychology research adopted a number of models that may reflect similar concepts, but each of these theoretical models is unique in the articulation of the particular factors considered relevant (Glanz & Bishop, 2010). Motivational models, for instance, identify potential determinants of health-related decisions and behaviours and differ in the identification of such constructs, their definition, the extent of theory development or empirical investigation (Armitage & Conner, 2000; Glanz & Bishop, 2010).

Some of the traditional and most enduring motivational theories, namely the Health Belief Model, the Protection Motivation Theory, and the Theory of Planned Behaviour, are still among the most common models employed to study cancer screening participation (Lemmo et al., 2023).

The health belief model (Rosenstock et al., 1988) posits that the implementation of health behaviours depends on six constructs (Lau et al., 2020): the perception of benefits, barriers, susceptibility, severity, self-efficacy, and the presence of cues to action. According to this model, patients are motivated to carry on health behaviours if the benefits of adopting those behaviours exceed the costs (i.e., barriers), which also depends on the perception of one's vulnerability to the prevented disease (i.e., assessed in terms of susceptibility and severity). In addition, patients should believe that the health behaviour in question will actually reduce the threat and they should feel able to take action (i.e., self-efficacy; Champion & Skinner, 2008). Finally, health behaviours can be triggered by certain contextual stimuli (i.e., cues to action; Champion & Skinner, 2008). Although research findings substantially supported the predictive validity of the health belief model, its greatest drawback was the absence of a clear definition of constructs and measurement (Armitage & Conner, 2000). In the last years, several efforts have been made to improve these aspects of

the health belief model (e.g., Champion et al., 2005; Rawl et al., 2001), but the issue was not completely resolved (R. M. Williams et al., 2018).

Originally, the protection motivation theory (Rogers, 1975) was a model explaining the impact of fear appeals on the receiver's attitudes and behaviours (Norman et al., 2015), but it was soon revised to become a more general framework for the study of persuasive communications and of the cognitive processes that mediate behavioural change (Rogers, 1983). Nowadays, it is used to predict health behaviours, design persuasive interventions and evaluate their impact (Norman et al., 2015). The protection motivation theory initially included three factors: perceived severity, vulnerability, and response efficacy. According to this model, to impact protection motivation (i.e., intention to follow the behavioural advice), a fear appeal must portray the perceived severity of the dangerous event, its likelihood, and the efficacy of the suggested recommendation in reducing the probability of that event to occur or even eliminate it (Norman et al., 2015). After the reformulation, a number of variables were added to the original model: observational learning, past experience, personality traits, perceptions of the rewards of maladaptive responses, self-efficacy, and response costs (Norman et al., 2015). These variables were divided into two independent cognitive mediating processes, namely threat appraisal and coping appraisal, that are triggered by fear appeals and affect protection motivation, which is the ultimate proxy of behaviour (Norman et al., 2015). Threat appraisal concerns the perception of a behaviour (or of the absence of behaviour) as risky and dangerous (Babcicky & Seebauer, 2019) from a cognitive (risk perception) and an affective point of view (threat-related feelings). Hence, threat appraisal includes the perceived severity of the potential disease resulting from the implementation (or absence) of a behaviour, one's perceived vulnerability to such disease, net of the rewards of "bad" behaviour (Lahiri et al., 2021). Coping appraisal implies choosing between several possible responses to reduce the danger (Babcicky & Seebauer, 2019). This

selection depends on the perceived efficacy of each response, the perceived own's self-efficacy in implementing the response, net of the costs associated with engaging in the selected behaviour (Lahiri et al., 2021). Since people consider their coping options only when they feel menaced, threat appraisal and coping appraisal are executed sequentially (Babcicky & Seebauer, 2019). This model has rarely been fully tested in empirical settings (Norman et al., 2015). Most often, it has been employed as a framework where researchers select only some of its constructs (Norman et al., 2015). A further limitation of the protection motivation theory is the lack of details about the development of its measurement instruments (Norman et al., 2015).

The theory of planned behaviour (Ajzen, 1985), discussed in the next section, has been subject to empirical scrutiny in thousands of papers (Bosnjak et al., 2020) and, among the described motivational theories, this model showed the clearest definition of constructs and the highest predictive validity (Armitage & Conner, 2000). Hence, it was chosen as the main theoretical framework for the present research.

The theory of planned behaviour

The theory of planned behaviour (Ajzen, 1985) is a reformulation of the theory of reasoned action (Fishbein & Ajzen, 1975), which was intended to predict volitional behaviours and their psychological precursors. Compared to the original model, the theory of planned behaviour addressed the problem of those behaviours that are not under people's complete control because of personal deficiencies or external obstacles (Ajzen, 1985).

The theory of planned behaviour inherited several factors from the theory of reasoned action. First, the intention to adopt (or to *not* adopt) a behaviour is the primary predictor of the behaviour in question (Ajzen, 1985). Intentions are plans or motivations to act. This construct captures the efforts people make to take action (Ajzen, 1991). A strong intention to engage in a behaviour positively impacts on the likelihood of its actual performance, whereas

a strong intention to *not* perform a behaviour predicts its avoidance (Ajzen, 1991). When appropriately measured, intention predicts an appreciable proportion of variance in actual behaviour (Ajzen & Fishbein, 2005). However, Ajzen (1991) stresses that such a strong association between intentions and behaviours occurs if one has volitional control over the performance of that behaviour. In addition, it should be noted that intentions can change. If this happens, the measured intention will be clearly a poor predictor of later behaviour (Ajzen & Fishbein, 2005).

Second, like in the theory of reasoned action, the formation of behavioural intentions depends on the attitudes towards the behaviour in question and subjective norms: when people's evaluation of a behaviour is positive, and when people believe that significant others would approve of the behaviour in question, then they will be intentioned to take action (Ajzen, 1985). Attitudes towards a behaviour are a positive and/or negative evaluation of the behaviour in question and depend on the beliefs about the likely consequences of its performance or avoidance (Bosnjak et al., 2020). Similarly to the other two motivational theories (e.g., the health belief model and the protection motivation theory), the theory of planned behaviour posits that if the beliefs about the advantages of implementing a behaviour outweigh the beliefs about the disadvantages of such behaviour, then people will probably form a positive attitude towards that behaviour (Ajzen & Fishbein, 2005). Conversely, people will form a negative attitude towards a behaviour whether its perceived drawbacks outweigh its perceived advantages (Ajzen & Fishbein, 2005).

Subjective norms capture social pressure to behave consistently with the believed positive or negative perception of a certain behaviour by significant others, such as friends and family (Bosnjak et al., 2020). Subjective norms derive from the expectations about how significant others will evaluate the performance or avoidance of the behaviour in question. Hence, they can differ from what significant others actually think of the behaviour (Bosnjak

et al., 2020).

Mostly, the novelty of the theory of planned behaviour was adding perceived behavioural control (PBC) to the aforementioned original predictors of the theory of reasoned action: behavioural achievement does not depend only on intention, but also on PBC, which predicts behaviour both directly and through a positive effect on intention (Ajzen, 1991). Indeed, PBC and intention jointly impact on behaviour, with the intention-behaviour gap (people not always behave how they intend to) being explained by the control one has on taking action, and performance becoming more likely when people are equally motivated and in control of the situation (Ajzen, 1991). The concept of PBC is derived from Bandura's construct of self-efficacy (Ajzen, 1991), intended as a person's judgments on how well they will be able to execute a course of action (Bandura, 1982).

The theory of planned behaviour has been used in several contexts, such as environment, education, business, management and health (Bosnjak et al., 2020). Cooke and French (2008), in particular, analysed the validity of the theory of planned behaviour (and of its predecessor, the theory of reasoned action) in predicting the intention to attend cancer screening programmes and actual participation. They meta-analysed 33 studies and found that attitudes towards the screening behaviour (e.g., perceiving the adherence to screening programmes as useful) were strong predictors of the intention to attend breast, cervical and CRC screening, especially where attending these exams is free.

Subjective norms (e.g., perceived pressure to screen by family members) and PBC (e.g., feeling able to complete an FOBT) had a smaller (but still medium) effect on cancer screening intention compared to attitudes (Cooke & French, 2008). They also noted that PBC was a significantly stronger predictor of cervical and CRC screening intention than of the intention to attend mammograms and, similarly to attitudes, where one has to pay to undergo screening, there was a weaker association between PBC and intention (Cooke & French,

2008). As far as actual behaviour is concerned, Cooke and French (2008) found a medium effect of screening intention on screening attendance and a small association between PBC and attending cancer screening. The intention-behaviour gap was smaller in the contexts of CRC and mammography than in the context of cervical cancer screening, whereas the effects of PBC on attendance did not differ for the type of screening (Cooke & French, 2008). Behavioural intention and PBC were weaker predictors of screening attendance where screening was free rather than where it was not (Cooke & French, 2008).

In recent years, the theory of planned behaviour received several criticisms. Its predictive validity seemed to be challenged by longitudinal designs, and the model provides a better account of self-report outcomes than objectively recorded measures (Sniehotta et al., 2014). In addition, the theory of planned behaviour was weaker in accounting for behaviour when data came from more heterogeneous samples (i.e., samples not including only university students, Sniehotta et al., 2014). However, these critics fail to show how different models can overcome such issues (Ajzen, 2015).

Most important for our research project, one of the main criticisms of the theory of planned behaviour concerned the fact that it neglects the role of affective factors. This lack gave rise to a reformulation of the original model (Conner et al., 2015) that might better predict cancer screening behaviours, because we know that the attendance of detection behaviours is significantly hindered by negative emotions and fostered by positive affects (Consedine et al., 2018). Analysing the role of affects within the context of the theory of planned behaviour might improve the predictive validity of this model, and provide a valid theoretical framework to study the effects of emotions on intention and behaviour while controlling for the well-known key cognitive predictors of these outcomes (Conner at al., 2015).

The acknowledgement of affective factors as predictors of health behaviours

Initial research on health behaviours was firmly grounded in the cognitive tradition, and only in the last twenty years the role of affective factors as determinants of preventive and detection actions has been acknowledged (D. M. Williams et al., 2018).

Affects are physiological responses, typically expressed with facial movements, and imply subjective perception of feelings (e.g., experiences of disgust or embarrassment; D. M. Williams et al., 2018). This definition of affect includes emotions (i.e., mental and physiological feeling states that direct our attention and guide our behaviour, Stangor & Walinga, 2014). According to Larsen and Prizmic (2004), the key dimensions of affect are valence and arousal. Affects valance can be positive (e.g., joy) or negative (e.g., disgust). Arousal can be strong (e.g., highly salient emotions) or mild (e.g., feeling in a certain mood). Affects, and emotions in particular, can be elicited by very different stimuli, but their manifestation (i.e., the experience and expression of such emotions) is consistent regardless of the elicitor (Consedine et al., 2018). For instance, the facial expression of disgust does not change whether it is elicited by food or perceived inappropriate sexuality (Rozin et al., 2008).

In line with the attention given to affective determinants of health behaviours, Conner et al. (2015) suggested that affective attitudes and anticipated affective reactions should be added to the original predictors of the theory of planned behaviour. However, Ajzen and Fishbein (2005) had already suggested tapping both cognitive and affective components when measuring attitudes. Hence, the construct of attitudes implicitly embraces affective evaluations of a behaviour (e.g., is the behaviour unpleasant or pleasant? Is it enjoyable?) together with cognitive beliefs about its instrumental benefits (e.g., is the behaviour useful? Is it worthless?). Positive affective attitudes increase the likelihood of adopting a behaviour, whereas negative affective attitudes decrease it (Conner et al., 2015).

Anticipated affective reactions are feelings or emotions perceived when picturing

oneself engaging in a behaviour (Conner et al., 2015). Negative anticipated affective reactions generate avoidance, whereas positive anticipated affective reactions foster the practice of behaviour (Consedine et al., 2018).

Conner et al. (2015)'s meta-analysis (Study 1) showed a moderate overlap between affective attitudes and anticipated affective reactions. After intention and PBC, these two affective constructs were the strongest predictors of engaging in health behaviours, whereas instrumental attitudes and subjective norms were the weakest. Although affective attitudes had a stronger impact on behaviour than anticipated affective reactions, the latter had a stronger impact on behavioural intention. Indeed, the first predictor of intention was PBC, followed by anticipated affective reactions, cognitive attitudes, and affective attitudes.

Affective attitudes and affective anticipated reactions explained a significant additional variance of intention and behaviour than the original components of the theory of planned behaviour. In addition, findings supported the application of this reformulation to a wide range of health behaviours, including cancer screening (Conner et al., 2015).

In Study 2, Conner et al. (2015) also considered the role of prior experience in determining the practice of health behaviours. Indeed, with this prospective research, they analysed the effects of the original components of the theory of planned behaviour, plus affective attitudes, anticipated affective reactions, and prior experience on later protection, detection and risky health behaviours. Affective attitudes towards the critical behaviour were captured in terms of how unpleasant-pleasant, not enjoyable-enjoyable it was, whereas regret (i.e., a negative feeling aroused by thinking that a future health condition could have been better had we acted differently in the present, Sandberg & Conner, 2008) operationalised affective anticipated reaction. This second study replicated and extended the findings of their meta-analysis. Although affective attitudes and affective anticipated reactions were strongly correlated, they were significant and independent predictors of the intention to engage in

health behaviours and actual actions. The type of health behaviour (i.e., protection, detection or risk) moderated the effects of affects on intention and action. In particular, those participants who showed a positive affective attitude towards a certain behaviour were more likely to adopt such behaviour when it had a protection purpose (e.g., using sunscreen) than when this action was risky (e.g., smoking) or aimed at detection (e.g., breast examination). In contrast, participants who anticipated regret when thinking of not engaging in a behaviour were more willing to adopt detection behaviours (e.g., anticipating a feeling of regret increased the likelihood to screen) than protection or risky behaviours. Concerning the actual adoption of these three health behaviours, anticipated regret improved the likelihood of performing detection behaviours.

We believe that one of the limitations of Conner et al. (2015)'s second study was relying only on regret to measure the effects of anticipated affective reactions on intention and behaviour. Their choice was in line with most of the research on anticipated affective reactions and health behaviours (Conner et al., 2015). However, in the context of CRC screening, anticipated regret only captures a feeling associated with *not* attending a faecal collection test or a colonoscopy (e.g., regret associated with a missed early detection of cancer). In our view, other emotions associated with attending the screening test should be considered. The disgust and embarrassment associated with the CRC screening procedure (e.g., elicited by touching faecal matter), and the fear towards the exam outcome, are significant barriers of CRC screening attendance (Reynolds et al., 2018). Therefore, when applied to CRC screening behaviours, the reformulation suggested by Conner et al. (2015) might be further improved considering these three emotions.

To the best of our knowledge, only Hunkin et al. (2020) adopted Conner et al. (2015)'s reformulation of the theory of planned behaviour to study the predictors of CRC screening intention. In their research, together with the original cognitive factors, Hunkin et

al. (2020) measured anticipated regret and faecal aversion. However, the authors found substantial multicollinearity (i.e., one predictor variable predicted the others) between anticipated regret and the other variables of the theory of planned behaviour (Hunkin et al., 2020). Indeed, regret might depend on how much we think that screening is useful (i.e., positive attitudes), or on how much we believe we will disappoint our significant others if we do not attend the screening exam (i.e., subjective norms). Since the multicollinearity between anticipated regret and the cognitive predictors hid the effects of interest, the authors removed attitudes, subjective norms and PBC from the regression model. In conclusion, Hunkin et al. (2020)'s findings seem to suggest the usefulness of moving from anticipated regret to different emotional dimensions associated with CRC screening, since regret might not explain additional variance than the original predictors of the theory of planned behaviour for what concerns CRC screening intention or attendance.

The emotional barriers to bowel screening

Disgust, embarrassment and fear are three prominent emotions in the context of CRC screening and thus identified as "the emotional barriers to bowel screening" (Reynolds et al., 2018). These specific emotional responses exert different impacts on people's behaviours (Reynolds et al., 2018). However, in human evolution, these three emotions fulfilled the same function of body protection (Reynolds et al., 2018). Disgust fulfils this function through the avoidance of contaminants, embarrassment protects us against social exclusions as a sanction for violating social norms, and fear makes us distance ourselves from menaces (Reynolds et al., 2018). Nevertheless, in the screening context, emotionally induced avoidance can make us delay the adoption of cancer detection behaviours (Consedine et al., 2018). The aspects of CRC screening that can elicit negative emotions, and thus avoidance, are collecting the stool sample, undergoing a colonoscopy, and the risk of receiving an inauspicious diagnosis (Reynolds et al., 2018).

Disgust is a rejection response to something perceived as corrupted, rotten or immoral (Rozin et al., 2008). The collection of the stool sample is associated with disgust because it implies dealing with a potential contaminant (i.e., bodily waste; Reynolds et al., 2013). The disgust associated with CRC screening can manifest in both physical (e.g., throwing away the invitation letter) and psychological forms (e.g., forgetting to collect the kit). Disgust varies with contextual factors (e.g., different faecal collection kits can induce more or less disgust, Chambers, Callander, et al., 2016), but it can also vary as a function of individual propensity and sensitivity to disgust (Reynolds et al., 2013). Thus, some individuals will feel more threatened than others by the procedure of the FOBT or FIT.

Using the faecal collection kit can also elicit embarrassment, since this action violates social norms (Consedine, Ladwig, et al., 2011) and even cultural taboos (Palmer et al., 2014) concerning the faecal matter. Individuals can vary for dispositional embarrassability (i.e., the tendency to feel embarrassed, Consedine, Ladwig, et al., 2011) but, generally speaking, this emotion makes people feel awkward and highly self-aware (Consedine et al., 2018). In the context of CRC screening, embarrassment can lead to the refusal to collect the kit from the pharmacy or the concern of being caught storing or posting faecal samples (Palmer et al., 2014). Embarrassment is also associated with invasive exams such as colonoscopy, due to a perceived violation of privacy (Consedine, Ladwig, et al., 2011). In addition, endoscopic exams elicit insertion disgust, an emotion associated with the violation of body envelope (Reynolds et al., 2018).

Finally, people may be afraid to feel pain during a colonoscopy and may be afraid of receiving a cancer diagnosis to the point of refusing to attend CRC screening (Consedine et al., 2018). Fear is a response to negative and uncertain situations (Achar et al., 2020). When the source of threat is moved from cancer to screening itself, the natural response to fear (i.e., avoidance) concerns faecal collection and endoscopic tests (Consedine et al., 2018). On the

contrary, if cancer is acknowledged as the threat and attending screening is acknowledged as the way to reduce such threat, individuals should be more likely to get screened. Counterintuitively, Consedine et al. (2006) found that trait fear (i.e., the disposition to feel afraid) improved CRC screening intention. This result is explained by the fact that people with a high dispositional fear seek more health information and medical advice than people with low trait fear (Consedine et al., 2006).

Only a bunch of studies on emotions and CRC screening were conducted in Italy, and such preliminary research confirmed that disgust, embarrassment and fear hinder Italians' CRC screening participation. Fear associated with a potential abnormal FOBT/FIT result, fear of colonoscopy (perceived as painful), disgust elicited by dealing with faecal matter, and embarrassment associated with both screening tests were listed in three qualitative studies as reasons for being reluctant to screen by Italian participants (Briganti et al., 2009; Genovese et al., 2021; Valent et al., 2020). In addition, Bocci et al. (2017) found that embarrassment and fear of colonoscopy were important obstacles for Italian women's CRC screening attendance, while disgust was not considered in their study.

The emotional barriers to bowel screening scale

Studies typically focus on a single emotion associated with CRC screening, but affective associations typically embrace several emotional dimensions that tend to co-vary (Reynolds et al., 2018). As already described, CRC screening can be concurrently perceived as disgusting (e.g., Klasko-Foster et al., 2020), embarrassing (e.g., Byrd et al., 2019) and scary (e.g., Basch et al., 2016). Measuring only one of these emotions may result in a partial view of the emotional determinants of CRC screening (Reynolds et al., 2018). Thus, to simultaneously study disgust, embarrassment and fear, Reynolds et al. (2012, 2018) developed the Emotional Barriers to Bowel Screening scale (EBBS scale). This scale originally included 20 items, each assessing one specific emotional barrier to CRC screening,

then reduced to 15 to improve the scale validity. These 20 sentences resulted from the collective work of an experienced team of clinicians, psychologists, and researchers. In testing the scale predictive validity, Reynolds et al. (2018) found that participants who expressed greater fear towards a possible detection of cancer were more likely to avoid doctors, even when asked to imagine having suspicious bowel symptoms. Greater insertion disgust was associated with a lower likelihood of having undergone endoscopic examination, whereas embarrassment had the opposite effect. The authors explained that embarrassment might be associated with health anxiety, thus increasing the likelihood to get screened (Reynolds et al., 2018).

The development of the EBBS scale is an important improvement of the research on affects and CRC screening, because the availability of a shared measurement tool is a precondition for results comparability through different contexts and samples. For instance, the EBBS scale can be used to extend the research on emotions and CRC screening to other cultures, whereas extant studies were mainly conducted in English-speaking countries. Indeed, cultural characteristics can affect the impact of emotions on CRC screening (Flynn et al., 2011). For instance, Dharni et al. (2017) showed that disgust and fear towards the potential outcomes of CRC screening exams discouraged White British participants' intention to screen, but did not affect other ethnic groups (i.e., African and Caribbean participants), whereas Consedine, Reddig, et al. (2011) found that Jamaican-born immigrants living in the United States were more embarrassed by screening related proximity to faeces and examination of the rectum than African-Americans and European Americans.

Finally, the EBBS scale helps to fill another gap in the extant literature, which does not sufficiently discuss how the perception or impact of negative emotions associated with CRC screening can be reduced. Again, we suggest that using a consistent measure to test the effects of different interventions can help to compare their efficacy.

Chapter 2

Systematic review and meta-analysis on the role of disgust in the CRC screening context[1]

Introduction

CRC screening exams involve two of the most common elicitors of disgust: the manipulation of bodily waste (i.e., the collection of faecal samples) and the violation of the body's envelope (i.e., the colonoscopy exam). Among the emotions associated with CRC screening, disgust is the most peculiar, since embarrassment and fear of the outcome are also associated with mammography and cervical screening (Genovese et al., 2021). Hence, disgust is the emotion that could at least partially explain why CRC screening rates are so low. In line with this reasoning, prior research defined disgust as the most relevant affective factor associated with the avoidance of colonoscopy (Klasko-Foster et al., 2020). Nevertheless, disgust has been the least studied among the emotional barriers to CRC screening (Reynolds et al., 2018).

A prior systematic review collected all the studies examining disgust and screening behaviour published between 2001 and 2011, finding only nine studies falling in this category (plus six studies about the role of disgust in cancer treatment; Reynolds et al., 2013). Overall, these nine studies confirmed that disgust plays a significant role in boosting the propensity to avoid CRC screening exams. However, as the authors of the systematic review emphasised, the research examining disgust and avoidance in CRC contexts was still in its infancy. Most studies used qualitative methods, whereas prospective and correlational analyses were still

[1] Part of this chapter, including tables and figures, was published in Scaglioni, G., Guidetti, M., & Cavazza, N. (2021). The role of disgust as an emotional barrier to colorectal cancer screening participation: A systematic review and meta-analysis. *Psychology & Health*, 1–20. https://doi.org/10.1080/08870446.2021.1967351

lacking (Reynolds et al., 2013). At the time, Reynolds et al. (2013) lamented the absence of specific tools to measure disgust in the CRC screening context. Finally, the different roles and relevance of dispositional disgust sensitivity, anticipated disgust and perceived disgust were still not disentangled.

In recent years, further studies examining CRC screening and disgust-related avoidance are available, the use of a quantitative approach has become more common, and new tools have been developed to investigate how disgust hampers attendance of CRC screening programmes. This novel research (e.g., Davis et al., 2017; Reynolds et al., 2018) highlighted that the role played by disgust in weakening screening exam compliance is not as uncontroversial as it seemed in the review by Reynolds et al. (2013), which can no longer be considered representative of the current state of research.

The present study

To update Reynolds et al. (2013)'s review and provide a tool to become acquainted with the research methods and the main findings of the works about disgust and CRC screening, in the current chapter we undertake a new systematic review and perform a meta-analysis to I) estimate the effect of disgust on screening intention and actual exam attendance, II) examine whether methodological characteristics moderate the effect of disgust on screening behaviour and III) estimate the effects of two factors, namely, the type of exam kit and trait disgust (i.e., dispositional disgust sensitivity), on the disgust associated with CRC screening exams.

We will test the effect of disgust on CRC screening intention and behaviour because emotions can have different consequences on these two constructs. For example, Conner et al. (2015)'s meta-analysis found higher correlations between emotions and health behaviour intentions rather than actual performance.

We will also explore whether disgust is equally predictive of CRC screening

attendance in different research settings, as methodological moderators might affect the variance of effect sizes and elucidate previous controversial findings. First, comparing studies that measured disgust before (i.e., as an anticipated emotion predicting screening intention) versus after the screening exam (i.e., as a recalled emotion predicting actual behaviour) might shed additional light on the differences between disgust as a predictor of screening intention and actual performance. Second, we will test the effect of disgust on self-reported versus medical indices of screening. Self-reported screening indices tend to overestimate CRC screening attendance, as they can be affected by social desirability bias (Lofters et al., 2015). For the same reason, participants might have assigned low rates to the disgust associated with CRC screening. The third characteristic is the data collection tool (interview vs questionnaire). Interviews may induce more socially desirable answers than questionnaires due to the direct interaction between interviewer and interviewee (Richman et al., 1999), which in turn might lead to the detection of a lower effect of disgust on screening attendance. Finally, population sample type (convenience vs random/representative) is relevant because convenience samples might be untypical of the screening target population as a whole (Davies & Mosdell, 2006). Indeed, people with a high socioeconomic status or high education tend to be over-represented in convenience samples (Bell, 1961; Emerson, 2015); these factors are associated with screening facilitators, such as the perception of screening benefits or health literacy (Kiviniemi, Ellis, et al., 2018; Kiviniemi, Klasko-Foster, et al., 2018). Hence, the effect of disgust on screening attendance observed in convenience samples might be lower than that found in actual random/representative samples.

Our final purpose is to analyse how disgust in the CRC context is impacted by a dispositional factor (i.e., trait disgust) and a situational factor (i.e., the type of exam kit) by combining the results of existing studies. Nowadays, CRC screening can be conducted with several types of test, such as endoscopic exams (e.g., colonoscopy) and faecal collection

exams (e.g., FIT). However, we will test only the effects of faecal collection exams on disgust because principal CRC screening guidelines establish that the first CRC screening steps should be based on detecting the presence of blood in the faeces, which means that colonoscopies are follow-up tests (Danese et al., 2020). Moreover, endoscopic and faecal collection exams elicit two different kinds of disgust, namely insertion disgust and faecal aversion disgust (Reynolds et al., 2018), which makes them less comparable. Faecal collection tests can be conducted with the FIT or the FOBT. The FOBT involves the collection of more faecal samples than the FIT, whereas the latter is easier to use. Since the FIT requires less faecal manipulation than the FOBT, it might arouse fewer psychological barriers (Cole et al., 2003), which might also explain why the FIT is generally associated with higher screening participation rates than the FOBT (Goodwin et al., 2019). Analysing the effects of the two different kits on disgust might shed light on the benefits of reducing CRC screening patients' contact with faecal matter.

To summarise, our systematic review aims to examine the literature on disgust and CRC screening and to identify the studies to be compared with the meta-analytical approach. With our systematic review, we will examine how data were collected, how the population was sampled and how the variables were operationalised. Then, these characteristics will be meta-analysed with moderation analyses. Meta-analytical analyses will also be conducted to shed light on the effects of disgust on CRC screening intention and attendance, and on the effects of trait disgust and type of exam kit on CRC screening-related disgust.

Method

The systematic review

The systematic selection process was conducted at the end of December 2020 (21–23 December) and followed a three-step process. First, we obtained search strings combining the word *Disgust* with *Cancer* and *Screening*. We searched for these strings in five electronic

databases: PsychInfo (*via* EBSCOhost), Psychology & Behavioural Sciences Collection (*via* EBSCOhost), PubMed, Scopus and Web of Science. Second, we conducted an additional search in the archives of selected papers (*British Journal of Health Psychology*, *Health Education Research*, *Journal of Health Psychology*, *Psychology & Health*, *Preventive Medicine*). We included in the systematic review only English articles for which the full text was available and that studied disgust and screening programme attendance either as a behaviour or as a behavioural intention. In addition to published articles, we included dissertations, theses, abstracts and posters in an effort to collect unpublished data. In line with Reynolds et al. (2013)'s review, we did not include only articles about CRC screening, but also about other screening programmes.

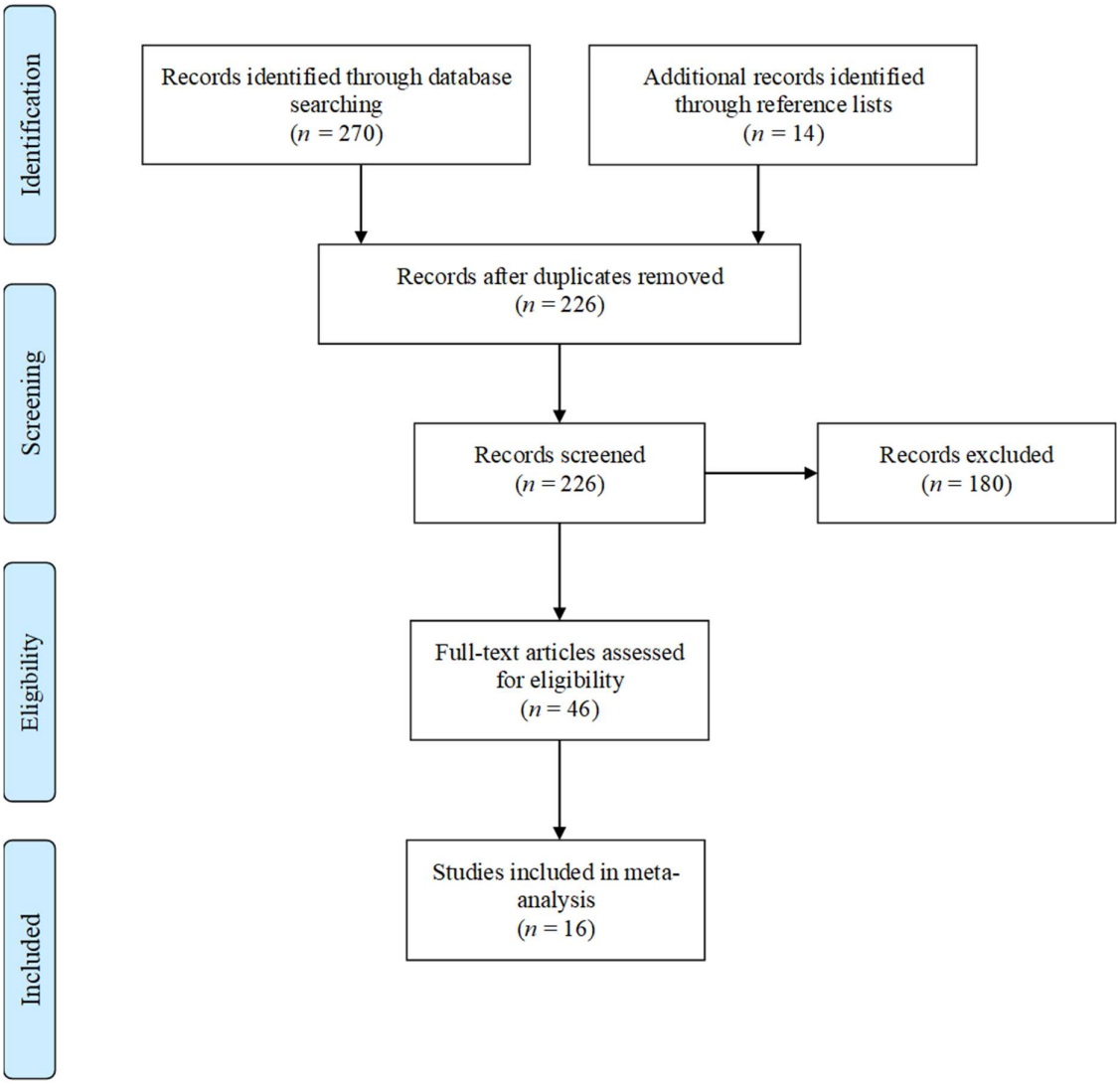
The search strings excluded some topics considered not relevant for this review: stigmatisation, circulatory problems, dermatological illness, mental disorders, epilepsy, studies on smokers, studies about children and studies on food or weight problems. Based on their irrelevance for our purposes, we decided to exclude *a posteriori* the following: studies on animals, studies about alcohol, studies about symptoms perception, studies about CRC surgery, studies on cancer patients, and studies about disgust as an element of facial recognition tasks. The overall search produced 270 records (Figure 1). Titles, abstracts, and texts were then read to establish whether the records met our inclusion criteria. Following this stage, we removed duplicates ($k = 58$) and 180 not relevant articles (e.g., articles for which the focus was not on disgust and cancer screening programmes. The reference list of the selected articles ($k = 32$) was used to include other relevant studies ($k = 14$). The final sample consisted of 46 records (Figure 1). Information regarding the quantitative and qualitative studies is summarised in Table 1.

In addition, a call to gather data from published and unpublished studies on disgust and CRC screening was sent to the European Association of Social Psychology (26 February

2020), the European Health Psychology Society (18 December 2020), the British Psychological Society (18 December 2020), the APA Society for Health Psychology (18 December 2020) and the Australian Psychological Society (18 December 2020). We did not receive any additional articles or data.

Figure 1.

PRISMA Flow Diagram (Moher et al., 2009).



The meta-analysis

Among the records found through the systematic review, we located all the quantitative studies examining CRC screening that reported sufficient data to calculate the

sizes of the following effects: effect of disgust on screening intention (k = 8); effect of disgust on screening attendance (k = 8); effect of trait disgust on the disgust associated with CRC screening (k = 5); effect of exam kit type on the disgust associated with CRC screening (k = 3).

In the meta-analysis, we could not include articles that did not report specific data on disgust (Neilson & Whynes, 1995; Neter et al., 2014), including those where disgust was part of a general affective construct (Jones et al., 2010; Kiviniemi, Ellis, et al., 2018; Kiviniemi, Klasko-Foster, et al., 2018, 2018; Osborne et al., 2018). However, we included the studies by Davis et al. (2017) and Hunkin et al. (2020). Although Davis et al. (2017) report a total negative emotions score, the authors consider this a measure of faecal disgust. Hunkin et al. (2020) report a general faecal aversion measure but two items out of three concern disgust. We neither include articles about other screening programmes (Brown-Kramer & Kiviniemi, 2015; Goldenberg et al., 2009) nor articles about dispositional or situational factors affecting state disgust, aside from trait disgust and kit type (Reynolds, Consedine, et al., 2014; Reynolds, McCambridge, et al., 2014; Smith, Kobayashi, et al., 2016; Smith, McGregor, et al., 2016). Finally, we excluded from the meta-analysis a study in which disgust was measured after a health care specialist's intervention, which might introduce bias (i.e., Quyn et al., 2018); an article about the efficiency of different kits, as disgust was reported as a baseline measure before the kit intervention (i.e., Chubak et al., 2013); and an article where the reported data could not be converted in Cohen's d (i.e., Cole et al., 2011).

Summary data were extracted for each record, including sample and methodological information. Table 2 provides details for the methodological moderators of each meta-analysed study reporting the effect of disgust on CRC screening attendance. Effect sizes (Cohen's d) and 95% confidence intervals (CIs) were calculated using data provided in each article, with the exception of a correlation between trait disgust and disgust associated with

CRC screening, sent to us by the authors (Davis et al., 2017).

Effect sizes were weighted using a random-effects model, which is recommended for social science meta-analyses (Field & Gillett, 2010). With random-effects models, the investigated studies are treated as a randomly selected sample of a larger study population (Hedges & Vevea, 1998). Thanks to this model, the overall number of participants in the studies (N = 28,388) offsets the limited availability of data from different sources (k = 16).

We interpreted effect sizes following Cohen's guidelines (1992): d = 0.20 is a *small* effect; d = 0.50 can be considered a *medium* effect; and $d \geq 0.80$ indicates a *large* effect.

Where appropriate, effects were meta-analysed within a study (e.g., effects were averaged across different aspects of trait disgust: disgust sensitivity and propensity). The appropriate effect sizes were then used in subsequent analyses. When authors indicated both faecal and insertion disgust, effect sizes were calculated with faecal disgust, as this was the most common measure across the studies. To examine the effect of type of kit on disgust, we included only studies that directly compared the two kit types. In particular, two studies analysed the perception of the FOBT kit and the FIT kit in a within-subjects design (Chambers, Callander, et al., 2016; Liles et al., 2012), whereas one applied a between-subjects design – i.e., the two different kit types were sent to different experimental groups (Deutekom et al., 2010).

The overall meta-analysis (homogeneity and publication bias included) and the moderation analyses were conducted with ProMeta version 3.0 (Cesena (FC), Italy). To control for the studies' heterogeneity, ProMeta relies on the homogeneity Q statistic (Cochran, 1954): when statistically significant, the Q indicates that the compared records are heterogeneous. The presence of publication bias was analysed using Egger's regression (Egger et al., 1997) and Rosenthal's fail-safe N (1979).

Results

The systematic review

The records found through the systematic review selection process were published between 1984 and 2020. However, most were published after 2012 (k = 32). Two records were book chapters and one was a dissertation. Among the articles, 5 were reviews about CRC screening (including the one about disgust by Reynolds et al., 2013), 28 were quantitative studies (half of them were experiments and the other half correlational studies), 8 were qualitative studies (in-depth interviews and focus groups), and two had mixed-method designs (the authors collected data using semi-structured interviews and analysed the results with both qualitative and quantitative methods). The characteristics and the main findings of the quantitative, qualitative and mixed-method design studies are reported in Table 1.

The examined screening programmes were related to CRC (k = 35) or breast/testicular cancer (k = 2). Half of the studies (k = 22) were conducted on national screening programmes, usually with the screening kit sent by mail (k = 19). Most samples included 36 to 850 participants (k = 22), but many works studied larger populations (from 1,447 to 9,922; k= 11). In four studies, samples ranged from 20,623 to 59,876. Most of the studies involved convenience samples (k = 19). Random selections were conducted in eight studies. In another eight studies, a recruitment letter was sent to all eligible people. Regarding the dependent variables used for the likelihood of exam uptake, almost half of the screening effects were operationalised through objective measures (kit returned or medical reports). The main outcomes of the remaining studies were self-report measures of screening behaviour (31%) and screening intention (24%). Most studies showed that CRC screening was associated with disgust (e.g., Bridou et al., 2013; Chapple et al., 2008; Clavarino et al., 2004; Itzhaki, 2018; Palmer et al., 2014; Smith, Kobayashi, et al., 2016; Smith, McGregor, et al., 2016) and that this association aroused avoidant behaviours (e.g., Cole et al., 2011; Reynolds,

Consedine, et al., 2014; Reynolds, McCambridge, et al., 2014). A number of different factors affected the association of CRC screening with disgust, such as trait disgust, type of screening exam and patients' socioeconomic background. Six studies examined the effects of trait disgust. Four of them found no effect on screening intention or behaviour (Chambers, Callander, et al., 2016; Davis et al., 2017; Klasko-Foster et al., 2020; Reynolds et al., 2018), but one study documented that trait disgust moderated the effect of state disgust on screening intention (Klasko-Foster et al., 2020). A few studies showed how screening sampling modalities (i.e., faecal sample collections, endoscopic exams, blood or saliva sample collections) had different effects in terms of the perception of CRC screening exams as disgusting and in terms of attendance rate – patients preferred exams with less or no faecal manipulation (e.g., Chambers, Callander, et al., 2016; Chubak et al., 2013; Deutekom et al., 2010; Hillyer, 2011; Liles et al., 2012; Osborne et al., 2018). A number of studies reported that socioeconomic disparities affect CRC screening perception and attendance (e.g., Dharni et al., 2017; Jones et al., 2010; Neilson & Whynes, 1995), with people with higher income (vs lower income) and higher education (vs lower education) reporting less negative affective associations to CRC screening and a greater likelihood of past screening attendance or intention to screen (Kiviniemi, Ellis, et al., 2018; Kiviniemi, Klasko-Foster, et al., 2018; Smith, Kobayashi, et al., 2016; Smith, McGregor, et al., 2016). Several studies suggested interventions to help patients overcome CRC screening barriers. The most frequently cited one was educating patients, especially with the mediation of a health care specialist (Beeker et al., 2000; Broc et al., 2017; Luque et al., 2018; Quyn et al., 2018; Sarma et al., 2019).

Assessment methods for disgust in the CRC context

In the systematic review, we found a common use of validated scales to operationalise disgust associated with CRC screening and trait disgust (Table 1). Specifically, two scales, published after the review by Reynolds et al. (2013), were used to analyse disgust (or

emotional elements) towards CRC screening exams: the EBBS scale (used by Davis et al., 2017; Reynolds et al., 2018), and the ICK-C scale (a two-item scale measuring disgust associated with CRC screening, Chambers, O'Carroll, et al., 2016; used by Chambers, Callander, et al., 2016; O'Carroll et al., 2015).

Trait disgust was measured using three different scales: the Disgust Propensity and Sensitivity-Revised scale (DPSS-R; van Overveld et al., 2010) measures how easily an individual feels disgusted (disgust propensity) and how unpleasant a person finds the disgust experience (disgust sensitivity); the Disgust Scale-Revised (DS-R; Olatunji et al., 2007; van Overveld et al., 2011) discriminates core, animal-reminder and contamination disgust; and the Disgust Scale (DS; Haidt et al., 1994) consists of true/false and disgust-rating questions regarding seven different domains of disgust elicitors (i.e., food, animals, body products, sex, body-envelope violations, death and hygiene).

Table 1.

Summary of the Quantitative and Qualitative Studies

Author(s)/ Country	Screening programme	Scales/ Measures	Screening behaviour/ intention barriers	Screening behaviour/ intention facilitators	Main findings
*Hunkin et al. (2020) Australia	CRC National programme Kit sent home	Screening: Intention	Having previously refused to get screened; Higher faecal aversion; Higher psychological reactance		Measuring anticipated regret prior to screening intention resulted in a lower willingness to attend the CRC exam
*Klasko-Foster et al. (2020) USA	CRC Colonosco-py Private care	Screening: Intention; Disgust: A version of Crites et al. (1994) and DES (Izard et al., 1993); Trait disgust: DPSS-R; DSR	Disgust		A lower screening intention was associated with greater situational disgust, but not with dispositional disgust. However, dispositional disgust moderated the effect of situational disgust on screening intention

Table 1.

Continued.

Author(s)/ Country	Screening programme	Scales/ Measures	Screening behaviour/ intention barriers	Screening behaviour/ intention facilitators	Main findings
Itzhaki (2018) Israel	CRC FOBT National programme Kit sent home	Screening: Self-report	Negative affects/emotions (Fear; Worry; Sadness; Disgust; Embarrassment)		Participants' knowledge about CRC screening was low to moderate. CRC was associated with negative feelings
Kiviniemi, Klasko-Foster et al. (2018) USA	CRC Colonoscopy Private care	Disgust: Modified version of Crites et al. (1994) Screening: Self-report	Cognitive barriers; Negative affects/emotion (fear of the exam)	Socioeconomic status (SES); Higher perceived benefits; Positive affective associations; Self-efficacy; CRC and screening knowledge	Cognitive and affective decision-making constructs account for at least some of the SES disparities in CRC screening attendance
Luque et al. (2018) USA	CRC FIT Private care		Negative affects/emotions (Disgust; Embarrassment; Fear; Worry); Cognitive barriers (Lack of knowledge); Practical issues; Kit issues; Forgetfulness, procrastination, or laziness	More information and instructions; Convenience (Completing the test at home); Screening education by a health care specialist; Phone call invite (vs letter); Videos; First person narratives by peers; Humour	FIT was described as disgusting and kit instructions were found difficult to follow. However, the findings show an overall support for using the FIT for CRC screening. FIT benefits were perceived as positive motivators
Quyn et al. (2018) UK	CRC FOBT National programme Kit sent home	Screening: Kit returned	Practical issues (Lack of time); Forgetfulness; Cognitive barriers (Lack of motivation); Negative affects/emotions (Disgust)	Screening education by a health care specialist	After an interview and a discussion with a nurse specialist about CRC screening, 49% of previous non-attenders patients returned a completed FOBT
Osborne et al. (2018) Australia	CRC National programme Kit sent home	Screening: Self-report			People exhibited a high aversion for faecal sampling. CRC screening participation rates might improve thanks to saliva and blood tests

Table 1.

Continued.

Author(s)/ Country	Screening programme	Scales/ Measures	Screening behaviour/ intention barriers	Screening behaviour/ intention facilitators	Main findings
*Reynolds et al. (2018) New Zealand	CRC National programme Kit sent home / Colonosco-py	Disgust: EBBS Trait disgust: DPSS-R; DSR Screening: Self-report	Cognitive barriers (Low risk perception); Negative affects/emotions (Insertion disgust)	Screening education by a health care specialist; Embarrassment	As emotions reliably co-vary, salient affective barriers should be always studied concurrently. Trait disgust was not correlated to screening. Disgust towards anal insertions emerged as a better predictor of avoidance than faecal disgust
Broc et al. (2017) France	CRC FOBT National programme Kit sent home / Colonosco-py	Screening: Self-report	Having previously refused to get screened (CRC and other screening exams); Cognitive barriers (Distrust; Low risk perception; Fatalism); Practical issues (Lack of time); Negative affects/emotion (fear)	Convenience (free, quick, at home); Past attendance (prior CRC and other screening exams); Perceived benefits; Social motivators (social norms, doctors' recommendation, family pressure)	Authors suggest to encourage screening participation in different ways, such as focusing on motivations rather than barriers and providing tailored education
*Davis et al. (2017) Australia	CRC FOBT National programme Kit sent home / Colonosco-py	Disgust: EBBS Trait disgust: DSQ Screening: Intention	Negative affects/emotions (Faecal disgust)	Prior CRC screening experience	Trait disgust was not a predictor of screening intention
Dharni et al. (2017) UK	CRC FOBT National programme Kit sent home		Negative affects/emotions (Fear, embarrassment, disgust); Practical issues (Lack of time)	Perceived benefits; civic duty; familiarity; religious faith; self-efficacy	Participants with different ethnicities and SES reported different facilitators and barriers
*Cham-bers, Callander et al. (2016) UK	CRC National programme Kit sent home	Disgust: ICK-C Trait disgust: DPSS-R Screening: Intention	FOBT kit; FOBT kit barriers: negative affects/emotions (disgust)	FIT kit; FOBT Kit facilitators: past experience (other screening exams); SES; FIT Kit facilitators: convenience	Trait disgust was not a screening intention predictor. For the FIT, disgust did not influence screening intention

Table 1.

Continued.

Author(s)/ Country	Screening programme	Scales/ Measures	Screening behaviour/ intention barriers	Screening behaviour/ intention facilitators	Main findings
Clarke et al. (2016) Ireland	CRC FIT National programme Kit sent home	Screening: Medical records	Distrust; Lack of confidence; Negative affects/emotion (anger, disgust); Lower knowledge; Forgot, lack of time	Practical kit aspects; Perceived benefits; Fatalism; Social motivators; Awareness campaigns	Authors found different FIT perceptions in men and women
Smith, Kobayashi et al. (2016) UK	CRC FOBT National programme Kit sent home	Screening: Intention	Low numeracy (i.e., ability to understand and use numbers); Negative affects/emotions (disgust, embarrassment, fear); Practical issues	High numeracy	Authors explain why low numeracy individuals were more reluctant to attend CRC screening
Smith, Mcgregor et al. (2016) UK	CRC FOBT National programme Kit sent home		Lower education		Education affected the perception of FOBT barriers
Brown-Kramer & Kiviniemi (2015) USA	Breast; Testicles Self-exam	Disgust: Modified version of Crites et al. (1994) Screening: Self-report		Positive cognitive beliefs; Positive affective associations	Affective associations were related to screening behaviour for both testicular and breast self-exams
*Gordon & Green (2015) USA	CRC FIT Integrated health care delivery system Kit sent home	Screening: Medical records	Negative affects/emotions (disgust; fear); Cognitive barriers (Low risk perception)	High SES; Familiarity; CRC screening perceived importance and knowledge; Strong doctors' recommendation; Targeted doctors' intervention; Civic duty	Non-users and irregular users were less intrinsically motivated to get CRC screening than long-term users, and they were more averse to collect their faecal sample

Table 1.

Continued.

Author(s)/ Country	Screening programme	Scales/ Measures	Screening behaviour/ intention barriers	Screening behaviour/ intention facilitators	Main findings
*Lo et al. (2015) UK	CRC FOBT National programme Kit sent home	Screening: Self-report	Low SES; Cognitive barriers (Low risk perception); Negative affects/emotions (disgust; embarrassment)	Older age; Social motivators (social pressure by relevant ones, conformism)	Perceived barriers, social norms, and knowledge had independent associations with uptake. SES differences in uptake were mediated through knowledge, social norms, and perceived barriers
*McGregor et al. (2015) UK	CRC FOBT National programme Kit sent home	Screening: Intention	Cognitive barriers (Low risk perception); Negative affects/emotions (disgust)	First person narratives; Perceived benefits; Self-efficacy	An additional narrative leaflet had a positive impact on beliefs about CRC screening which led to stronger screening intentions
*O'Carroll et al. (2015) UK	CRC FOBT National programme Kit sent home	Disgust: ICK-C Screening: Kit returned	Negative affects/emotions (disgust)	Higher intention; Higher anticipated regret; Higher perceived benefits	Anticipated regret indirectly affected FOBT uptake via intention. Disgust directly affected FOBT uptake over and above intention
*Kiviniemi et al. (2014) USA	CRC Colonoscopy Private care	Disgust: Modified version of Crites et al. (1994) Screening: Self-report	Negative affects/emotions (Disgust; Anger; Sadness; Embarrassment)	Older age; Positive affective associations	As affective associations became more negative, screening intentions decreased
Neter et al. (2014) Israel	CRC FOBT National programme Kit sent home	Screening: Kit returned		Implementation intentions; Awareness campaigns; Positive attitudes; Self-efficacy; Intention; Knowledge; Self-rated health; Older age; Being married; High SES	Screening attendance in the group who received the implementation intentions intervention was from 1.2% to 6.6% higher than in the control group

Table 1.

Continued.

Author(s)/ Country	Screening programme	Scales/ Measures	Screening behaviour/ intention barriers	Screening behaviour/ intention facilitators	Main findings
Palmer et al. (2014) UK	CRC FOBT National programme Kit sent home		Procrastination; Negative affects/emotions (Disgust; Embarrassment; Fear); Cognitive barriers (Low risk perception; Lack of knowledge)	Social motivators (social pressure by relevant one; health care specialists' recommendation; conformism); Familiarity	Initiatives to normalise discussion about bowel cancer screening and to simplify the test might lead to increased screening attendance
*Reyn-olds, McCam-bridge et al. (2014) New Zealand	CRC National programme	Disgust: Differential Emotions Scale (DES) Trait disgust: DSR	Disgust sensitivity; Negative affects/emotions (Disgust)		Disgust did not vary by gender. Disgust and trait disgust may interactively operate to deter certain types of health decisions
Reynolds, Consedine et al. (2014) New Zealand	CRC National programme	Disgust: Differential Emotions Scale (DES); Trait disgust: DSR	Mindfulness		When people were disgusted, mindfulness predicted greater anticipated avoidance
Bridou et al. (2013) France	CRC FOBT National programme Kit distributed by doctors		Cognitive barriers (test reliability doubts, financial considerations); Negative affects/emotions (Disgust, Embarrassment, Fear)	Screening knowledge; Convenience; Prior attendance	Participants were generally convinced of screening importance. Nevertheless, FOBT was criticised and participants expressed a preference for colonoscopy.
Chubak et al. (2013) USA	CRC Integrated health care delivery system Kit sent home	Screening: Kit returned	FOBT	FIT	Uptake of mailed exam kits varies by kit type
*Liles et al. (2012) USA	CRC Not-for-profit HMO Kit sent home	Screening: Kit returned	FOBT	FIT; Being older; Being male; Attention to health	FOBT was considered more unpleasant; FIT was considered easier to perform

Table 1.

Continued.

Author(s)/ Country	Screening programme	Scales/ Measures	Screening behaviour/ intention barriers	Screening behaviour/ intention facilitators	Main findings
*Hillyer (2011)	CRC Columbia University CRC Screening Programme	Screening: Kit returned	FOBT; Negative affects/emotions (Disgust); Self-reported acculturation; familiarity	FIT	CRC screening attendance might improve using FIT, inviting to CRC screening patients attending mammography, increasing self-efficacy, and giving a recommendation from a health provider
Cole et al. (2011) Australia	CRC FOBT National programme Kit sent home	Screening: Kit returned	Negative affects/emotions (Disgust)	Being older; Belief in screening; Brush-based kit	Knowledge did not predict screening uptake
*Deute-kom et al. (2010) The Nether-lands	CRC National programme Kit sent home	Screening: Kit returned	FOBT	FIT; Being female; FOBT facilitators: being older	Attendance rates were higher among those who received the FIT (vs FOBT)
Jones et al. (2010) USA	CRC Practice-based research network	Screening: Self-report	Negative affects/emotions (Disgust); Cognitive barriers (Lack of knowledge; Low risk perception); Lack of time; Financial concerns; Low SES	Older age; Being married; Previous history of polyps	Screening barriers are not homogenous across different tests. Test-specific barriers need to be considered in designing strategies to promote screening
Study 1 – Golden-berg et al. (2009) USA	Mammo-gram Private care	Screening: Intention	Creatureliness primes for people high in neuroticism, when mortality is salient	Uniqueness primes for people high in neuroticism, when mortality is salient; Creatureliness primes for people low in neuroticism, when mortality is salient	When concerns about mortality were primed, reminders of one's physical nature led women high in neuroticism to report reduced intention in undergoing a mammogram

Table 1.

Continued.

Author(s)/ Country	Screening programme	Scales/ Measures	Screening behaviour/ intention barriers	Screening behaviour/ intention facilitators	Main findings
Chapple et al. (2008) UK	CRC FOBT National programme Kit sent home		Cognitive barriers (Low risk perception; Lack of knowledge); Practical issues; Negative affects/emotions (Fear; Disgust; Embarrassment)	Positive experiences with other screening programmes; Cancer familiarity; Leaflets; Doctors' recommendation; Civic duty	Some participants screened for "civic duty", which is not present in any health behaviour model
Clavarino et al. (2004) Australia	CRC FOBT Kit sent home	Screening: Kit returned	Practical issues; Cognitive barriers (Low risk perception); Being older; Negative affects/emotions (Disgust)	Convenience; Doctors' recommendation; High risk perception; Being older; Prior CRC experience	FOBT distributed to households by mail was well accepted by the community and by the medical practitioners
Beeker et al. (2000) USA	CRC Private care		Cognitive barriers (Low risk perception; Lack of knowledge; Distrust; Fatalism; Lack of self-confidence; Negative affects/emotions (Disgust; Embarrassment; Fear)	Social motivators (Doctors' recommendation; Focus group discussion; awareness campaigns); Perceived benefits; Convenience (at home)	Education campaigns, decision aids, and targeted interventions are needed to increase awareness and to encourage people to screen
Neilson & Whynes (1995) UK	CRC FOBT Kit sent home	Screening: Medical records		Attention to health; High SES	Compliers were more likely to have a high SES, to have more personal and family experiences of illness than persistent non-compliers
*Hunter et al. (1991) UK	CRC Kit sent home	Screening: Medical records	Negative emotions/affect (disgust); Cognitive barriers (Fatalism)	Cancer familiarity	Different tests were associated with different levels of disgust, but screening attendance was virtually identical.
*Macrae et al. (1984) Australia	CRC FOBT Kit offered by GP	Disgust: HBM indices Screening: Kit returned	Negative emotions/affect (embarrassment; worry);		Cancer familiarity, perceived risk, family pressure, and disgust were associated with kit acceptance but not compliance.

Note. * Studies included in the meta-analysis

Table 2.

Detail on methodological moderators.

Study	Disgust measured before/after screening decision	Data collection tool	Population sample type	Screening behaviour measure
Hillyer, 2011	Before	Interview	Non-probabilistic	Kit returned or medical records
Gordon & Green, 2015	After	Questionnaire	Probabilistic	Kit returned or medical records
Hunter et al., 1991	After	Questionnaire	Probabilistic	Kit returned or medical records
Kiviniemi et al., 2014	After	Interview	Non-probabilistic	Self-report
Lo et al., 2015	After	Interview	Probabilistic	Self-report
Macrae et al., 1984	Before	Questionnaire	Non-probabilistic	Kit returned or medical records
O'Carroll et al., 2015	Before	Questionnaire	Probabilistic	Kit returned or medical records
Reynolds et al., 2018	After	Questionnaire	Non-probabilistic	Self-report

The meta-analysis

Effects of state disgust on screening intention and attendance

Table 3 and Figure 2 report the individual studies' results and the overall effect sizes for the association between disgust and screening intention. Table 4 and Figure 3 report the effect sizes for the association between disgust and screening attendance.

Our first analysis on the strength of the association between disgust and screening intention ($k = 8$, $N = 16{,}884$) yielded a significant negative low-to-moderate effect size ($d = -0.41$, 95% CI = [−0.65, −0.18], $p < .001$). Next, relying on Rosenthal's (1979) method, we investigated the number of zero-effect studies needed to nullify the observed result. The analysis revealed a fail-safe N of 929, indicating that only an additional number of 929 zero-effect studies would reduce the overall effect significance to just non-significant. In other words, the observed effect was highly robust. Moreover, Egger's regression test did not

reveal significant asymmetries that could signal the presence of a publication bias (p = .456).

Looking at heterogeneity, we found highly significant variability among effect sizes (Q = 543.91, df = 7, p < .001, I^2 > 98.7%), suggesting that the effect of disgust on screening intention varied across studies.

Next, we calculated the size of the effect of disgust on screening attendance (k = 8, N = 16,560). The overall weighted effect size was low-to-moderate (d = −0.41, 95% CI = [−0.59, −0.22], p < .001). Egger's linear regression did not highlight any publication bias (p = .299), nor did the fail-safe N, according to which 955 unpublished studies with zero effect sizes would have to exist to overturn the conclusion that disgust significantly affects screening attendance. As with intention, the effect of disgust on screening behaviour varied across studies (Q = 134.01, df = 7, p < .001, I^2 = 94.78%).

We conducted an ANOVA Q-Test to compare the two effect sizes further. This test confirmed that the effects of disgust on CRC screening intention and attendance were not statistically different (Q = 0.03, df = 1, p = .874).

Table 3.

Effect sizes of disgust on CRC screening intention.

Study	*d*	Lower limit	Upper limit	*p*	Weight	Sample
Chambers, Callander et al., 2016/FIT	−0.15	−0.38	0.08	.201	12%	200
Chambers, Callander et al., 2016/FOBT	−0.29	−0.49	−0.10	.003	12%	200
Davis et al., 2017	−0.02	−0.05	0.01	.257	13%	139
Hunkin et al., 2020	−0.35	−0.50	−0.19	.000	13%	666
Klasko-Foster et al., 2020	−0.47	−0.71	−0.24	.000	12%	296
Macrae et al., 1984	−1.04	−1.28	−0.8	.000	12%	581
McGregor et al., 2015	−0.52	−0.64	−0.4	.000	13%	1,157
O'Carroll et al., 2015	−0.52	−0.55	−0.48	.000	13%	13,645
Overall	−0.41	−0.65	−0.17	.000	100%	16,884

Figure 2.

Effects of disgust on CRC screening intention.

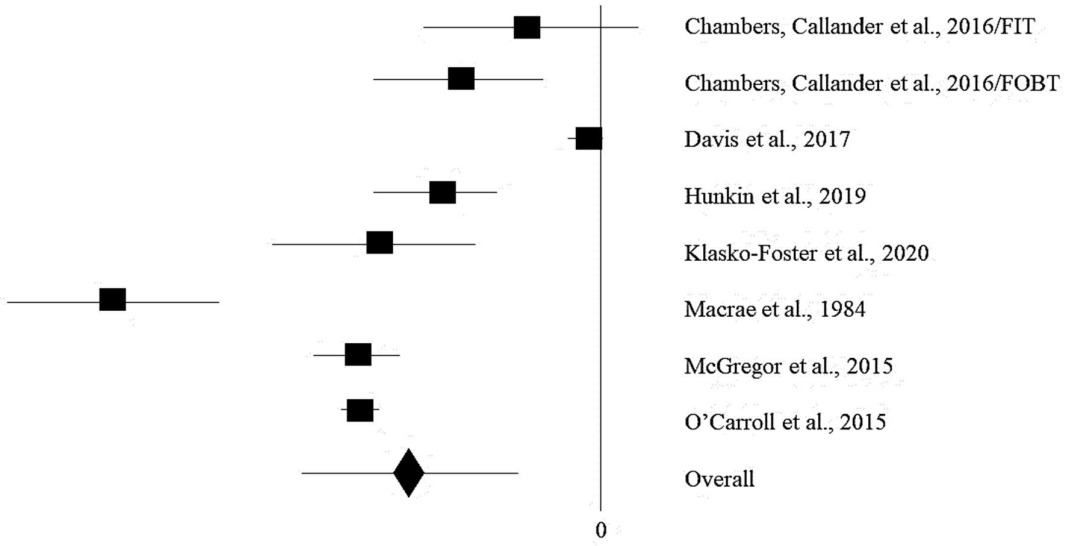


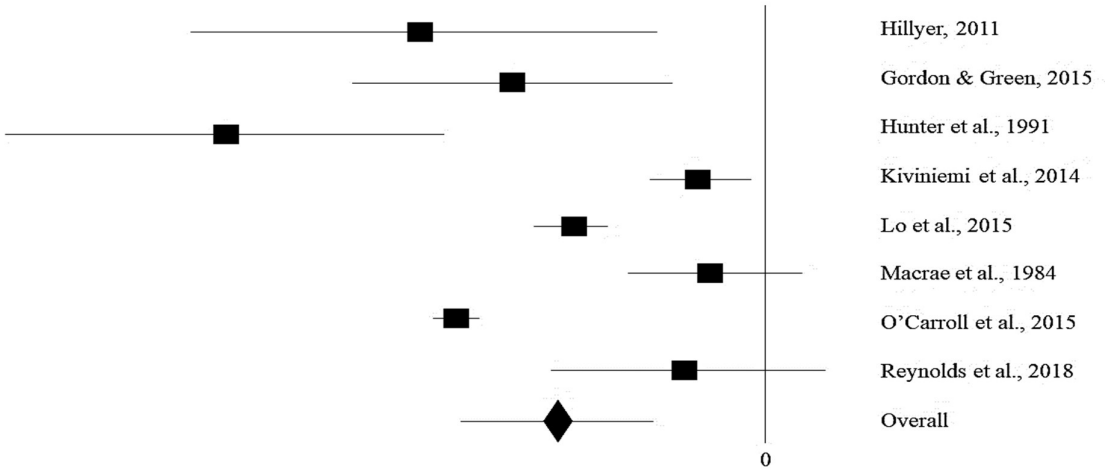
Table 4.

Effect sizes of disgust on CRC screening attendance.

Study	*d*	Lower limit	Upper limit	*p*	Weight	Sample
Hillyer, 2011	−0.68	−1.14	−0.21	.005	8%	197
Gordon & Green, 2015	−0.50	−0.82	−0.18	.003	11%	200
Hunter et al., 1991	−1.07	−1.51	−0.62	.000	8%	343
Kiviniemi et al., 2014	−0.13	−0.23	−0.03	.011	15%	103
Lo et al., 2015	−0.38	−0.45	−0.32	.000	16%	1,270
Macrae et al., 1984	−0.11	−0.28	0.07	.230	14%	498
O'Carroll et al., 2015	−0.61	−0.65	−0.58	.000	16%	13,645
Reynolds et al., 2018	−0.16	−0.43	0.11	.255	12%	304
Overall	−0.41	−0.59	−0.22	.000	100%	16,560

Figure 3.

Effects of disgust on CRC screening attendance.



Methodological moderators

The ANOVA *Q*-Test comparing studies that measured disgust before versus after attending a CRC screening exam was not statistically significant ($Q = 0.10$, $df = 1$, $p = .755$). The same analysis was performed by comparing studies that measured screening attendance with self-reported indices versus those with medical indices; it found an almost significant difference ($Q = 3.14$, $df = 1$, $p = .076$). The studies that captured screening attendance with self-report measures found a lower effect size ($d = -0.24$, 95% CI = [−0.44, −0.03], $p = .023$) than those relying on objective measures, such as returned kits and medical records ($d = -0.55$, 95% CI = [−0.84, −0.27], $p < .001$). The third moderation analysis compared studies that relied on different data collection strategies (i.e., questionnaire vs structured interview), showing no significant differences ($Q = 0.50$, $df = 1$, $p = .478$). The final moderation analysis concerned the population sampling strategy. The studies with random or representative samples found a larger effect size ($d = -0.57$, 95% CI = [−0.76, −0.38], $p < .001$) than those including convenience samples ($d = -0.17$, 95% CI = [−0.30, −0.03], $p = .014$), $Q = 11.32$, $df = 1$, $p = .001$.

Effects of trait disgust and exam kit type on state disgust

Table 5 and Figures 4 report the individual studies' results and the overall effect sizes for the association between trait disgust and disgust associated with CRC screening. Table 6 and Figure 5 report effect sizes for the association between type of exam kit and disgust towards CRC screening.

Our analysis of the strength of the association between trait disgust and disgust towards CRC screening ($k = 5$, $N = 725$) showed that being particularly sensitive to disgust elicitors increased the perception of disgust in CRC screening contexts. This was a statistically significant (95% CI = [0.40, 0.87], $p < .001$) medium-to-high positive effect ($d = 0.63$). Egger's regression test was not significant ($p = .446$). The fail-safe N determined that 108 unpublished studies with zero effect sizes would have to exist to overturn the conclusion that trait disgust significantly affects disgust towards CRC screening exams. Heterogeneity among the studies was moderate ($Q = 11.84$, $p = .019$, $I^2 = 66.23\%$).

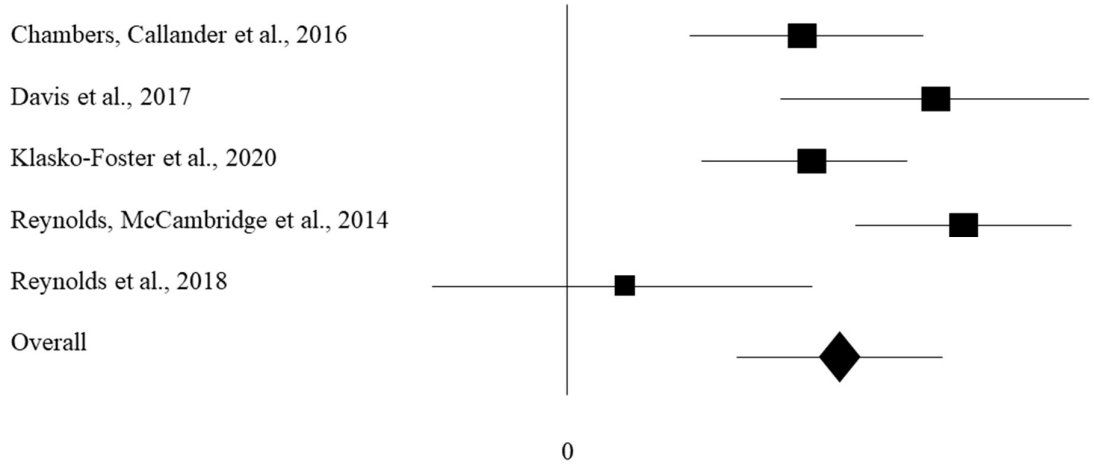
Table 5.

Effect sizes of trait disgust on disgust associated with CRC screening.

Study	*d*	Lower limit	Upper limit	*p*	Weight	Sample
Chambers, Callander et al., 2016	0.55	0.26	0.84	.000	21%	200
Davis et al., 2017	0.85	0.49	1.22	.000	18%	139
Klasko-Foster et al., 2020	0.56	0.33	0.80	.000	24%	200
Reynolds, McCambridge et al., 2014	0.14	−0.31	0.59	.539	14%	80
Reynolds et al., 2018	0.93	0.68	1.17	.000	23%	306
Overall	0.65	0.34	0.96	.000	100%	725

Figure 4.

Effects of trait disgust on disgust associated with CRC screening.



Finally, we tested the effects of using an FOBT kit (vs FIT kit) on the perception of disgust (k = 3, N = 9,606). The FOBT kit induced higher disgust than the FIT kit. The overall effect size was strong and highly significant (d = 3.58, 95% CI = [1.85, 5.30], p < .001). The studies were heterogeneous (Q = 341.46, p < .001, I^2 = 99.41%) and no publication bias was found: Egger's regression was not significant (p = .496) and the fail-safe N was 418.

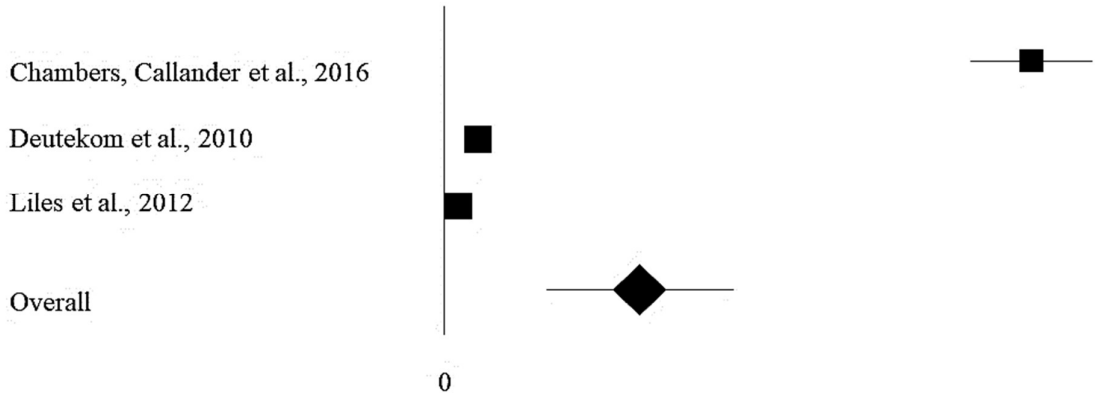
Table 6.

Effect sizes of FOBT (vs FIT) on disgust associated with CRC screening.

Study	*d*	Lower limit	Upper limit	*p*	Weight	Sample
Chambers, Callander et al., 2016	10.6	9.53	11.67	.000	31%	200
Deutekom et al., 2010	0.64	0.57	0.71	.000	35%	9,008
Liles et al., 2012	0.29	0.07	0.51	.009	35%	398
Overall	3.58	1.85	5.3	.000	100%	9,606

Figure 5.

Effects of FOBT (vs FIT) on disgust associated with CRC screening.



Discussion

The aims of this first stage of the present research project were to undertake a systematic review of the literature regarding disgust in CRC screening contexts, and explore the effects of disgust on CRC screening compliance with a meta-analytical approach. This study updated Reynolds et al. (2013)'s work. Indeed, since their reference period (2001–2011), research examining disgust and CRC screening has grown numerically and qualitatively. A meaningful change, that filled a gap lamented in the previous review, has been the introduction of two scales developed to measure disgust towards CRC screening, the EBBS scale (Reynolds et al., 2012, 2018) and the ICK-C (Chambers, O'Carroll, et al., 2016). These two instruments should be used in future research, because adopting these scales might lead to more reliable and comparable findings. In particular, the EBBS scale (Reynolds et al., 2012, 2018) might be a more useful tool than the ICK-C (Chambers, O'Carroll, et al., 2016) because it also taps the barriers of embarrassment and fear. Thus, we chose to adopt this instrument for the further studies of the present research project.

Our findings showed that the empirical investigation of disgust-related avoidance and CRC screening had developed as never before (i.e., more studies have been performed and larger samples have been included). Encouraged by the new presence of quantitative data, we

conducted a meta-analysis to (I) estimate the effect of disgust on screening intention and attendance, (II) analyse whether the findings about disgust and screening attendance are affected by methodological moderators and (III) estimate the effects of two potential elicitors—trait disgust and type of exam kit—on disgust associated with CRC detection exams. Our findings show low-to-moderate negative effects of disgust on screening intention and attendance. Hence, disgust is a barrier in the CRC screening decision-making process and in the actual performance of screening exams. It is worth noting that we found the same effect size for intention and attendance, which might indicate the direct effect of this emotion on actual behaviour. Suppose the effects of disgust on actual attendance had been fully mediated by screening intention. In that case, we should have found a smaller effect size for behaviour and a larger effect size for screening intention, because medium-to-large changes in intentions usually lead to small-to-medium variations in actions (Sheeran & Webb, 2016). This means that interventions to promote CRC screening should also address disgust and maybe the other emotional barriers, not only the beliefs about CRC screening (e.g., perception of screening benefits), which are chiefly mediated by screening intentions (O'Carroll et al., 2015). To test this interpretation, we compared messages promoting CRC screening through affective versus cognitive levers in Study 3 (see Chapter 5).

Furthermore, comparing studies that measured disgust before versus after the screening exam confirmed that there was no difference between the effects of disgust on screening intention and behaviour.

Another suggestion of the present meta-analysis is related to the moderation effect of the screening attendance measure (self-report vs kits returned/medical records). Since self-report measures might be affected by social desirability bias, researchers should try to use more objective measures. However, this moderation effect was not fully significant. Thus, self-report measures of attendance might be acceptable.

Neither of the two data collection methods (interview vs questionnaire) yielded a significant moderating effect on the relationship between disgust and screening participation. This means that interviews can be used to avoid the typical high drop-out rates of studies on CRC screening and disgust (Davis et al., 2017).

A particularly important result of our meta-analysis, in terms of its applied potential, is that the effect size of disgust on screening adherence was larger when observed on randomly selected or representative samples of the target population compared to convenience samples. Random and representative samples are generally more likely to include participants who feel distant from institutions and the health care system, as well as participants with low socioeconomic status. Both these characteristics (Table 1) affect the perception of disgust and screening in the CRC context (e.g., Kiviniemi, Ellis, et al., 2018; Kiviniemi, Klasko-Foster, et al., 2018; Lo et al., 2015; Smith, Kobayashi, et al., 2016; Smith, McGregor, et al., 2016). This finding indicates that prevention initiatives should be planned to overcome emotional barriers experienced by socially marginalised people.

Finally, we investigated how a dispositional and a situational factor could affect disgust in the CRC context. The type of exam kit exerted a strong effect on state disgust: the FOBT kit, which involves more faecal manipulation in comparison to the FIT, was associated with a stronger state disgust than the FIT. Also, trait disgust significantly affected state disgust but not as strongly as kit type. Taken together, our findings suggest that disgust can actually affect screening compliance and, although some patients are more reluctant to be screened than others, screening modalities have the potential to reduce barriers to CRC screening participation. The effect of trait disgust on state disgust might also imply the need to design targeted interventions for immunosuppressed patients and for those who feel more vulnerable to disease, as these categories of people tend to score high on disgust sensitivity (Neuberg et al., 2011) and might need more help in overcoming screening barriers. This is

particularly salient now that we are still struggling to emerge from the aftermath of the COVID-19 pandemic, a health threat that increased people's disgust sensitivity (Stevenson et al., 2021).

Agenda for future research and screening policies

Despite the substantial growth in research examining disgust and cancer screening, the scientific production on this topic cannot be considered fully mature. For instance, a point outlined in Reynolds et al. (2013)'s agenda for future research was the need to disentangle the different roles and relevance of trait disgust, anticipated disgust, and experienced disgust, but this distinction remains overlooked. Future work should pay more attention to this conceptual distinction by, for instance, using the support of a longitudinal approach.

As disgust can undermine screening participation, its potential elicitors should be carefully considered when choosing a national screening exam's modality, as well as when designing invitation letters and information leaflets. For instance, avoiding an excessive repetition of expressions associated with bodily waste (e.g., faeces and blood) might improve such texts. We tested this hypothesis in Study 2 (see Chapter 4).

Moreover, future research should investigate how general practitioners and health care specialists might be involved in promoting CRC screening, reassuring patients, reinforcing internal motivations and resizing emotional barriers. A few studies in our systematic review showed that a doctor or nurse intervention can promote screening participation (e.g., Gordon & Green, 2015; Quyn et al., 2018). However, none of the sampled studies has explored how this intervention affects internal motivations, anticipated emotions or decision-making. In Study 4 (see Chapter 6), we tested whether a video depicting two doctors recommending CRC screening improved intention to screen directly and through the affects and beliefs associated with CRC screening. This video was compared with a narrative and a control audio-visual message.

Regarding exam modality, national screening policies should take into consideration that the type of test has psychological and practical consequences. These psychological consequences might be especially affected by the manipulation of bodily waste (i.e., faeces), as this is one of the main differences between the two kits looked at in the meta-analysis, and by insertion disgust (Reynolds et al., 2018). Removing the faecal aversion or the insertion disgust barrier might have an even greater positive effect on screening experience and attendance. Analysing only the effect of the exam kit type (vs invasive exams) on disgust can be considered a limitation of our work. However, this choice was in line with the CRC screening practices adopted in most of the countries where the reviewed studies were carried out (Australian Government Department of Health and Aged Care, 2021; New Zealand Ministry of Health, 2021; Public Health England, 2021; Publications Office of the European Union, 2010). Moreover, our analysis suggests that, compared to tests like the FIT and FOBT, CRC screening exams not involving the collection of faecal samples (e.g., blood and saliva exams) may be less likely to evoke negative emotional responses (Osborne et al., 2018). Thus, medical research has started to evaluate two innovative screening tests: the PillCam® COLON and the methylated SEPT9 DNA plasma assay (mSEPT9). The former is a capsule that allows exploration of the colon and the recording of video images by two cameras placed on the two sides of the pill (Romero-Vázquez et al., 2014). The latter, and the most cost-effective of the two instruments (Peterse et al., 2019), is a blood test aimed at analysing the SEPT9 gene, which is associated with malignant tumours (Wang et al., 2018). The use of PillCam® and mSEPT9, as well as the study of the psychological consequences elicited by these new colorectal screening methods, will be critical in this sense. As we failed to find studies analysing patients' reactions to these new screening modalities, further work needs to test associated emotional barriers, including not only disgust but also embarrassment and fear.

Finally, future research should strive to examine CRC screening emotional barriers more comprehensively rather than focusing on one single emotion, as they tend to co-vary (Reynolds et al., 2018). Following the recent studies on CRC screening and emotional barriers (e.g., Reynolds et al., 2018), the focus of the present work on disgust can be considered an intrinsic limitation of it. However, this choice was made for clarity's sake and because we wanted to explore a salient but overlooked barrier to CRC screening participation. Another important limitation of this meta-analysis is the small number of studies available for comparison and the highly significant heterogeneity between them. This is particularly evident in the effects of the exam kit type on disgust towards CRC screening, which may be due to the large effect size found in Chambers, Callander, et al. (2016). Considering this, we suggest caution in interpreting the overall weighted effect sizes. Nevertheless, it should be noted that our random-effects model virtually covered a sample of 28,388 participants and that our tests did not find any evidence of publication bias. Therefore, our results seem quite robust.

Conclusions

A high participation rate is key for a successful CRC screening programme, as early bleeding lesions can be found and cured only in those patients who attend screenings at the recommended intervals. Nevertheless, worldwide CRC screening rates are still suboptimal (Danese et al., 2020; Navarro et al., 2017; G. P. Young et al., 2019). In this systematic review and meta-analysis, we focused on a specific emotional barrier to screening attendance: disgust. We analysed how the literature has evolved since the publication of a previous systematic review about this topic (Reynolds et al., 2013) and we went beyond this work in several ways. First, we compared more studies and studies that often involved larger samples. Second and more importantly, we conducted the first meta-analysis of the effects of disgust on CRC screening intention and attendance. With this meta-analysis, we also tried to

understand how research settings can impact the strength of the association between disgust and CRC screening behaviour. In addition, we tested how two different factors, type of exam kit and trait disgust, affect CRC screening-related disgust.

Our main finding is that, across 16 studies performed on 28,388 participants in five different national contexts, disgust was associated with avoidance in the CRC screening context. Moreover, the detection of disgust effects on CRC screening behaviour is affected by population sampling strategies. Finally, as trait disgust and exam modality affect disgust, we suggested a number of interventions that might improve screening perception and thus participation.

This systematic review and meta-analysis allowed us to better understand the relation between disgust, screening intention and screening attendance. The moderation analyses allowed us to identify possible methodological bias in the research on disgust and CRC screening. Thus, this work helped us to build the next stages of the research project. For a start, the present work provided us a set of instruments to measure the main constructs of the present research project. Among these, we chose to rely on the EBBS scale (Reynolds et al., 2012, 2018) to analyse the effects of our interventions on the emotional barriers to CRC screening. Indeed, the EBBS scale was the only instrument specifically developed for a similar purpose. We translated the EBBS scale into Italian and removed the items regarding colonoscopy to adapt the instrument to the local procedures of CRC screening. Details are discussed in the next chapter.

Chapter 3

Study 1: Measuring the emotional barriers to bowel screening in Italy[2]

Introduction

In Chapter 1 we highlighted that disgust, embarrassment, and fear are necessary for humans' survival, as these emotions make us avoid contaminants, menaces and sanctions for violating social norms. However, the avoidance behaviours elicited by these emotions can have detrimental effects in the CRC screening context (Consedine et al., 2018). Indeed, in most Italian programmes of CRC screening, citizens are required to collect a stool sample and deliver it to a pharmacy or a laboratory. Dealing with faecal matter can elicit disgust and embarrassment, respectively because stools are a potential contaminant and this action violates social norms and cultural taboos (Palmer et al., 2014; Reynolds et al., 2018). In addition, some people may refuse to attend CRC screening because they dread the possibility of receiving a cancer diagnosis (Shiloh, 2010).

To fully apprehend the effects of negative emotions on CRC screening behaviour and design interventions effective in reducing such emotional barriers, a first critical step is to be able to rely on valid measurement instruments.

Reynolds et al. (2018) suggest that such instruments should operationalise multiple affects associated with CRC screening, because these emotions co-vary and empirical evidence stemming from the measurement of a single emotion could actually originate from affective reactions not considered in the study or in the measurement instrument.

[2] Part of this chapter, including tables and figures, was published in Scaglioni, G., & Cavazza, N. (2022). Emotional Barriers to Bowel Screening in Italy: Scale psychometric properties and effects on screening attendance. *Psycho-Oncology*, *31*(1), 78–85. https://doi.org/10.1002/pon.5781

To the best of our knowledge, the only instrument ever developed to measure the three emotional barriers associated with CRC screening (i.e., disgust, embarrassment, and fear) is the EBBS scale (Reynolds et al., 2012, 2018). Orally presented at the 14th World Congress of Psycho-Oncology in 2012, the EBBS scale remained unpublished until 2017, when Davis et al. (2017) suggested that this instrument might be a unidimensional measure of faecal aversion in the CRC screening context. In 2018, Reynolds et al., authors of the EBBS scale, published the first revision of the scale and, in contrast with Davis et al. (2017), the authors' confirmatory factor analysis (CFA) supported the four-components structure (i.e., faecal disgust, insertion disgust, embarrassment and fear of the outcome). The EBBS scale included 20 items, but Reynolds et al. (2018) removed five items because of low factor loadings (i.e., the factor variance explained by the item).

The unidimensional and multidimensional EBBS models were never formally compared. Hence, the first purpose of Study 1 will be to test the dimensionality of the EBBS scale. However, for the present research project, we do not adopt the original four-component EBBS scale for the reasons sketched below.

CRC screening programmes can greatly vary across countries. For instance, in the United States CRC screening principal exams are endoscopic tests, whereas in Europe colonoscopy is usually a follow-up after a positive FOBT or FIT (Navarro et al., 2017). The original EBBS scale (Reynolds et al., 2018) can be applied to both contexts because it includes nine items about emotional barriers associated with faecal collection tests and five items about colonoscopy (plus one item about CRC screening diagnosis in general). However, we believe that in screening programmes where FOBT or FIT are the first-line test, and colonoscopy is not used for screening but only for diagnostic purposes—like in Italy, where this research project was carried out—, the insertion disgust items might place undue emphasis on colonoscopy. Indeed, studies about the question-behaviour effect showed that

the mere action of answering questions increased the salience of the attitudes object of the inquiry (for a review, see Wilding et al., 2016). Thus, on the one hand, measuring disgust and embarrassment associated with the screening procedure and fear associated with a potential cancer diagnosis is strictly necessary to understand how to improve the perception of CRC screening, and ultimately design interventions to boost CRC screening attendance. On the other hand, giving so much space to insertion disgust (i.e., disgust elicited by the perceived violation of the body envelope) could be detrimental for studies participants, who might be led to overestimate the likelihood of undergoing endoscopic exams after the FOBT or the FIT. Thus, the second aim of Study 1 will be to propose a reduced version of the EBBS scale excluding the insertion disgust subscale. We speculate that this version might be a better research instrument for screening programmes based on faecal-collection tests, as no existing scale was developed explicitly for these contexts.

Furthermore, although Bocci et al. (2017) found that embarrassment and fear of the colonoscopy were substantial obstacles to women's attendance of CRC screening in Siena (Tuscany, Central Italy), to the best of our knowledge no prior quantitative study assessed the role of disgust. Therefore, the present study aims to give a first account regarding the effects of faecal disgust on CRC screening avoidance in an Italian context, which is its third purpose. In line with that prior study and our meta-analysis (Chapter 2), we expect faecal disgust, embarrassment, and fear of the outcome to be negatively associated with the likelihood of having attended CRC screening (hypotheses 1, 2 and 3, respectively) and positively associated with the likelihood of delaying seeking medical help when suffering from bowel illness (hypotheses 4, 5 and 6, respectively), even after controlling for other relevant factors (Bocci et al., 2017; Davis et al., 2017; Reynolds et al., 2018).

Method

Participants

We invited people aged 45 and older, living in Italy, and with no prior diagnosis of CRC to complete an online questionnaire on the Qualtrics survey platform. Participants were recruited through snowball sampling (i.e., posts on social media and personal contacts). We offered no remuneration for participation. We automatically excluded participants who did not meet our inclusion criteria (i.e., being at least 45 years old, living in Italy, and having received no prior diagnosis of CRC). Data were collected over the course of four weeks (November 11–December 2, 2020). A total of 509 individuals accessed the online questionnaire. Of these, 241 were excluded because they did not meet the inclusion criteria (n = 105), did not give their consent for data analysis (n = 13), or did not complete the EBBS items (n = 123). The final sample consisted of 268 participants (Table 7).

Procedure

After participants gave their informed consent, the study began with the presentation of a CRC Italian screening programme (see Appendix A). Specifically, participants read a text explaining that, in Italy, people between 50 and 74 years old are offered CRC screening every 2 years. The invitation letter is sent by mail, while the FOBT or FIT kit is collected by hand at pharmacies. Citizens are only invited for further tests if this preliminary test is positive (i.e., if there are traces of blood in the stool sample). The questionnaire continued with the EBBS scale items, questions about CRC screening knowledge, CRC risk perception, hypothetical decision-making about seeking medical help for bowel problems, and background information (demographic data, having ever discussed CRC screening with a doctor, CRC familiarity, and self-reported past CRC screening attendance).

Our measures and data analyses closely followed the procedure of the previous EBBS revision (Reynolds et al., 2018), but we tested a version of the EBBS scale that included only

three emotion subscales: faecal disgust (i.e., disgust elicited by faecal exposure), embarrassment (i.e., related to the social taboos violated by this type of screening), and fear of a negative outcome (i.e., concerns about a possible cancer diagnosis).

Table 7.

Participants' characteristics and study measures.

	***M* (*SD*)**	***N* (%)**
Age	54.78 (5.95)	
Gender		
Male		47 (18%)
Female		211 (82%)
CRC risk perception		
Lower than others		18 (7%)
About the same as others		199 (77%)
Higher than others		40 (16%)
Ever discussed CRC[a] screening with a doctor		85 (33%)
CRC familiarity[b]		63 (25%)
Ever attended CRC screening		149 (58%)
Delaying seeking medical help		31 (12%)
CRC screening knowledge	6.40 (1.42)	
EBBS[c] disgust subscale	5.40 (2.73)	
EBBS embarrassment subscale	3.86, (1.82)	
EBBS fear subscale	5.71 (3.11)	

Note. [a] Colorectal cancer, [b] Number of participants who reported cases of CRC in their family, [c] Emotional Barriers to Bowel Screening

Measures

Reduced EBBS scale

To develop a more suitable instrument for studying psychological barriers to faecal collection exams (i.e., an instrument for those screening contexts where endoscopic tests are a follow-up exam), we excluded the insertion disgust items and tested a 10-item version of the EBBS scale. We then translated and adapted into Italian these selected 10 items tapping *faecal disgust*, *embarrassment*, and *fear of the outcome*. The scale was then back-translated into English by a professional service and compared with the original version (Appendix B).

Participants expressed their agreement (on a five-point scale) with sentences about the perception of negative emotions in the CRC screening context. Items were presented in randomized order. We replaced missing values with the variable mean. For each EBBS subscale, we obtained a single score summing individuals' answers to the respective items. A higher score indicates a stronger emotional response.

CRC screening knowledge

We measured *CRC screening knowledge* as a predictor of self-reported screening participation and hypothetical medical help-seeking. To assess knowledge, we adapted for the Italian context items originally developed for the United Kingdom CRC screening programme (von Wagner et al., 2009). Participants rated 10 statements as true or false. Items were presented in randomized order. We coded correct answers as 1 and then summed items to obtain a total knowledge score. Participants could read the correct answers at the end of the questionnaire.

CRC risk perception

We asked participants whether they thought their *risk of developing CRC* was "lower" (−1), "about the same" (0), or "higher" (1) in comparison with other people of their own age (Weinstein, 1987).

Demographic and CRC screening background

The questionnaire included background questions about demographic data, whether the participant had ever discussed CRC screening with a doctor (yes = 1, no = 0), and CRC familiarity (i.e., having had CRC cases in one's family; yes = 1, no = 0).

CRC screening avoidance

In line with Reynolds et al. (2018), we assessed *CRC screening avoidance* using decisions to delay seeking medical help and self-reported past CRC screening attendance measures. We asked participants to imagine a scenario in which they had been feeling ill for

five days with diarrhoea and stomach pain (Reynolds et al., 2018; Reynolds, McCambridge, et al., 2014) and had to choose whether to schedule an appointment with a doctor, knowing that doing so would imply the collection of a faecal sample. The choice was between calling the doctor immediately ("0") or waiting a few days in hopes of feeling better ("1"). Regardless of the participant's answer, a warning reminded participants that they should be screened even in the absence of any symptoms. Then, in a single item, we asked participants whether they had ever provided a completed FOBT (or FIT) to attend CRC screening. We coded the answer "no" as 0, "yes" as 1, and "I do not want to answer" as missing.

Data analyses

To test the controversial multidimensionality of the scale, we ran a CFA with all EBBS items loading on a single factor (Davis et al., 2017) and a CFA with the expected three-factor model (Reynolds et al., 2018). We evaluated the two models' goodness of fit with several indexes: Bollen's incremental fit index (IFI; Bollen, 1989), comparative fit index (CFI; Bentler, 1990), and the root mean square error of approximation (RMSEA; Steiger, 1990). We accepted as satisfactory IFIs and CFIs higher than 0.90 (Reisinger & Mavondo, 2007), and we accepted as fair an RMSEA between 0.05 and 0.08 (Browne & Cudeck, 1992). We used Cronbach's alpha coefficients and the correlation among CFA latent variables to test the internal consistency of the two competing models. We first assessed predictive validity through the correlation test among CFA latent variables (i.e., the subscale of disgust, fear, and embarrassment) and the two outcomes (i.e., self-reported past CRC screening attendance and the intention to delay medical help-seeking). Next, we ran logistic regression analyses for each dependent variable. In each model, we replicated Reynolds et al. (2018)'s analyses: we included the emotion subscales and age, gender, CRC familiarity, having ever discussed CRC screening with a medical doctor, risk perception, and screening knowledge as control variables.

Results

Preliminary analyses

Almost half of the participants reported no prior CRC screening attendance (42%). Most of them declared that they would immediately seek medical help after the onset of bowel symptoms (88%). CRC screening was associated with a moderate fear of the outcome and disgust, whereas embarrassment was quite weak (Table 7). Overall, participants answered correctly to more than half of questions about CRC and CRC screening, showing an adequate knowledge of this malignancy and detection programmes (Table 7). Most of the participants expressed that their risk of contracting CRC was "about the same" as people of their own age, some participants perceived to be at a higher risk, and a minority indicated to be at a lower risk in comparison to other people their own age (Table 7). Many participants (67%) have never talked about CRC screening with a doctor or another health care specialist.

Main analyses

The EBBS multidimensional model showed acceptable goodness of fit indexes (IFI = 0.94, CFI = 0.94, RMSEA = 0.08; 90% CI: [0.06–0.10]), while the unidimensional model did not (IFI = 0.75, CFI = 0.74, RMSEA = 0.16; 90% CI: [0.14–0.18]) (Figure 6). The reduced EBBS scale had good internal reliability (α = .81), and its subscales showed acceptable values (Cronbach's alphas: disgust, α = .80; fear, α =.73; embarrassment, α =.67). The three subscales' internal consistency was also supported by correlational analyses, as the three CFA latent variables were positively correlated with one another. In particular, disgust and embarrassment were strongly positively correlated (r = .83), likely because they share the same elicitor (i.e., contact with faecal matter) and are both associated with the screening procedure. In support of the subscale's predictive validity, the three emotions were negatively correlated with past screening attendance and positively correlated with the decision to delay seeking medical help. Correlations between variables are reported in Table 8.

Figure 6.

On the top: Confirmatory Factor Analysis of the multidimensional Emotional Barriers to Bowel Screening (EBBS) scale (standardised parameters and correlations between the three emotional dimensions are displayed). On the bottom: Confirmatory Factor Analysis of the unidimensional EBBS scale (standardised parameters are displayed).

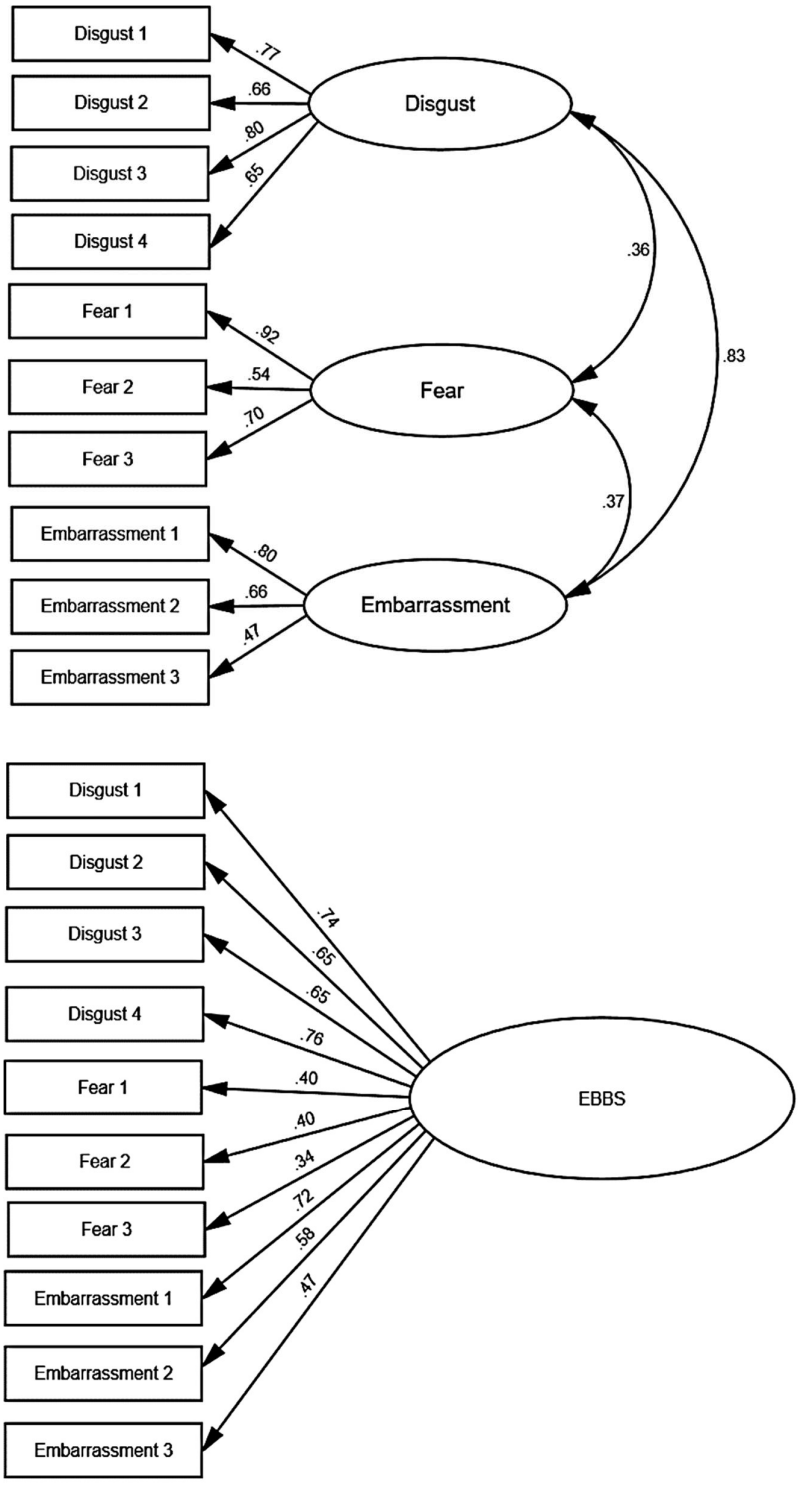


Table 8.
Correlations between variables.

	Age	Gender	CRC[a] risk perception	Ever discussed CRC screening with a doctor	CRC familiarity	CRC screening Knowledge	EBBS Disgust subscale	EBBS Fear subscale	EBBS Embarras-sment subscale
Gender	–.01								
CRC risk perception	–.03	–.07							
Ever discussed CRC screening with a doctor	.18*	.12	.24**						
CRC familiarity	.10	.06	.27**	.20*					
CRC screening knowledge	.19*	.10	.11	.20*	.12				
EBBS Disgust subscale	–.19*	–.04	–.03	–.19*	–.01	–.09			
EBBS Fear subscale	–.02	.03	–.02	–.12	–.03	–.04	.37**		
EBBS Embarrassment subscale	–.17*	.03	–.08	–.19*	.03	–.03	.83**	.38**	
CRC Screening Past Attendance	.49**	.08	.05	.38**	.09	.35**	–.15*	–.16*	–.19*
Delaying medical help seeking	.05	–.07	–.03	–.06	.07	–.02	.15*	.22**	.17*

Note: [a] Colorectal Cancer, * $p \leq .05$, ** $p \leq .001$. Model fit indexes: IFI = 0.94, CFI = 0.94, RMSEA = 0.07 (90% CI: 0.05–0.09)

To test the predictive validity of the EBBS scale, we also conducted a logistic regression for each outcome (Table 9). The model predicting past screening attendance showed an acceptable fit index, χ^2 (9) = 123.75, $p < .001$, and explained 52% of the outcome variance (Nagelkerke's R^2). Older age, having discussed CRC screenings with a doctor, and better screening knowledge predicted a greater likelihood of having ever attended faecal collection tests. In contrast, and as predicted (hypothesis 3), fear predicted a lower likelihood of the same. Embarrassment, disgust, gender, risk perception, and CRC familiarity were not significant outcome predictors. Hence, our findings did not support hypotheses 1 and 2.

The model predicting medical help-seeking did not attain statistical significance, $\chi^2(9) = 13.11$, $p = .158$. As fear was the only significant predictor, we replicated the regression analysis entering only this emotion as the independent variable following Reynolds et al. (2018)'s step-wise procedure. The resulting model was significant, $\chi^2(1) = 10.47$, $p = .001$. More intense fear ($\beta = 1.77$, $p = .001$) predicted a greater likelihood of delaying medical help-seeking. The model explained 8% of the outcome variance (Nagelkerke's R^2). Again, only the hypothesis regarding fear was corroborated (hypothesis 6), as the findings did not support our expectations about disgust (hypothesis 4) or embarrassment (hypothesis 5).

Discussion

As the findings of our systematic review suggested (see Chapter 2), in the present study we tried to overcome a prior limitation, which consisted in considering a single emotion, by examining CRC screening emotional barriers comprehensively with the EBBS scale (Reynolds et al., 2012, 2018). The first purpose of this study was to perform a formal comparison of the unidimensional (Davis et al., 2017) versus multidimensional (Reynolds et al., 2018) EBBS models. Our findings showed that the fit indexes were acceptable only for the multidimensional model. Therefore, the EBBS scale is suitable for testing the effects of each measured emotion but should not be used as a single score.

Table 9.
Logistic regressions.

	CRC[a] screening past attendance				Delay in medical help seeking			
	OR	*p*	β	95% C.I.for β	*OR*	*p*	β	95% C.I.for β
Age	1.25	.000	3.75	(2.43, 5.78)	1.01	.865	1.04	(0.69, 1.57)
Gender	1.94	.127	1.29	(0.93, 1.8)	0.71	.509	0.88	(0.59, 1.3)
CRC risk perception	0.92	.836	0.96	(0.66, 1.4)	0.77	.573	0.88	(0.58, 1.36)
Ever discussed CRC screening with a doctor	5.42	.000	2.22	(1.51, 3.26)	0.77	.606	0.88	(0.55, 1.41)
CRC familiarity	0.73	.471	0.88	(0.61, 1.26)	1.73	.248	1.27	(0.85, 1.89)
CRC and CRC screening Knowledge	1.66	.000	2.06	(1.38, 3.08)	0.94	.667	0.91	(0.6, 1.38)
EBBS[b] Disgust subscale	1.11	.171	1.34	(0.88, 2.03)	1.04	.610	1.12	(0.72, 1.76)
EBBS Embarrassment subscale	0.85	.239	0.75	(0.46, 1.21)	1.06	.621	1.12	(0.72, 1.72)
EBBS Fear subscale	0.87	.022	0.66	(0.46, 0.94)	1.16	.019	1.60	(1.08, 2.35)

Note. [a] Colorectal cancer, [b] Emotional Barriers to Bowel Screening

The second aim of this study was to propose a reduced version of the EBBS scale for contexts in which colonoscopy cannot be considered a part of CRC screening programmes because it is used only for diagnostic purposes. Only 5% of FOBT/FIT attendees in Italy receive positive results and must undertake an endoscopic exam (Osservatorio Nazionale Screening, 2021).

This reduced tool might help avoid an unnecessary emphasis on colonoscopy in empirical studies about emotional barriers to CRC screening. Our findings showed that the EBBS scale remains an effective psychometric instrument even without the insertion disgust items. The analysed emotions (i.e., faecal disgust, embarrassment, and fear) were positively correlated with each other, negatively correlated with the likelihood of having undergone CRC screening through a faecal collection test, and positively correlated with the intention to delay seeking medical help when feeling unwell. Thus, we obtained overall good internal consistency, and our findings supported the scale's predictive validity. The analyses of the EBBS scale's predictive validity also enabled us to investigate faecal disgust, embarrassment, and fear of the outcome as predictors of CRC screening avoidance (i.e., the third purpose of this study).

Our regression analyses revealed that older participants, participants who had a conversation about CRC screening with a doctor and participants with a better CRC and CRC screening knowledge reported prior CRC screening attendance more often than, respectively, younger participants, participants who have not discussed CRC screening with a doctor, and participants who did not know well this malignancy or the screening programme. Contrary to our hypotheses 1 and 2, the regression analyses showed no effect of disgust and embarrassment on the likelihood of having attended CRC screening. However, in line with hypothesis 3, those participants who dread a potential cancer diagnosis were less likely to report prior CRC screening attendance. Disgust and embarrassment did not foster the

intention to delay seeking medical help after the onset of bowel symptoms, thus we rejected hypotheses 4 and 5. In contrast, fear of the outcome was a discriminating emotion in predicting the hypothetical delay of seeking medical help: in line with hypothesis 6, feeling afraid of a potential cancer diagnosis boosted the avoidance of medical care.

Therefore, although higher scores in all the three negative emotions were associated with a lower likelihood of having attended CRC screening and with a greater delay of help-seeking in a hypothetical scenario (Table 8), our findings revealed only fear as an apparent barrier to CRC screening attendance and to seeking medical consultations. The difference between the three emotions may be due to the elicitors of these barriers (i.e., fear of a cancer diagnosis is more prominent than disgust and embarrassment associated with screening procedure, Table 1). In addition our retrospective design prevents us from establishing cause-effect relationships, and our measures can be affected by recall bias. Indeed, it is equally possible that, on the one hand, fear of the outcome have hindered CRC screening participation and, on the other hand, that having attended CRC screening in the past had a reassuring effect on participants. However, it is worth noting that in the current study the role of fear as an elicitor of avoidance is supported by its positive effects on the hypothetical decision to delay seeking medical help when feeling ill.

To better understand the effects of disgust, embarrassment and fear on the decision to screen, in the subsequent studies we chose to rely on intention measures (Studies 2–4), and control for prior CRC screening attendance in the analyses.

Besides the retrospective design, a second limitation of the present study concerns its participant sample. Due to resources constraints, notwithstanding the recommendation of the systematic review related to the recruitment of representative samples of the target population rather than convenience samples (see Chapter 2), but in line with Reynolds et al. (2018)'s procedure, we could only recruit a non-probabilistic sample.

Relying on self-reported items which are not necessarily accurate (Baumeister et al., 2007) rather than on observed behaviour could be considered another limitation of the present study. The constraints imposed by the Covid-19 pandemic and the protection of participants' privacy prevented us from measuring the negative emotions associated with CRC screening with a more ecologically valid approach, and then recording actual data about participants' attendance of CRC screening to assess their effects. Ideally, studies about CRC screening should be at least conducted in a laboratory setting, with FIT withdrawal as the main outcome. This would protect participants' privacy, as researchers would have no access to data about their medical procedures. However, our meta-analysis comforts us when showing that the findings about the effect of disgust on CRC screening attendance differed little when attendance was measured with self-report items or objective measures (i.e., kit returned or medical records).

These limitations noted, we believe that the present study is relevant for a number of reasons. The analyses on the EBBS scale psychometric properties allow us to use this instrument to operationalise the emotional barriers associated with CRC screening in our further studies (Studies 2–4), as a multidimensional construct. This means that our analyses will consider every emotion separately, rather than using a single EBBS score.

Conclusions

Studying how negative emotions induce avoidance towards screening tests like the FOBT or the FIT was the second step of the present research project to design interventions effective in promoting these detection behaviours, and the respective studies assessing the efficacy of such interventions. To the best of our knowledge, this is the first study to investigate affective associations of disgust, embarrassment, and fear related to CRC screenings in an Italian context. Apparently, for our participants, fear of screening outcome may hinder preventive behaviours such as attending screenings or contacting a health care

specialist when feeling sick. Hence, an implication of the present study is that screening campaigns should attempt to reassure people, perhaps with the help or mediation of a general practitioner. For our participants, discussing CRC screening with a practitioner might have boosted the attendance of faecal collection tests. In line with previous research (e.g., Quyn et al., 2018), we suggest that an intervention by a health care specialist might be particularly effective in enhancing participants' CRC screening intentions. However, in the next chapter we will discuss the possible limitations of the actual applicability of such intervention.

Chapter 4

Study 2: An experiment to improve the CRC screening invitation letter[3]

Interventions to promote CRC screening

Several interventions to improve CRC screening participation have been reported in the literature (see reviews of Goodwin et al., 2019; Sarma et al., 2019). Some of these promoted CRC screening attendance by redesigning screening services, whereas others were interventions of persuasive communication (i.e., messages aimed at shaping, reinforcing or changing receivers' responses; Miller, 1980) delivered through various media (e.g., face-to-face interventions or print materials).

For instance, we can identify several *nudges* (i.e., interventions that gently steer people to make a desirable choice without coercion; Sunstein, 2014) applied to the Italian CRC screening programme, although screening attendance rates are far from reaching the EU-recommended uptake rate of 65% (Kaminski et al., 2020).

Citizens are automatically enrolled in the screening programme (i.e., a nudge called *default choice*; Savadori, 2020). The faecal collection procedures were simplified by changing the exams modality from the FOBT (requiring the collection of three stool samples) to the FIT (a single collection of the stool sample), which increased screening attendance (Senore & Sassatelli, 2014) because improving the ease and convenience of a recommended choice increases the likelihood of putting that choice into action (Sunstein, 2014). Another example was mailing the faecal collection kit directly to citizens living in Central Italy rather than asking them to pick up the kit at their primary care office (Rossi et al., 2011).

[3] Part of this chapter, including tables, was published in Scaglioni, G., Chiereghin, A., Bazzani, C., Mezzetti, F., & Cavazza, N. (2022). Psychosocial Predictors of Colorectal Cancer Screening Intention: An Experiment on the Invitation Letter. *International Journal of Behavioral Medicine*, Advance online publication. https://doi.org/10.1007/s12529-022-10142-1

As far as interventions based on persuasive communication are concerned, another improvement of the CRC screening services would be involving patients' general practitioners, because one of the most effective interventions to promote CRC screening is the recommendation by a health care provider, acknowledged as one of the most reliable sources of medical information (Goodwin et al., 2019; Närhi, 2007; Quyn et al., 2018; Sarma et al., 2019). Patients receiving the invitation letter or a reminder to screen signed by their doctor (or even by their doctor's office) were more likely to attend CRC screening than those patients who received a standard message (Benton et al., 2017; Hewitson et al., 2011; Lucchini et al., 2014). An American study found that reminders were even more effective when the health care specialists directly phoned potential participants to ask them to get screened (Coronado et al., 2018). Implementing such interventions, however, is not always a real possibility. General practitioners can disagree on signing the letter, and local health care systems may lack the human resources to make the phone calls. The findings of Study 2 show that speaking about CRC screening with a doctor is quite uncommon: only 33% of participants talked about CRC screening with a health care specialist (see Chapter 3, Table 1), 39% considering only participants over 50 years old.

Since the development of effective preventive messages is a critical part of cancer screening programmes, if we look at the communication domain, we can find other potential levers to achieve a better rate of CRC screening compliance. Indeed, several studies showed that communication aimed at cancer prevention can encourage the attendance of screening programmes (Hesse, 2009).

Media coverage of CRC screening (e.g., national newspaper articles) and advertisements promoting CRC exams (e.g., placed at bus stops, on pharmacy bags, and digital screens in doctors' waiting rooms) have proven beneficial for CRC screening uptake (Lo et al., 2012; White et al., 2015). For example, Lo et al. (2012) analysed the effects of the

considerable attention given in print and TV media to a cancer detection exam, flexible sigmoidoscopy. Such media coverage, stimulated in April 2010 because *the Lancet* published a study about the effectiveness of this screening exam in reducing CRC mortality and incidence, had a positive impact on FOBT attendance for at least a month (Lo et al., 2012). This effect was particularly evident among those citizens who previously refused to get screened. Thus, the authors suggest that media coverage was more than just a reminder to screen, it was also persuasive. Indeed, public debate and increased knowledge likely improved the perception of CRC screening and subsequent participation.

White et al. (2015) aimed to increase FOBT attendance by raising awareness about CRC and CRC screening. They tested the effects of three interventions: providing an educational flyer, providing a kit that simplified the faecal collection of a stool sample, and starting an outdoor advertising campaign. Interventions were tested alone or in combination across four different geographical groups and compared with a non-treatment control group. Their findings showed that combining the two mailed interventions (i.e., the flyer and simplified kit) slightly increased FOBT attendance, whereas advertising had a substantial positive impact on CRC screening uptake (White et al., 2015).

Other interventions tried to increase screening participation by reducing the "intention-behaviour gap" (i.e., intentions not converted into actions; Rhodes & de Bruijn, 2013) with the exposure to sentences or questions eliciting *implementation intentions*. Implementation intentions are "if-then" reasonings that specify the conditions under which a behaviour will be implemented (Sheeran et al., 2018). For example, the intention to participate in screening (e.g., "I will attend screening") could be more easily translated into behaviour if associated with a particular event or context (e.g., "If I get the invitation letter, I will go pick up the kit and attend screening"). Citizens can be encouraged to form implementation intentions about CRC screening with questions about where, when and how

they intend to screen or with “pre-formulated” implementation intentions (Lo et al., 2014). Formulating an intention in this way promotes its transformation into concrete action (Sheeran et al., 2018). For instance, in Israel, leaflets stating: “If you already have the kit, then take advantage and use it!” were integrated into a routine annual FOBT kit mailing (Neter et al., 2014). The implementation intention specified a premise (i.e., having the kit, mailed with the leaflet) and the subsequent conclusion (i.e., attending CRC screening). The leaflet also included blank parts where participants should write when they were planning to use the kit and where they will keep it. This intervention was successful: attendance rates were significantly higher for those participants who read the implementation intentions leaflet than those reading the standard message (Neter et al., 2014). In the United States, Greiner et al. (2014) delivered the implementation intentions through surveys in which participants had to select several answers about their attending of a colonoscopy (e.g., how they would remember to set up the colonoscopy appointment, when they would send the request for time off from work, how they would remind to take the laxative medicines). This strategy was also effective, with participants who were guided through the formation of implementation intentions attending colonoscopy more than participants in the control group (i.e., participants who answered questions on diet, exercise, and healthy living; Greiner et al., 2014). In contrast, the two studies about implementation intentions carried out in England (Lo et al., 2014; Wilding et al., 2020) found no benefits in exposing participants to implementation intentions. Thus, this intervention might be more effective in some contexts than others.

Another communicative technique to increase CRC screening uptake is targeting social norms, which should elicit normative social influence (i.e., what society approves of; Sieverding et al., 2010) and informational social influence (i.e., what other people usually do; Sieverding et al., 2010). Von Wagner et al. (2019) found that the statement “uptake is 8 out of 10” (p. 1622), meaning that 8 invitees out of 10 actually get screened, boosted CRC

screening intention. A similar claim could not be made in Italy, where 50.9% of the population from 50 to 74 years old have never attended a CRC screening test (Eurostat, 2021). However, Stoffel et al. (2019) used a message stating: "Nearly half of men and women who are eligible to participate [in the CRC screening programme] do so", which is comparable to the Italian CRC screening rate. This intervention was also effective in increasing the intention to screen of citizens previously refusing to attend CRC screening. Although "nearly half" seems to communicate a general avoidance of CRC screening, Stoffel et al. (2019) explain that CRC screening non-adherents believe that only a few people attend CRC screening. Thus, the expression "nearly half" adjusts their estimation bias upward (Stoffel et al., 2019).

Other communication-based interventions, such as matching messages promoting CRC screening with receivers' characteristics, didactic persuasion, and narrative persuasion, will be discussed in Chapters 5 and 6, where we will describe our test of their efficacy.

Interventions should also address affective barriers to CRC screening

In line with the reasoning concerning emotional barriers, messages in the domain of CRC screening promotion should point not only to informing the target population, but also to addressing their affective reactions (Kiviniemi et al., 2014). The drafting of the messages used for screening campaigns, and *in primis* the drafting of the invitation letter, should acknowledge that receivers can be disgusted, embarrassed, and scared by CRC screening exams (Reynolds et al., 2018), and should avoid prompting these negative emotions portraying the screening experience as minimally threatening. For instance, the invitation letter currently used in Bologna (Italy), where the current study took place, contains several references to bodily waste and handling faeces, which can elicit disgust and embarrassment. In addition, the content of this letter can be scary because it implicitly hints that the reader may be ill without knowing it. Therefore, this text could elicit negative emotions, provoking

avoidance behaviours that can instantly distance individuals (e.g., discarding the letter) or psychological manifestations of rejection (e.g., procrastinating or forgetting to screen; Rozin et al., 2008).

To the best of our knowledge, no study has investigated how to improve the wording of informative or promotional material about CRC screening. Thus, Study 2 will test the efficacy of reducing the repetition of bodily waste expressions (e.g., the repetition of the words "faeces" and "blood") in the invitation letter.

In addition, Study 2 will be the first empirical test of how the theory of planned behaviour integrated with the emotional barriers is suitable to explain CRC screening attendance (see Chapter 1).

The importance of testing theory-driven interventions

Health behaviour models identify key factors promoting behaviours and behavioural change. Applying behavioural theories (e.g., the protection motivation theory, see Chapter 1) for the design of interventions aimed at fostering a recommended health behaviour has several benefits (Glanz & Bishop, 2010). According to Glanz and Bishop (2010), using a theoretical framework allow researchers to understand the underlying mechanisms of an intervention functioning or failing. For instance, a theoretical framework can provide important insight to understand whether an intervention directly impacts on behaviour, or whether its effects are due to changes in psychological constructs that support that behaviour, such as people's beliefs about its consequences, or people's perceived self-efficacy in engaging in the behaviour in question. Once identified why an intervention worked, this information can be used to further improvement (Glanz & Bishop, 2010). In line with this position, Glanz and Bishop (2010) compared 11 systematic reviews and found that theory-driven interventions were generally more effective than those lacking a theoretical base. Some strategies combining more than one theory had even improved effects (Glanz &

Bishop, 2010). The authors claim that the reasons why theory-drive intervention are the most effective are not entirely clear. One reason could be that studies testing those strategies might have been developed with greater rigor.

The theory of planned behaviour (see Chapter 1) seems well suited for understanding how an intervention will affect CRC screening intention, through the impact on factors promoting the intention. It helps answer questions like does this specific intervention influence attitudes towards the screening, subjective norms and/or PBC, or does it strengthen their impact upon intention?

The theory of planned behaviour can also guide the actual design of interventions. For instance, Maheri et al. (2021) referred to this motivational model to project an educational training about CRC screening. Lectures, group discussions, and workshops with family members enhanced the positive evaluation of CRC screening (i.e., positive attitudes) and the perceived social acceptance of CRC screening (i.e., subjective norms). Group sessions tried to enhance individuals' perceived capability to screen (i.e., PBC) by discussing the roles of facilitators and barriers in making CRC screening attendance simpler or harder, and asking those who attended CRC screening to share their experience with the others. The effect of the intervention on PBC was not statistically significant. Nevertheless, the positive effect on attitudes and subjective norms was sufficient to increase participants' CRC screening intention.

As discussed in Chapter 1, a limitation of the theory of planned behaviour is not considering affective variables (Conner et al., 2015). Our meta-analysis (see Chapter 2) showed that disgust plays a relevant role in hindering CRC screening intention and uptake. The findings of Study 1 (see Chapter 3) showed that fear of the outcome can be a barrier to the attendance of faecal collection tests. Therefore, in line with Conner et al. (2015), who suggested a reformulation of the theory of planned behaviour that included anticipated

emotional reactions (i.e., feelings elicited by the idea of engaging in a behaviour) and affective attitudes (i.e., affective positive or negative evaluations of the behaviour), our theoretical framework will also consider the role of the emotional barriers of CRC screening (operationalised through the reduced version of EBBS scale described in Chapter 3): disgust and embarrassment associated with the faecal-tests, and fear towards the test outcome. As discussed in Chapter 1, including negative emotions in the traditional model of the theory of planned behaviour might improve its predictive power (Conner et al., 2015), while including cognitive predictors (i.e., attitudes, subjective norms and PBC) in the studies about the emotional barriers associated with CRC screening allows controlling for fundamental factors of the decision to screen for CRC.

The present study

Study 2 was conducted in collaboration with the Governance of Screening Programs Unit of the Local Health Authority in Bologna, Italy. Its first purpose is to improve the invitation letter that constitutes one of the earliest steps of the CRC screening process in Bologna (Appendix C). We revised the text to include fewer expressions that may evoke negative emotions (i.e., "faeces", "blood", and "occult") in comparison with the actually used invitation (see details below and Appendix C). We expect that reading the revised letter versus the original letter will positively impact screening intention (hypothesis 1).

Based on the theory of planned behaviour, we will also investigate the effect of positive attitudes towards CRC screening, subjective norms, PBC, disgust, embarrassment, and fear on CRC screening intention, and we will analyse whether our intervention (i.e., reducing the repetition of bodily waste expressions in the letter) will interact with these predictors. In particular, in line with the theory of planned behaviour, beliefs about CRC screening efficacy, perception of support from significant others for deciding to screen, and the perceived ease of completing the test should foster CRC screening participation. Thus, we

expect attitudes (hypothesis 2a), subjective norms (hypothesis 2b), and PBC (hypothesis 2c) to be positively associated with CRC screening intention.

In addition, we know that disgust, embarrassment, and fear can hinder CRC screening participation (Azaiza & Cohen, 2008; Bynum et al., 2012; O'Carroll et al., 2015). Therefore, we anticipate that, even after controlling for cognitive predictors, faecal disgust (hypothesis 3a), embarrassment (hypothesis 3b), fear of the outcome (hypothesis 3c), and insertion disgust (i.e., fear of colonoscopy; hypothesis 3d) will be negatively associated with CRC screening intention. Contrary to Study 2, the current study also considers the role of insertion disgust to investigate whether the possibility of undergoing a colonoscopy after a positive FOBT discourages participation in CRC screening. In the section below, *Measures,* we explain how we faced the mere-measurement issue discussed in Chapter 3.

Finally, following the procedure of Carfora et al. (2020), who tested whether exposure to different messages moderated the effect of several predictors (including attitudes, subjective norms and PBC) on health behaviour intention (i.e., red/processed meat consumption), we will test if the intervention (i.e., reading the revised vs original letter) interacted with our cognitive and affective predictors. Thus, we will investigate whether reading the letter with few bodily waste references will improve the impact of positive attitudes (research question 1), subjective norms (research question 2) and PBC (research question 3) on CRC screening intention. On the other hand, we will investigate whether reducing the repetition of bodily waste references will decrease the impact of negative emotions spontaneously elicited by the idea of the test (i.e., faecal disgust, research question 4; embarrassment, research question 5, fear, research question 6; and insertion disgust, research question 7).

Method

Participants

We aimed to include people over 40 years old (i.e., near the age of the CRC screening target) without a previous history of CRC and living in Bologna, Italy. We chose to include also participants under the recommended screening age (i.e., 50 years old) because they might be contemplating screening for CRC (Davis et al., 2017) or have already screened with private care.

Participants were recruited through snowball sampling and advertisements on social media. We asked participants to voluntarily complete an online questionnaire. To estimate the minimum sample size, we conducted an a priori power analysis (Faul et al., 2007). With α = .05, test power = .80 (i.e., the minimum recommended in social sciences; Cohen, 1988), and mean effect f = .19 (effect of disgust on CRC screening intention identified in our meta-analysis, see Chapter 2), we estimated that the sample should include at least 220 participants, half randomly assigned to the experimental and the other half randomly assigned to the control group. A total of 386 people accessed the online questionnaire available for three months (2nd April 2021–2nd July 2021). Of these, 65 participants immediately dropped out, 47 dropped out while reading the invitation letter, 12 dropped out before completing any intention item, and two participants were excluded because they did not complete any emotion or intention item. Another 32 participants were excluded because they reported characteristics outside the inclusion criteria (i.e., being over 40 years old, living in Bologna, not having a previous history of CRC, and giving prior consent to participation and data processing).

The final sample consisted of 117 participants in the control group and 111 participants in the experimental group. Table 10 reports the participants' socio-demographic characteristics in each group. In the overall sample, participants' (N = 228) age ranged from

40 to 72 years (M = 52.86, SD = 7.66), 80% of the sample consisted of women, half of the participants had a University or postgraduate degree, and most of the participants were employees.

Table 10.

Study 2. Socio-demographic characteristics of participants.

	Original Letter		Experimental Letter		Between-group differences
	n	%	*n*	%	
Gender					χ^2 (1, N = 224) = 3.31, p = .069
Female	87	74%	93	84%	
Male	28	24%	16	14%	
Highest educational level					χ^2 (4, N = 224) = 1.01, p = .908
Middle school	6	5%	6	5%	
High school	54	46%	45	41%	
University	32	28%	35	32%	
Postgraduate degree	22	19%	24	22%	
Employment					χ^2 (4, N = 225) = 5.75, p = .218
Unemployed	2	2%	6	5%	
Employed	87	74%	70	63%	
Self-employed	10	8%	14	13%	
Retired	11	9%	17	15%	
CRC familiarity[a]	22	19%	27	24%	χ^2 (1, N = 219) = 0.60, p = .439
Screening Experience					χ^2 (2, N = 214) = 4.84, p = .089
Refused to screen[b]	11	9%	3	3%	
Never invited[c]	39	33%	37	33%	
Attended[d]	59	51%	65	59%	

Note. Participants in the control condition were on average 52 years old (SD = 7.5). Participants in the control condition were on average 53 years old (SD = 7.9). The difference was not statistically significant, t (222) = –.54, p = .591.

[a]Participants who reported to being related with someone who received a CRC diagnosis.

[b] Participants who actually received an invitation letter, but refused to get screened.

[c] Participants who never received an invitation letter.

[d] Participants who attended CRC screening at least once.

Some participants reported CRC diagnoses in their families (22.4%). Most participants declared to attend CRC screening every time they receive the letter (n = 95), or

they declared to have received only the first invitation letter and to have attended CRC screening (n = 10). Other participants reported that they occasionally adhered to the screening but not every time they received the letter (n = 10). A minority of participants were persistent non-compliers (n = 6). Other six had received their first invitation letter but did not attend CRC screening. Among the participants who had never received an invitation letter, eight screened outside the public programme (i.e., in private care facilities), and 76 reported no prior experience with faecal collection or endoscopic tests.

Procedure

This study was approved by the Comitato Etico Area Vasta Emilia Centro della Regione Emilia-Romagna (Protocol number PG0032762021, IRCCS Azienda Ospedaliero–Universitaria di Bologna, Policlinico di Sant'Orsola, Via Albertoni 15–40138 Bologna, Italy).

The experimental letter was developed with the Governance of Screening Programs Unit of the Local Health Authority in Bologna, Italy. We applied six changes to the original letter (e.g., from "Invitation to Occult Blood Test" to "Invitation to FOB Test" and from "faecal sample" to "the sample"). The manipulation was tested with a pilot study. Ten participants read either the original or the revised letter and expressed less faecal disgust while reading the text with fewer bodily waste expressions.

In the main between-participants experiment, we asked participants to read either the real invitation letter (coded = 0) used in Bologna or the manipulated letter (coded = 1). The survey website (Qualtrics) randomly assigned participants to one of the two experimental conditions. Participants were unaware of the assigned condition and gave informed consent to participation and data treatment before beginning the questionnaire (see Appendix D).

After reading one of the two invitation letters, we asked participants to imagine receiving that letter and having to choose whether to attend CRC screening. They completed a questionnaire concerning this fictional scenario, which included negative emotions (10

items), insertion disgust (one item), CRC screening intention (two items), and 10 items to operationalise attitudes, subjective norms, and PBC (i.e., the constructs from the theory of planned behaviour; see below). Items of the same scale were presented in randomised order. Socio-demographics (e.g., gender, age, education, and employment) and background information (i.e., past CRC screening experience and CRC familiarity) also were recorded. *Having received the formal invitation to screen but having refused to* was coded as "–1", *having never attended CRC screening because not invited yet* was coded as "0", and *having attended CRC screening at least once* was coded as "1".

Measures

Cognitive predictors

To operationalise the predictors derived from the theory of planned behaviour, we adapted items from Lucas et al. (2016). On a 5-point Likert scale, participants reported their level of agreement with 10 sentences. *Attitudes towards CRC screening* were captured using six items (α = .59), with three items measuring cognitive attitudes (e.g., "Colorectal cancer screening is useful") and three measuring affective attitudes (e.g., "I would be happy to screen for colorectal cancer"). Higher scores corresponded to more positive attitudes towards screening. Two items tapped *subjective norms* (α = .83): "People that I consider important would like me to attend colorectal cancer screening" and "People that I consider important would advise me to attend colorectal cancer screening". Higher rates of subjective norms corresponded to higher perceived social expectations to screen. *PBC* was gauged using two items ("I think I can take the exam kit and return it to the pharmacy" and "I think I can successfully use the exam kit"; α = .84). Higher PBC scores meant higher confidence in the self's capability to screen. Mean scores were calculated for each cognitive construct.

Negative emotions

We captured *anticipated emotions* through the reduced, Italian version of the EBBS

scale (10 items) described in Chapter 3. In line with the findings of Study 1, we used this scale as a multidimensional measure. Three items measured anticipated CRC screening-related *faecal disgust* (α = .87, e.g., "Collecting a sample of my faeces on a stick would be disgusting"), three measured *embarrassment* (α = .79, e.g., "Delivering the sample of faeces would be embarrassing"), and three measured *fear of the outcome* (α = .76, e.g., "I would worry that the FOBT would find something wrong with me"). As we discussed in the previous chapter, we removed the five items concerning *insertion disgust* (i.e., disgust associated with colonoscopy) from Reynolds et al. (2012, 2018)'s EBBS scale because they placed an undue emphasis on the endoscopic follow-up exam. However, for the present study, we chose to consider the emotions associated with the whole screening experience. Thus, in Study 2 we will investigate whether the possibility of undergoing a colonoscopy after a positive FOBT might discourage participation in CRC screening. To reduce the mere-measurement effect of assessing insertion disgust (Sandberg & Conner, 2008), we relied on a single item ("I would be so concerned about colonoscopy that I would avoid testing") rather than on five items, which might decrease the salience of this test compared to the faecal collection exam. Participants rated on a 5-point scale from 1 (*not likely at all*) to 5 (*very likely*) the likelihood of experiencing each emotion after reading the letter. Higher scores corresponded to a greater likelihood of experiencing negative emotions thinking of CRC screening. In line with Reynolds et al. (2018), mean scores were calculated for each subscale.

Intention to screen

CRC screening intention was gauged using two items ("When I receive the invitation letter, I will attend colorectal cancer screening" and "I am willing to attend colorectal cancer screening'; α = .86). Participants' answers were expressed on a 5-point Likert scale. A single intention score was obtained by averaging the two items. Higher scores in intention to screen corresponded to greater willingness to attend CRC screening.

Data analyses

As intention to screen was strongly skewed (84% of participants expressed the maximum intention to screen), we followed the procedure used by O'Carroll et al. (2015) and dichotomised this variable. An intention to screen equalling "5" was coded as "1" (strong intention), while the other scores were coded as "0" (less than strong intention). To test our hypotheses, we conducted a hierarchical logistic regression. The outcome was the dichotomised intention to screen.

In step 1, we entered the four emotions (i.e., faecal disgust, embarrassment, fear of the outcome, and insertion disgust) to isolate their effects on the outcome. In step 2, we entered the three cognitive variables (i.e., attitudes, subjective norms, and PBC), which allowed us to measure how the model improved. In step 3, we entered two CRC past screening dummies: *Never attended CRC screening although invited to* and *never being invited to screen* (*having attended CRC screening* was the reference category); the experimental condition (original letter vs revised letter); and the interactions between the type of letter and the variables entered at step 1 and step 2. Affective and cognitive predictors of CRC screening intention were standardised.

Results

Preliminary analyses

Table 11 reports means and standard deviations for study measures and the correlations among them. CRC screening was associated in particular with fear towards the diagnosis, insertion disgust, and to a minor extent with faecal disgust and embarrassment. In addition, participants expressed a great intention to screen, a firm confidence in their abilities to uptake CRC screening (i.e., PBC), positive attitudes towards the programme and high perceived social pressure to screen. Past CRC screening attendance was significantly correlated with the outcome, so it was included among the logistic regression predictors.

Table 11.

Means, Standard Deviations, Spearman's rho correlations for Study 2 measures.

	M (SD)	1	2	3	4	5	6	7	8
1. Disgust	1.27 (0.61)	—							
2. Embarrassment	1.22 (0.54)	.57***	—						
3. Fear of the Outcome	2.11 (0.95)	.23***	.22***	—					
4. Insertion disgust	1.68 (1.05)	.25***	.32***	.26***	—				
5. Attitudes	4.73 (0.44)	–.19**	–.28***	–.20**	–.31***	—			
6. Subjective Norms	4.66 (0.75)	–.11	–.17*	–.06	–.35***	.33***	—		
7. PBC[a]	4.74 (0.69)	–.44***	–.49***	–.17*	–.34***	.32***	.42***	—	
8. Intention to screen	4.75 (0.69)	–.23***	–.35***	–.18**	–.26***	.47***	.38***	.55***	—
9. CRC screening experience[b]	—	–.24***	–.34***	–.23***	–.20**	.21**	.14*	.38***	.39***

Note. * $p < .05$, ** $p < .01$, *** $p \leq .001$.

[a] Perceived Behavioural Control.

[b] Prior attendance of colorectal cancer screening coded as –1 = “Refused to screen”, 0 = “Never invited to screen”, 1 = “Attended CRC screening at least once”.

Preliminary analyses assessed that respondents' gender (r = –.05, p = .428), years of formal education (r = .04, p = .603), and CRC familiarity (i.e., being related to someone who received a CRC diagnosis; r = .10, p = .160) did not correlate with their CRC screening intention. Hence, they were not considered in the subsequent analyses.

Main analyses

Step 1 of the hierarchical logistic regression explained 18% (Nagelkerke's R^2) of the outcome variance (i.e., the dichotomised screening intention measure). Faecal disgust (B = −.46, SE = .22, p = .034) and insertion disgust (B = −.41, SE = .20, p = .039) were negatively and significantly associated with CRC screening intention, whereas embarrassment (B = −.07, SE = .22, p = .731) and fear of the outcome (B = −.32, SE = .22, p = .139) were not.

The model was strengthened in step 2 with the entry of the cognitive predictors, explaining a further 26% (Nagelkerke's R^2) of variance. From this step, insertion disgust ceased to be statistically significant (B = −.07, SE = .25, p = .775). Attitudes towards CRC screening (B = .74, SE = .24, p = .002), subjective norms (B = .49, SE = .23, p = .035), and PBC (B = .78, SE = .28, p = .006) were significantly and positively associated with CRC screening intention.

At step 3, entering the categorical covariate (prior CRC screening experience), experimental conditions, and the interactions, the model was strengthened again and explained an additional 16% (Nagelkerke's R^2) of variance. The final model showed an acceptable fit index, χ^2 (17) = 85.75, p < .001, and explained 60% (Nagelkerke's R^2) of the outcome variance (Table 12). The manipulation of the letter (i.e., reducing the repetition of words like "faeces", "blood", and "occult") did not affect CRC screening intention (B = .49, SE = .72, p = .496); therefore, we rejected hypothesis 1. In contrast, we found support for hypothesis 2a: positive attitudes towards CRC screening were significantly associated with greater CRC screeningintention (B = .92, SE = .42, p = .028). However, subjective norms (B

= .58, *SE* = .31, *p* = .064) and PBC (*B* = .41, *SE* = .32, *p* = .195) were no longer significant predictors of CRC screening intention in the third step. Thus, we did not find strong support for hypotheses 2b and 2c. As expected (Hypothesis 3a), faecal disgust was associated with a lower likelihood of being strongly intended to screen (*B* = −.88, *SE* = .39, *p* = .025). In no step of the regression model, embarrassment and fear of the outcome predicted CRC screening intention. Thus, we rejected hypotheses 3b and 3c (Table 12). Although insertion disgust was associated with CRC screening intention before controlling for the cognitive predictors derived from the theory of planned behaviour, the effect did not reach conventional statistical significance at this step. Therefore, we did not find strong support for hypothesis 3d. Our findings supported hypothesis 4c, with the type of letter moderating the association between PBC and intention to screen, but not hypotheses 4a and 4b (Letter * Attitudes, *B* = .01, *SE* = .57, *p* = .992; Letter * Subjective norms, *B* = − .57, *SE* = .68, *p* = .397; Letter * PBC, *B* = 2.40, *SE* = 1.18, *p* = .043). We also rejected hypotheses 5a–5d, as no moderation of type of letter on the association between emotions and intention to screen was significant (Letter * Disgust, *B* = 1.13, *SE* = .61, *p* = .067; Letter * Embarrassment, *B* = −.68, *SE* = .67, *p* = .310; Letter * Fear of the outcome, *B* = − .26, *SE* = .62, *p* = .676; Letter * Fear of colonoscopy, *B* = .88, *SE* = .81, *p* = .273).

To gather more insight into this moderation effect of the experimental condition on the association between PBC and CRC screening intention, we performed a logistic regression for each group (Table 13). In both groups, PBC was significantly associated with CRC screening intention. However, this association was stronger among participants who read the revised letter than among those who read the original letter.

Table 12.

Study 2. Step 3 of the hierarchical logistic regression. Association with intention to screen. Odds Ratio and 95% Confidence Interval (Lower Limit, Upper Limit).

	OR	95% CI (LL, UL)
Faecal disgust	0.41*	(0.19, 0.90)
Embarrassment	1.54	(0.72, 3.28)
Fear of the outcome	0.80	(0.55, 1.64)
Insertion disgust	1.10	(0.55, 2.22)
Attitudes	2.50*	(1.10, 5.67)
Subjective norms	1.78	(0.97, 3.29)
PBC[a]	1.51	(0.81, 2.82)
Refused to screen[b]	0.04**	(0.01, 0.24)
Never invited[b]	0.67	(0.16, 2.73)
Letter	1.64	(0.40, 6.77)
Letter*Faecal disgust	3.08	(0.93, 10.26)
Letter*Embarrassment	0.51	(0.14, 1.88)
Letter*Fear of the outcome	0.77	(0.23, 2.60)
Letter*Insertion disgust	2.42	(0.50, 11.74)
Letter*Attitudes	1.01	(0.33, 3.08)
Letter*Social norms	0.56	(0.15, 2.13)
Letter*PBC	10.97*	(1.08, 111.22)

Note. *$p < .05$, ** $p < .001$.

[a] Perceived Behavioural Control.

[b] Reference category: Participants who attended CRC screening at least once.

Table 13.

Study 2. Logistic Regression by Condition. Association with intention to screen. Regression coefficient (Standard Error), Odds Ratio, and Confidence Interval (Lower Limit, Upper Limit).

	Original Letter (N = 116)			Revised Letter (N = 104)		
			95% CI			95% CI
	B (*SE*)	*OR*	(LL, UL)	*B* (*SE*)	*OR*	(LL, UL)
Faecal disgust	–0.85 (0.41)*	0.43	(0.19, 0.96)	0.12 (0.49)	1.13	(0.43, 2.97)
Embarrassment	0.53 (0.41)	1.70	(0.77, 3.75)	–0.01 (0.65)	0.99	(0.28, 3.49)
Fear of the outcome	–0.13 (0.37)	0.88	(0.43, 1.82)	–0.71 (0.54)	0.49	(0.17, 1.4)
Insertion disgust	0.12 (0.37)	1.13	(0.54, 2.37)	1.09 (0.85)	2.97	(0.57, 15.56)
Attitudes	0.97 (0.44)*	2.64	(1.13, 6.20)	1.12 (0.44)*	3.05	(1.3, 7.17)
Subjective norms	0.56 (0.32)	1.75	(0.93, 3.27)	0.09 (0.65)	1.10	(0.31, 3.95)
PBC[a]	0.37 (0.32)*	1.45	(0.78, 2.72)	3.68 (1.37)**	39.55	(2.73, 573.74)
Refused to screen[b]	–4.15 (1.19)**	0.02	(0.00, 0.16)	–1.54 (1.91)	0.21	(0.01, 8.99)
Never invited[b]	–1.52 (1.00)	0.22	(0.03, 1.54)	1.55 (1.40)	4.70	(0.30, 73.22)

Note. * $p < .05$, ** $p < .01$.

[a] Perceived Behavioural Control.

[b] Reference category: Participants who attended CRC screening at least once.

Discussion

Study 2 tested a theory-driven intervention to improve the CRC screening invitation letter adopted by an Italian local health care authority. Assuming the framework of the theory of planned behaviour, we anticipated that reading a CRC screening invitation letter with fewer references to bodily waste (e.g., references to blood and faeces), compared to the actual letter used in Bologna (Italy), would boost intention to screen, as such references could activate defensive cognitive processes (e.g., discontinuing reading and losing interest; Rozin et al., 2008). Contrary to Hypothesis 1, the experimental letter did not affect screening intention: reducing bodily waste expressions has not been effective enough to increase CRC screening intention. This may be due to our request to imagine a fictional scenario. Hence, our participants were potentially less engaged with the letter than if they had read it before the actual delivery of the kit.

The second purpose of this study was to investigate the reasons underlying reluctance to screen for CRC using suggestions provided by the theory of planned behaviour (Ajzen, 1985) integrated with the emotional barriers to CRC screening (Reynolds et al., 2018). Our findings confirmed the benefits of using these predictors together, as emotions and cognition contributed to explaining different aspects of CRC screening intention (i.e., emotion predicted 18% of CRC screening intention variance, and cognitions predicted an additional 26% variance). Excluding one of the two measures might result in a partial view of CRC screening decision-making factors.

Attitudes and PBC were the strongest cognitive predictors of CRC screening intention, whereas subjective norms had an overall minor effect on this outcome and ceased to be statistically significant when controlling for prior CRC screening attendance. This is in line with hypotheses 2a and 2c (although PBC ceased to be statistically significant when controlling for the experimental condition), but in contrast to hypothesis 2b. Thus, as posited in the theory of planned behaviour, a positive evaluation of CRC screening and high perceived control over the screening behaviour boosted the willingness to attend the CRC screening exam. On the other hand, the perception of social pressure was less relevant than the other two cognitive predictors. Thus, for our participants, internal motivations (e.g., preserving health) might affect the decision to screen for CRC more than external motivations (e.g., attending screening to reassure family members).

Among the four emotional barriers, faecal disgust was the main barrier to CRC screening. In contrast, embarrassment and fear of the outcome did not hinder CRC screening intention. Thus, our findings supported hypothesis 3a, but not hypotheses 3b and 3c. While a negative association of faecal disgust with CRC screening intention is not novel (see Chapter 2), the present finding confirms that this emotion exerts a relevant role in the CRC screening context even after controlling for the effects of cognitive factors, whereas insertion disgust

only predicted intention to screen before the predictors included in the theory of planned behaviour were entered in the regression model. Therefore, hypothesis 3d was not supported.

The findings about embarrassment and insertion disgust suggest that the potential violation of social taboos (associated with violation of the body envelope and intimacy) may play a negligible role in hampering screening intention, even though we cannot exclude the fact that these emotions have a direct effect on CRC screening behaviour, unmediated by intention (Klasko-Foster et al., 2020).

The null effect of fear of the outcome contrasts with the findings of Study 1 (see Chapter 3). However, our previous study analysed the association between fear of the outcome and past screening behaviour (rather than intention to attend in the future). Thus, it is possible that fear of the outcome has a direct and unmediated effect on CRC screening behaviour (Lawton et al., 2009), or that adherents in Study 1 expressed a lower fear of the outcome because receiving negative FOBT or FIT results in the past (i.e., the stool sample did not present occult blood) had a reassuring effect. It is worth noting that, also in the current study, participants who screened in the past for CRC expressed a lower fear of the outcome (M = 1.90, SD = .89) than the other participants (M = 2.32, SD = .96), t (212) = 3.27, $p < .001$.

Our last purpose was to explore whether our intervention moderated the impact of cognitions and emotions on CRC screening intention. The impact of attitudes (research question 1) and subjective norms on CRC screening (research question 2) was the same for all the participants, regardless of the letter they read. However, we found that for those participants who read the revised letter, the association between PBC and intention to screen was stronger than that of participants having read the original letter (research question 3). One explanation might be that the kit instructions of the revised letter were easier to follow because there were fewer distractors (Perone et al., 2021). Disgusting cues, such as the words

associated with faeces and blood, capture selective attention (Perone et al., 2021). Indeed, the allocation of limited attention resources prioritises threats (Perone et al., 2021), and detecting disgusting cues provokes a vicious circle that focuses people's attention on finding and inspecting other disgusting evokers (Perone et al., 2021). In other words, the more disgusting stimuli there are in a text or in an environment, the more people will allocate their attention to these stimuli and the visual research of these stimuli, rather than trying to ignore them and focusing on other aspects of that text (e.g., the ease of completing the described task) or environment. Reducing the number of disgusting cues leaves more attentional resources for interpreting the text. Being the attention less shared with negative emotions, this could have improved the focus on kit instructions and on how easy it is to attend CRC screening. Indeed, the faecal disgust expressed by participants who read the revised (vs original letter) was not associated with CRC screening intention (Table 13), even though this difference did not reach conventional statistical significance (research question 4).

Our findings also seem to support the idea that low-intensity stimuli allow readers to adopt a detached perspective and focus on cognitive and positive aspects of a situation, rather than on emotional barriers (Sheppes et al., 2014). When emotions are elicited, individuals can react with adaptive (i.e., beneficial) or maladaptive (i.e., detrimental) behaviours. Stimuli associated with high-intensity emotions are more likely to activate avoidance (i.e., the stimulus is removed from the environment or people's focus of attention, thus it stops eliciting emotions), whereas low-intensity stimuli are easier (vs high-intensity stimuli) to reappraise by adopting a detached (i.e., non-emotional) perspective (Sheeran et al., 2018).

Therefore, high-intensity stimuli likely generate the spiral described above (i.e., attention is dedicated uniquely to emotional barriers). In contrast, low-intensity disgusting cues are easier to control, thus attention resources can be allocated to the cognitive benefits of engaging in a behaviour (e.g., on the ease of using the kit at home rather than in a health care

facility).

Finally, we found no interaction between the experimental condition and the other three emotions (research questions 5–7). It should be noted that embarrassment, fear of the outcome and insertion disgust already had no effect on CRC screening. Thus, adopting a detached perspective could no be furtherly beneficial, whereas it could help participants in facing a significant emotional barrier (i.e., disgust). Another reason could be that the tested intervention was more pertinent for faecal disgust. However, mentioning the contact with faeces can elicit a feeling of shame, and the references to occult blood might increase the salience of fear towards a possible positive result and the subsequent colonoscopy. Thus, we could expect our intervention to affect these negative affects.

Several limitations inherent in Study 2 cause us to issue cautionary notes. The most prominent potential limitation is the lack of behavioural outcomes. We are aware of the gap between intention and behaviour (Rhodes & de Bruijn, 2013), a gap that in the CRC screening context often sees intention expression being affected by ceiling effects (O'Carroll et al., 2015), as in the present study, probably due to social desirability. However, our choice to rely on intention could be justified by some reasons. First, several studies have shown that the intention to screen is strongly associated with actual behaviour (e.g., Chambers, O'Carroll, et al., 2016; Conner et al., 2015; Cooke & French, 2008). Second, our systematic review highlighted that this is a common choice in studies assessing the effects of emotions in the CRC screening context (see Chapter 2, *Results*, *The systematic review*). Third, our meta-analysis showed that disgust affects in the same way both CRC screening intention and attendance (see Chapter 2, *Results*, *The meta-analysis*).

The second limitation is relying exclusively on self-reported measures. It is true that it remains difficult to understand whether the self-reports provided by participants correspond to their actual feelings or behaviours, or if they were reporting feelings and goals that they

believed were the socially desirable answers. In particular, to capture emotions elicited by invitation to CRC screening, future studies could take advantage of measures less affected by social desirability, such as automatic facial expression recognition systems, using software primarily programmed to code facial displays of fear, disgust, anger, surprise, happiness, and sadness (Samadiani et al., 2019).

Other limitations concern the nature of the sample. We adopted convenience sampling, and participants were not actually invited to take part in screening. This can result in less engagement (McGregor et al., 2016) and negatively impact the study's ecological validity. It is likely that those who agreed to participate in our study were also people already interested in CRC screening and those having a positive perception of this preventive exam. It should be noted that participant dropout was relatively high (32%). The same barriers to CRC screening participation might have prevented completing the study, which might explain another limitation: average scores of intention to screen and theory of planned behaviour constructs were positively skewed, while average emotion scores were below the scale mid-point, and predictor variance was low. This resulted in amplified standard errors, thus our findings may include false negatives (i.e., the absence of an effect that would be present in the target population). In addition, the confidence intervals for the effects of PBC were quite large, and may suggest that the sample does not provide a precise representation of the population mean, because of the skewed distributions in the variables or a small sample size. Thus, the present findings cannot be generalised without further studies and should be considered with caution. In the subsequent studies, we tried to fix the ceiling effect of intention items. In particular, in study 3, we will try to assess intention in a way that could prevent such an issue (see Chapter 5).

Some limitations of the procedure should also be carefully considered. Because of our study's cross-sectional design concerning predictors of screening intention, we cannot draw

causal conclusions about its results. Finally, unlike Study 1, in Study 2 we provided no education about CRC screening, and we did not assess CRC screening knowledge. The only information about the local CRC screening programme (including detailed instructions for the faecal collection kit) was in the letter. Thus, participants without CRC screening experience might have had fewer cues to answer our questions. However, we believe that this limitation was overcome by controlling for prior CRC screening experience in the analyses.

While acknowledging potential weaknesses, these findings are nevertheless important for a variety of reasons. This is the first study to assess the impact of disgust, embarrassment, and fear on CRC screening together with the predictors included in the theory of planned behaviour. As Conner et al. (2015) suggested, research on health behaviours should consider both cognitive and affective predictors of action. Although such research traditionally focused on anticipated regret, Hunkin et al. (2020)'s findings showed that this affect may present multicollinearity issues with the theory of planned behaviour constructs. In addition, Reynolds et al. (2018) advised taking into account multiple affects associated with CRC screening to avoid confounding effects due to the co-variation of emotions. Our findings showed that the affective barriers to CRC screening (i.e., disgust, embarrassment, and fear; Reynolds et al., 2018) are a valid alternative to anticipated regret for studying cognitive and emotional predictors of intention to screen.

Studying together affective and cognitive factors boosting or hindering CRC screening intention may contribute to understanding the decision to get screened or not in a novel way. For instance, our findings about the conjoint effects of embarrassment, insertion disgust, and subjective norms (all non-significant also in the logistic regressions by groups) provide more insight into this health behaviour than studying these constructs separately. Together, they suggest that, for our participants, CRC screening might constitute a private matter and a choice that is weakly or not affected by social pressure.

We found that faecal disgust is a significant barrier to CRC screening intention, above and beyond beliefs about screening utility, acceptance and self-effectiveness (i.e., cognitive predictors). Thus, campaigns and public policies designed to promote CRC screening should acknowledge disgust as a barrier to attendance and consider alternative approaches to screening addressed to individuals who refrain from performing faecal collection tests (e.g., Romero-Vázquez et al., 2014; Wang et al., 2018).

Finally, to the best of our knowledge, no prior study has investigated how to improve the wording of informative or promotional material about CRC screening. Although our intervention on the invitation letter did not really improve CRC screening intention, this study makes a practical contribution to the design of pro-CRC screening campaigns by showing that a text with fewer references to bodily waste can make PBC more salient, thereby increasing its positive effect on CRC screening participation. In line with this reasoning, the findings of Study 2 will help us in designing the interventions tested in Studies 3 and 4, where the excessive repetition of bodily waste expressions will be avoided.

Conclusions

Our findings suggest that public campaigns should point to boosting patients' positive attitudes towards CRC screening and their own PBC. For instance, campaigns could highlight CRC screening benefits and report first-person narratives emphasising successful screening experiences, which may increase patients' sense of self-efficacy (Bandura, 1982). In Study 3, we will test an intervention levering affective and/or cognitive attitudes towards CRC screening, whereas in Study 4 we will test whether a narrative video can boost participants' PBC.

Finally, we suggest avoiding bodily waste expressions as much as possible. For those participants who read the revised letter, disgust was not a barrier to CRC screening intention, and their PBC had a great impact on intention to screen. This intervention might have

enhanced the likelihood of facing the emotional barriers to CRC screening with reappraisal, an emotion regulation strategy consisting of moving the attentional focus from the negative aspects (e.g., disgust) to the positive aspects of a situation (e.g., the easiness of using the kit). The role of emotion regulation strategies in the CRC screening context will be described and analysed in the next chapter.

Chapter 5

Study 3: Facing the emotional barriers to CRC screening.

An experiment on the matching effect

Introduction

Choosing to attend CRC screening might seem an easy decision, because screening can reduce the incidence and mortality of this malignancy (Kaminski et al., 2020). However, as described in the previous chapters, much evidence confirmed that negative emotions associated with the screening procedure (i.e., disgust and embarrassment) or outcome (i.e., fear) can hinder the attendance of faecal collection and endoscopic tests. For instance, our meta-analysis and Study 2 showed that disgust associated with dealing with faeces is a barrier to CRC screening intention formation. Study 1 showed that fear towards a potential cancer diagnosis elicits avoidance in endoscopic medical contexts.

The impact of negative emotions on behavioural intention and subsequent actions can vary as a function of individual differences. For example, the impact of cancer worry on the avoidance of doctors increases when respondents feel at a high risk of developing cancer, because only after a medical diagnosis individuals have to realise to be ill (Persoskie et al., 2014). Conversely, when patients feel at low risk of developing cancer, they anticipate a positive outcome from a medical examination (e.g., attending screening). Thus, they positively perceive seeking medical advice (Persoskie et al., 2014). Another example concerns trait disgust: people with greater dispositional sensitivities, such as people who are perceiving their health as vulnerable (Neuberg et al., 2011), can be less prone to attend screenings because of their negative emotions if compared to less sensitive persons, because such dispositional emotional tendencies can activate automatic reactions to certain stimuli (Reynolds, McCambridge, et al., 2014). Thus, for people with high trait disgust, feeling

disgusted towards the CRC screening procedure automatically induces an avoidant response.

Less attention has been devoted to the emotion regulation strategies that people activate to cope with their affective states, and how these regulation strategies spill over in the CRC screening context, also in relation to people's age (Carstensen et al., 2006). This issue merits consideration since persuasive messages could address emotion regulation strategies with the purpose of neutralising the effects of negative emotions on behaviour as a function of the target's life stage.

To address this gap in the literature, in Study 3 we will investigate whether: a) the activation of different emotion regulation strategies is associated with age; b) emotion regulation strategies can moderate the effect of emotional barriers on CRC screening intention; c) matching the content of a message promoting CRC screening with citizens' preferred emotion regulation strategy can boost CRC screening intention.

Emotion regulation strategies

Research on health behaviours and affects relatively neglected individuals' efforts to alter an emotional response, namely affect regulation (Sheeran et al., 2018). Emotion regulation strategies influence which emotions are experienced and when, their intensity and expression (Gross, 1998). Affect regulation can influence not only which emotions will be experienced after the exposure to a stimulus, but also the *anticipated* affects associated with thinking about that stimulus, and subsequently the impact that anticipated affects will have on health behaviours (Sheeran et al., 2018).

Emotion regulation is not an automatic process. To effectively regulate emotions, individuals should first identify the need to regulate affect, then choose which strategy to employ to regulate emotions, and finally implement the chosen strategy (Sheeran et al., 2018).

The Affect Regulation in Cancer framework (Kangas & Gross, 2020), derived from

the process model of emotion regulation (Gross, 1998), identifies five families of regulatory strategies: situation selection, situation modification, attentional deployment, cognitive change, and response modulation. Situation selection implies selecting to approach or avoid a given experience according to its anticipated emotional outcome: people typically engage in situations that are expected to increase positive affective states and avoid experiences for which they expect negative emotions (Kangas & Gross, 2020). For instance, it is more likely that someone attends CRC screening if they anticipate that it would be relieving (McGregor et al., 2015). Situation modification operates on an event to change its emotional impact (e.g., seeking social support to face that event; Kangas & Gross, 2020). Attentional deployment is another strategy that can lead to approaching or avoiding a stimulus, as it implies directing the focus of one's attention away from or towards that stimulus (e.g., distraction is a typical strategy that downregulates negative emotions; Kangas & Gross, 2020). Cognitive change, also called reappraisal (Kangas & Gross, 2020), modifies the mental representation of a situation and, subsequently, its emotional impact (John & Gross, 2004), for example placing more importance on the benefits of a medical procedure than on the pain it might involve. In other words, cognitive change involves changing the interpretation of the stimulus, sometimes adopting a detached perspective (Sheeran et al., 2018). Finally, response modulation acts on the physical and physiological expression of emotions (e.g., suppressing a grimace; Kangas & Gross, 2020).

Two of these strategies—reappraisal and situation selection—are particularly important for the present case, because they both occur *before* the emotional response fully activates and changes one's behaviour (John & Gross, 2004). Among the five families, reappraisal has proven the most effective in reducing the impact of emotions on the motivation to take protective actions against a health threat (Ferrer et al., 2018). In the context of CRC screening, people who tend to reappraise might move their attention away

from the *emotional barriers* associated with the screening procedure and its potential outcomes (Reynolds et al., 2018) to CRC screening *instrumental and affective benefits*, such as efficacy and relief (Ben Natan et al., 2019; Yoo et al., 2013). On the other hand, people who tend to downregulate negative affective states with avoidance (i.e., situation selection) might be more likely to delay unpleasant medical procedures such as CRC screening (Kangas & Gross, 2020).

Considering that the CRC screening target only includes people over 50 years of age, and that the preference for situation selection can increase with age (Livingstone & Isaacowitz, 2015; Rovenpor et al., 2013; Sands & Isaacowitz, 2017), it seems reasonable to expect a link between these variables in such a context. Indeed, although this pattern is not universal (Fung et al., 2008), as it was observed predominantly in American samples, also Italian older adults tend to avoid negative information, in line with the situation selection strategy of emotion regulation (Fairfield et al., 2022). This tendency has been explained in the framework of the socioemotional selectivity theory (Carstensen et al., 2006): older adults' preference for situation selection is due to the perception of a limited future time horizon, which motivates older adults to engage only in pleasant situations (Carstensen & Hershfield, 2021). On the other hand, younger adults' perception of a longer time horizon encourages them to have multiple and long-term goals and motivates them to sacrifice their current emotional well-being for this goal pursuit (Livingstone & Isaacowitz, 2015), which is consistent with the reappraisal strategy.

The age-related preference for a specific emotion regulation strategy has consequences on how information is processed and which type of communication can be effective: older adults dedicate more attention to emotionally (vs cognitively) relevant information (Carstensen et al., 2006; Mikels et al., 2010), whereas younger adults tend to seek more information than older adults (Livingstone & Isaacowitz, 2021) and prefer rational

appeals (Carstensen & Hershfield, 2021; Mikels et al., 2010). The communication promoting CRC screening should acknowledge these differences.

Matching messages promoting CRC screening with individual characteristics

Research on persuasive health communication shows that tailoring messages to individual characteristics can capture recipients' attention, boost personal relevance, and increase the chances of a behavioural response in line with the message content (Joyal-Desmarais et al., 2022; Noar et al., 2007; Rimer & Kreuter, 2006; C. J. Wilson et al., 2015).

In the context of screening, Williams-Piehota et al. (2005) showed that messages about mammography could be successfully tailored to *monitors'* and *blunters'* coping styles, which differ for the type and the amount of health information the receiver desires, for the reaction to this information and subsequent behavioural response (Williams-Piehota et al., 2005). The blunter coping style has points in common with the situation selection regulation strategy cited above, because people who use a blunter coping strategy prefer to avoid health threatening information. On the contrary, monitors (i.e., people who have a monitor coping style) actively look for health information even if it distresses them (Williams-Piehota et al., 2005). Thus, it is quite different from the reappraisal strategy: for monitors, threat and distress are motivators of actions, while reappraisal consists in reducing the perception of menace, and in performing a behaviour only after this self-reassurance.

Although coping styles have some aspects in common with emotion regulation strategies, they are responses to stress (Compas et al., 2014). Therefore, to investigate how people face a wider range of stimuli and emotions, such as disgust and embarrassment, it would be more suitable to consider emotion regulation strategies (Compas et al., 2014). However, to the best of our knowledge, no study has investigated how emotion regulation strategies and emotional barriers interact in the CRC screening context, nor how they might affect communication efficacy. The current study aims to fill this gap.

The present study

First, in line with the framework of the socioemotional selectivity theory (Carstensen et al., 2006), we expect older participants to prefer situation selection (hypothesis 1a) and younger adults to prefer a reappraisal strategy to regulate their emotions (hypothesis 1b).

Second, reappraisal might lead to attending CRC screening *despite* the emotional barriers associated with its procedure and outcomes, whereas situation selection may cause CRC screening avoidance *because of* these negative emotions. Therefore, we expect a moderation effect of emotional regulation strategy on the association between disgust (hypothesis 2a), embarrassment (hypothesis 2b) and fear (hypothesis 2c) and CRC screening intention, with people who prefer reappraisal being less affected by these emotional barriers.

Third, since matching persuasive messages to the target's characteristics can boost screening attendance (Myers et al., 2007; Williams-Piehota et al., 2005), and considering the above-mentioned effects of preferring a specific emotion regulation strategy on information processing, we also expect to find an interaction between the type of lever included in the message and participant's preferred emotion regulation strategy: the cognitive lever (vs the affective or no lever) will be associated with a higher intention to attend screening for receivers who prefer reappraisal (hypothesis 3a); in comparison, the affective lever (vs the cognitive or no lever) would be associated with a higher intention to attend screening for those who prefer situation selection (hypothesis 3b).

Finally, considering that one of the conclusions of Study 2 was that messages promoting CRC screening should boost citizen's positive attitudes towards these tests, in the present study we expect that the message giving salience to affective (hypothesis 4a) or cognitive (hypothesis 4b) attitudes of CRC screening, or to both types of attitudes (hypothesis 4c) will have a main effect on the outcome and foster CRC screening intention (vs a control message without any affective or cognitive levers; see Appendix E).

Method

Participants

As in Study 2, we aimed to include people over 40 years of age (i.e., near the age of the CRC screening target) who had no previous history of CRC, but we expanded the location criterium to living in Italy (likewise in Study 1) rather than in the city of Bologna.

Participants were recruited through snowball sampling using advertisements on social media. To estimate the minimum sample size, we conducted an a priori power analysis (Faul et al., 2007). Following Capasso et al. (2021), who tested the efficacy of several messages on COVID-19 vaccination intention, we considered a small-sized effect ($\eta^2 = 0.04$), $\alpha = .05$ and power = .80. This analysis indicated a minimum sample size of 100 participants per condition. Thus, we aimed to recruit at least 400 participants.

A total of 2422 people accessed the online questionnaire over three months (18 May 2022–31 July 2022). Of these, 1215 participants immediately dropped out, 222 participants dropped out before reading the message, and 93 participants dropped out while reading it. In addition, 34 participants did not consent to participate; 89 participants were excluded because they did not meet our inclusion criteria (46 participants were not over 40 years old, four respondents did not live in Italy, 39 participants reported a previous CRC diagnosis). Another 15 participants were excluded from data analyses because they did not perform the ranking task (see below). Three participants were excluded because they did not complete any item measuring emotions. Finally, 268 participants were excluded because they failed the manipulation check.

The final sample consisted of 483 participants (78% women) who were randomly assigned to one of the four experimental conditions. After exclusions, 112 participants read the affective message, 130 participants read the cognitive message, 137 participants read the combined message (both levers), and 104 participants read the control message (no lever).

Participants' age ranged from 40 to 84 years old (M = 51.09, SD = 8.33); 53.4% of participants had a senior high-school leaving qualification, and 30.4% had a university-level degree; 58.8% of the participants were employed, and 19.5% were unemployed or retired; less than half of the sample (41.6%) had received at least one formal invitation to screen (e.g., a screening invitation letter from the local health care authority) and, among these, 84.6% reported to having attended CRC screening at least once. Respondents in the four experimental groups did not differ in age, gender, education, employment or screening experience (Table 14).

Table 14.

Study 3. Characteristics of participants in each condition and between-group differences.

	Affective message *n* (%)	Cognitive message *n* (%)	Combined message *n* (%)	Control message *n* (%)	Between-group differences
Gender					χ^2 (3) = 4.76, p = .190
Female	96 (86%)	99 (76%)	104 (76%)	79 (76%)	
Male	16 (14%)	31 (24%)	33 (24%)	25 (24%)	
Education					χ^2 (9) = 8.50, p = .484
Compulsory education	3 (3%)	14 (11%)	12 (9%)	6 (6%)	
High school	58 (52%)	66 (51%)	76 (55%)	58 (56%)	
University	39 (35%)	39 (30%)	37 (27%)	32 (31%)	
Post-graduate education	12 (10%)	11 (8%)	12 (9%)	8 (7%)	
Employment					χ^2 (12) = 12.53, p = .404
Employee	67 (60%)	81 (62%)	75 (55%)	61 (59%)	
Self-employed	22 (20%)	17 (13%)	20 (15%)	10 (10%)	
Unemployed	5 (5%)	8 (6%)	13 (9%)	14 (13%)	
Retired	12 (10%)	15 (12%)	16 (12%)	11 (11%)	
Other	6 (5%)	9 (7%)	13 (9%)	8 (7%)	
CRC screening experience					χ^2 (6) = 5.25, p = .512
Refused to screen	3 (3%)	8 (6%)	12 (9%)	8 (7%)	
Never invited	64 (57%)	66 (51%)	65 (48%)	54 (52%)	
Attended screening	45 (40%)	56 (43%)	59 (43%)	42 (41%)	

Note. Participants' mean age varied from 50 years old (SD = 7.86) in the affective condition to 52 years old (SD = 8.63) in the cognitive condition. The difference between the four conditions was not statistically significant, F (3, 432) = .70, p = .553.

Procedure

This study was conducted in collaboration with a research team from the University of Naples Federico II (Italy). The project was approved by the University of Parma Research Ethics Board (Protocol number 0107278).

We asked participants to fill in an online questionnaire anonymously. Each participant was randomly assigned to one of the four conditions through a link or a QR code. The survey (Appendix F) was the same for all the conditions and differed only for the message shown. Participants were blind to the hypotheses and experimental conditions. The survey started with a general description of the experiment, and participants were asked to give informed consent to participation and data treatment. The first questions established whether participants met our inclusion criteria, recorded sociodemographic data, and assessed participants' orientation towards prevention (see below). Then we assessed participants' preference for reappraisal or situation selection with a ranking task. Afterwards, we briefly explained what CRC screening is, measured past attendance, and exposed participants to an experimental stimulus (see Appendix E) for a total lapse of approximately 10 seconds, knowing they would have to answer some questions about it later. Specifically, participants read one of the four manipulated messages: a message with a cognitive lever which was intended to match with the reappraisal-associated need for rational appeals; a reassuring message with an affective lever which was intended to match with situation selection-associated need for emotionally relevant information; a combined message with both levers and intended to match with both strategies; a control message with no lever and not intended to match with any strategy.

Each message stated that attending CRC screening was free of charge and invited the reader to pick up the faecal collection kit. The cognitive lever added: "Attending CRC screening is useful and important for early detection and to improve your chances of

defeating the disease". The affective lever added the sentence: "Finding out that you are healthy, after attending screening, will make you feel relieved and peaceful". Messages were presented in a graphic format inspired by images usually shared on the official Facebook page of the Italian Ministry of Health. No explicit reference to the source (neither in a written form nor by including the logo) was provided. We decided to proceed this way in light of the literature showing that graphic messages can enhance the understanding of the information conveyed within health messages (e.g., Cox et al., 2014), as they appear to be easier to comprehend and more emotionally engaging (Cox et al., 2010). The intervention was designed based on a recent study (Capasso et al., 2021), which aimed to test the effects of anticipated affect messages on the intention to get vaccinated against COVID-19, and it was implemented following guidelines for affect-based interventions (Conner et al., 2020).

The effectiveness of the manipulation was checked with an item presented just after the stimulus exposure, asking participants to remember which words were included in the message. Then, participants were invited to imagine they received an invitation to screen for CRC (regardless of age) containing the previously-read message. Consequently, they rated their emotions towards bowel screening and their CRC screening intention. Finally, the debriefing explained the purpose of the study and, to guarantee equal treatment, participants had the opportunity to read the messages they had not seen.

Measures

Emotion regulation strategies

Six sentences describing behaviours consistent with *reappraisal* and *situation selection* were presented to participants. We asked that they rank them from 1, "the most representative of your typical behaviour", to 6, "the least representative of your typical behaviour". Sentences were presented in random order. Three sentences operationalizing reappraisal (i.e., "When I want to feel less negative emotion (such as sadness or anger), I

change what I'm thinking about"; "When I want to feel more positive emotion (such as joy or amusement), I change what I'm thinking about"; "I control my emotions by changing the way I think about the situation I'm in") were derived from the Emotion Regulation Questionnaire (Gross & John, 2003) and were adapted for the Italian context by Balzarotti et al. (2010). The other three sentences concerned situation selection (i.e., "I shy away from situations that might upset me"; "I select activities that help me to feel good"; "I steer clear of people who put me in a bad mood") and were adapted from Webb et al. (2018). Following the procedure by Osborne et al. (2018), reappraisal ranks were converted to scores so that ranks 1, 2, 3, 4, 5 and 6 received corresponding scores of 6, 5, 4, 3, 2, and 1. A mean was obtained from the three items of the reappraisal strategy, being the score relative to the situation selection complementary. Therefore, a higher score indicates a greater preference for reappraisal and a lower score indicates a greater preference for situation selection.

Negative emotions associated with CRC screening

Negative emotions were measured using the reduced version of the EBBS scale described in Chapter 3. Participants rated the likelihood of experiencing each emotion on a 5-point Likert scale from 1 (not likely at all) to 5 (very likely). Four items measured *faecal disgust* ($\alpha = .90$, e.g., "Collecting a sample of my faeces on a stick would be disgusting"), three measured *embarrassment* ($\alpha = .89$, e.g., "Delivering the sample of faeces would be embarrassing"), and three measured *fear of the outcome* ($\alpha = .71$, e.g., "I would worry that this test might find something wrong with me"). Higher scores corresponded to a greater likelihood of experiencing negative emotions elicited by CRC screening. Mean scores were calculated for each subscale.

Intention to screen

As anticipated in the previous chapter, in Study 3 we strove to avoid ceiling effects for the measure of intention. Therefore, we measured CRC screening intention in two

different ways: one item asked participants when they would screen after reading the message (*never*, *within a week*, *a month*, *a year* or *willing to get screened but procrastinating*), and five items assessed, on a 5-point Likert scale, their willingness to perform every screening step (collecting the kit, collecting the sample, etc.).

Control variables

Orientation towards prevention was assessed with two items: "In general, how careful would you say you are in the prevention of possible diseases?" and "In general, how interested would you say you are in disease prevention programmes?". Scores were expressed on a 5-point Likert scale from 1 (*not much careful/interested*) to 5 (*very careful/interested)*. A mean score was calculated ($r = .56$, $p < .001$). *Screening experience* was assessed with two items asking the participant whether they had ever received a formal invitation to screen and whether they had ever attended. A single score was calculated with non-attenders ("−1", people who received a formal invitation to screen but refused to), never-invited ("0", people who were never invited to screen), and attendees ("1", people who attended CRC screening at least once).

Results

Preliminary analyses

The single item assessing screening delay after receiving an invitation to screen (see *Measures)* was less affected by ceiling effects ($M = 4.04$, $SD = 1.07$, skewness = −1.00) than the five items assessing the intention to engage in every screening step ($M \geq 4.36$, $SD \leq 0.93$, skewness ≤ −1.49). Furthermore, the former measure of intention was strongly correlated to the averaged measure of those five intention items ($r = .52$, $p \leq .001$). Therefore, establishing intention to screen with the amount of time participants would wait to screen was considered a reliable measure and adopted as the only outcome in Study 3.

Table 15 reports descriptive statistics and correlations. As in Studies 1 and 2, CRC

screening was mainly associated with the fear towards a potential cancer diagnosis, followed by a moderate disgust towards dealing with faeces and, lastly, embarrassment.

Respondents' gender (t (150.93) = 0.14, p = .883), education (r = –.09, p = .057) and employment (F (4, 475) = 2.08, p = .083) did not affect the outcome and were not further considered. Respondents' age, prior CRC screening experience and orientation towards prevention were significantly associated with CRC screening intention and, as such, were considered covariates in the subsequent moderated regression analysis (Table 15).

Main analyses

We first investigated whether preferences for reappraisal and situation selection were related to participants' age. We expected a negative correlation between the emotion regulation strategy score and age, meaning that older adults prefer situation selection (hypothesis 1a), whereas younger adults prefer reappraisal (hypothesis 1b). We found the opposite, as the two variables were positively correlated (Table 15). For descriptive purposes, we ran a t-test comparing the effects of being younger or older than 50 years (i.e., being younger than the CRC screening target vs being part of the screening target) on the emotion regulation strategy score. The difference between the two age groups was significant (t (433) = –2.81, p = .005) and confirmed that older adults showed a slight preference for reappraisal (M = 3.66, SD = .93) and younger adults showed a slight preference for situation selection (M = 3.41, SD = .94), although both preferences were near the scale midpoint (M = 3.50).

Then, to test whether reappraisal reduced the impact of disgust, embarrassment and fear on CRC screening intention (hypotheses 2a–2c), whether this emotion regulation strategy interacted with being exposed to affective and/or cognitive arguments promoting CRC screening (hypotheses 3a and 3b), and whether the messages had a main effect on CRC screening intention (hypotheses 4a–4c), net of respondents' age, prior CRC screening experience and orientation towards prevention, we ran a moderated regression analysis.

Table 15.

Study 3. Means, Standard Deviations, and Correlations between variables.

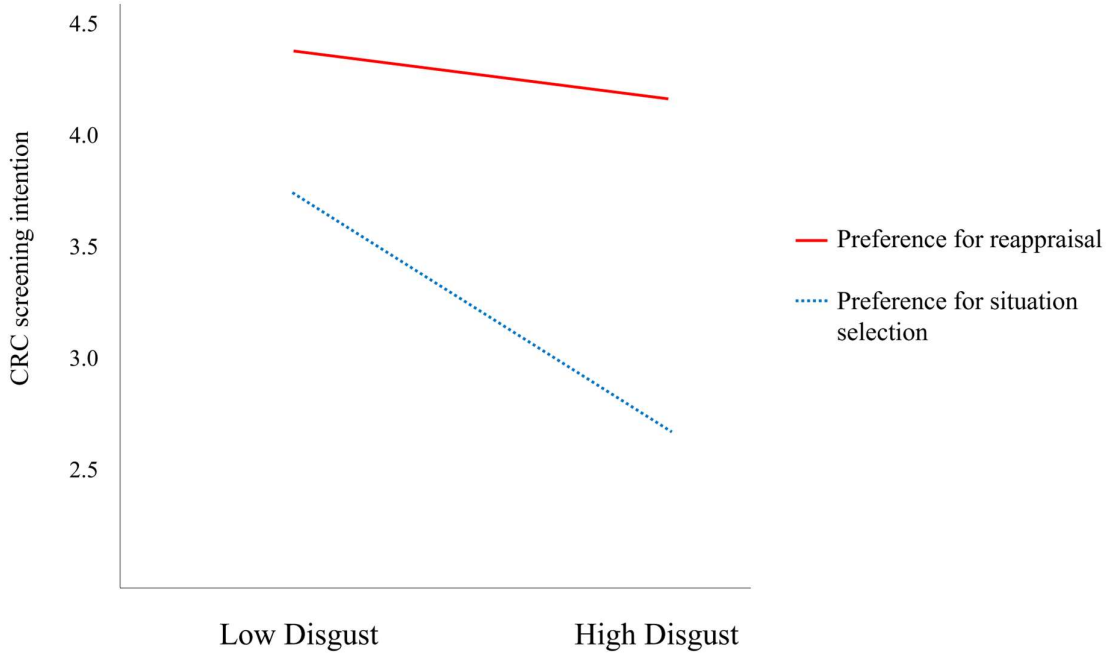
	M (*SD*)	1	2	3	4	5	6	7	8	9
1. Age	51.09 (8.33)									
2. Screening Experience	–	.50**								
3. Orientation towards prevention	3.84 (0.95)	.26**	.32**							
4. Emotion regulation strategy	3.55 (0.94)	.12**	.06	.01						
5. Cognitive lever	–	.06	.01	.04	.02					
6. Affective lever	–	–.02	.01	.03	.02	–.01				
7. Disgust	1.44 (0.89)	–.06	–.18**	–.12**	–.02	.03	–.03			
8. Embarrassment	1.36 (0.85)	–.08	–.23**	–.14**	.01	–.05	.01	.62**		
9. Fear	2.32 (1.01)	–.03	–.15**	–.05	–.08	–.05	–.02	.31**	.29**	
10. Screening intention	4.04 (1.07)	.10*	.19**	.34**	.07	.09	.06	–.19**	–.15**	–.05

Note. * $p \leq .05$, ** $p \leq .01$

Focal predictors (i.e., disgust, embarrassment and fear) and the moderator (i.e., emotion regulation strategy) were mean-centred to facilitate results interpretation. Experimental conditions were treated as categorical variables, with the control message as reference category. The analysis yielded a main negative effect of disgust (b = –.28, β = –.23, SE = .09, p = .001), and this emotion significantly interacted with preferring a reappraisal regulation strategy (b = .21, β = .14, SE = .10, p = .038), thus confirming hypothesis 2a. Single slopes analyses (Figure 7) showed that disgust was a screening deterrent only for those participants who preferred situation selection (b = –0.48, SE = .14, p < .001) rather than reappraisal (b = –0.09, SE = .12, p = .451).

Figure 7.

Single slope analyses. Effect of disgust on CRC screening intention as a function of preferring situation selection versus reappraisal.



In comparison, fear and embarrassment were not associated with CRC screening intention (fear, b = .01, β = .01, SE = .05 p = .849; embarrassment, b = .08, β = .06, SE = .10, p = .419), and did not interact with the emotion regulation strategy (fear*reappraisal,

b = –.07, β = –.06, *SE* = .05 *p* = .189; embarrassment*reappraisal, *b* = –.14, β = –.09, *SE* = .11, *p* = .194). Hence, our findings did not support hypotheses 2b and 2c.

No matching effect emerged from the interactions between preference for reappraisal and experimental conditions (affective condition*reappraisal, *b* = .03, β = .01, *SE* = .15 *p* = .832; cognitive condition*reappraisal, *b* = –.03, β = –.01, *SE* = .14 *p* = .832; combined condition*reappraisal, *b* = .03, β = .02, *SE* = .14 *p* = .818). Thus, we reject hypotheses 3a and 3b. Finally, the affective (*b* = .16, β = .06, *SE* = .14 *p* = .258) and cognitive (*b* = .22, β = .09, *SE* = .14 *p* = .107) messages did not boost CRC screening intention, but we found a main positive effect of reading the combined message (*b* = .27, β = .11, *SE* = .13 *p* = .049) versus the control message. Therefore, we rejected hypotheses 4a and 4b, but our findings supported hypothesis 4c.

Discussion

The present study aimed to investigate the role of two emotion regulation strategies, situation selection and reappraisal, in the CRC screening context. The research examined whether preferring one of the two strategies depends on people's age, whether a tendency to prefer reappraisal over situation selection might help individuals to cope with emotional barriers to CRC screening and, finally, we investigated the potential implications of emotion regulation strategies for designing effective persuasive communication of CRC screening.

We observed age-related differences in the preference for one strategy over the other, but in the opposite direction of what was expected (hypotheses 1a and 1b): older participants preferred a reappraisal strategy, while younger participants preferred situation selection. Nevertheless, it should be noted that the correlation between age and the emotion regulation score can be interpreted as a small effect (Cohen, 1988). Indeed, the comparison of two age groups (i.e., participants younger than 50 years old vs participants older than 50 years old) showed that both scores for emotion regulation strategy were close to the scale midpoint,

which means that such preferences were relatively mild, likely because the two groups had a similar age.

Our hypotheses on the age-related preference for an emotion regulation strategy over the other were based on the motivational principles of the socioemotional selectivity theory (Carstensen et al., 2006): younger adults are more motivated than older adults in pursuing long-term goals, thus they are more willing to experience immediate negative affects in exchange of enduring benefits (Livingstone & Isaacowitz, 2015). However, the present unexpected findings might be explained by relying on the age-related positivity and negativity effect: some studies showed that the tendency to focus more attention on positive or negative information is actually associated with age but, for younger adults, the focus and the recollection of negative emotions prevail (Masumoto et al., 2016; Reinhardt & Rossmann, 2021; Sands et al., 2018). In contrast, the focus and recollection of positive aspects prevail for older adults (Masumoto et al., 2016; Reinhardt & Rossmann, 2021; Sands et at., 2018), and older adults tend to use more tactics than younger adults to make a situation positive (Livingstone & Isaacowitz, 2021). Thus, the focus of older adults on positive aspects of a situation might favour the adoption of reappraisal strategies, because they will ignore negative emotions and give greater value to the benefits of engaging in a behaviour. Conversely, younger adults might interpret the same situation as more demanding and evaluate costs as greater than the behaviour benefits, thus choosing avoidance or inaction.

A similar explanation might be the different reactiveness to stressors of older and younger adults—younger adults are more affected by negative emotional inputs than older adults, whereas older adults' higher resistance to stressors allows them to perceive threatening stimuli with less intensity than younger adults (Neupert et al., 2007; Wolfe & Isaacowitz, 2022). The emotional intensity of a stimulus affects how easy it is to reappraise that stimulus, with low-intensity stimuli being easier to reappraise than high-intensity stimuli

(Matthews et al., 2021; Ortner et al., 2021; G. Young & Suri, 2020). Thus younger adults' higher perceived arousal may increase the chances of using avoidant strategies (i.e., selecting to not engage with a situation), whereas older adults anticipate the same situation as less emotionally intense and, as a consequence, may be more likely to adopt a reappraisal strategy.

After examining a potential determinant of the preference for reappraisal or situational selection, we analysed how these regulation strategies may spill over in the CRC screening context. Our findings showed that disgust is a significant emotional deterrent of CRC screening intention, but only for those participants who expressed a preference towards situation selection (i.e., approaching or avoiding a situation according to its emotional outcome). On the contrary, the effect of disgust on CRC screening intention was neutralised by adopting a reappraisal regulation strategy, that is focusing on the silver linings of potentially negative situations. These results were partially in line with our expectations, as they supported hypothesis 2a but not hypotheses 2b and 2c: we expected to find the same interaction for embarrassment and fear; however, likewise in Study 2, these emotions were not associated with CRC screening intention in the regression model.

Nevertheless, since in Studies 1 and 2 we found that those participants who had refused to attend CRC screening expressed the highest fear of the outcome, and Bocci et al. (2017) found a significant negative association between embarrassment, fear and CRC screening behaviour, we cannot exclude that these emotions exert a direct effect on CRC screening attendance, unmediated by intention.

Concerning the implications for designing campaigns promoting CRC screening, the observed association between preferred emotion regulation strategy and age could imply that citizens in the screening target age group (i.e., over 50 years old) are more easily persuaded by a message highlighting CRC screening benefits. In contrast, people approaching the

screening age (i.e., in their late 40s) might need reassurance about the procedure. However, our findings did not support this matching effect, as the affective and cognitive messages tested did not affect CRC screening intention regardless of participants' emotion regulation strategy (rejection of hypotheses 3a–4b). The absence of a matching effect might be explained by the fact that all participants, regardless of their preferred emotion regulation strategy, benefited from reading the combined message (i.e., the message including references to both affective and cognitive positive attitudes towards CRC screening). Indeed, these participants were more willing to screen than participants reading the control message (i.e., the message with no references to levers). Thus, in line with prior findings (Capasso et al., 2021), the present study showed that messages targeting only affective or cognitive attitudes could not increase the intention of engaging in a health behaviour. In contrast, emphasising both the instrumental (e.g., CRC screening is useful) and the affective (e.g., attending CRC screening is relieving) benefits of CRC screening represents a further step that makes a message more persuasive than levering only on affective or cognitive arguments (Capasso et al., 2021).

However, we acknowledge that this work may be affected by several weaknesses, and that its findings should be interpreted cautiously. First, we relied again on self-reported measures and failed to include actual behavioural outcomes. It is difficult to ascertain whether the self-reports provided by participants correspond to their actual feelings or behaviours or if they were reporting feelings and goals that they believed were the socially desirable replies. However, as mentioned in relation to the previous study (Study 2), we believe that our choice was justified because I) intention to screen is strongly associated with actual behaviour (Conner et al., 2015); II) disgust impacts to the same extent on CRC screening intention and CRC screening attendance (see Chapter 2); III) self-reports are considered a "gold-standard" method to measure affect in terms of experiential feeling states (D. M. Williams et al., 2018).

Second, considering two emotion regulation strategies as alternatives could be another drawback of the present study, as different emotion regulation strategies can occur together (Aldao & Nolen-Hoeksema, 2012).

Third, our participants formed a convenience sample recruited through social media and personal contacts; thus, the sample was not representative of the target population and overrepresented people with high educational attainment (Emerson, 2015). However, it should be noted that education and employment did not affect CRC screening intention; therefore, this overrepresentation might have little impact on our findings. More importantly, because of our recruitment strategy, this convenience sample is likely composed of people who were already favourable to CRC screening. More than half of the people who accessed the survey dropped out, which might indicate that the same barriers to CRC screening participation might have prevented study completion.

Although the aforementioned limitations must be acknowledged, the findings of Study 3 have several implications. Finding that older adults, and not younger adults, prefer reappraisal shows the importance of carefully considering social-psychological features of the target audience before delivering an intervention. This also implies the need to increase the efforts to engage citizens who receive the CRC screening invitation letter for the first time because they are more vulnerable to emotional barriers than older invitees. Furthermore, the first invitation is crucial because screening behaviour tends to crystallise and is replicated in the long run (Broc et al., 2017; Davis et al., 2017; R. Wilson et al., 2021). Therefore, it is worth reserving demanding interventions for people who are invited for the first time (e.g., personal contacts with a health care specialist) to balance resources and benefits.

To the best of our knowledge, no prior study investigated the impact of emotion regulation strategies in the CRC screening context, so these findings shed some light on the possibility of attenuating the effect of emotions in screening situations. Disgust, the main

barrier to screening attendance, is weakened when people activate a reappraisal strategy of emotion regulation. This suggests a practical implication: preventive programmes should not only try to persuade people to attend the screening, but also point to reinforce the reappraisal strategy and address this emotional barrier (i.e., disgust). Messages about bowel screening should not portray heavily threatening experiences because reappraisal is more likely to happen when emotional intensity is low rather than high (Matthews et al., 2021; Ortner et al., 2021; G. Young & Suri, 2020). This might explain why, in the experimental group of Study 2 (i.e., those who read the letter with fewer references to bodily waste), participants' CRC screening intention was more affected by PBC, whereas it was no longer affected by disgust. Reading a letter with low emotional intensity might have enhanced the likelihood of adopting a reappraisal emotion regulation strategy.

Finally, our findings confirm the importance of considering both cognitive and affective predictors of CRC screening, and extend this implication from research (Study 2) to the application of such an approach in the design of persuasive interventions. Thus, in the next chapter we will test the effectiveness of another intervention levering on affective (i.e., the negative emotions associated with CRC screening) and cognitive (PBC in particular) arguments.

Chapter 6

Study 4: Didactic or narrative persuasion? An experiment on promotional videos

Introduction

Health campaigns promoting CRC screening traditionally include statistical information to educate the audience about cancer risks and screening efficacy (e.g., Smith et al., 2015). Although this communication strategy has some benefits, such as enabling a patient's informed choice, several studies have found no positive association between this intervention and CRC screening attendance (e.g., Cole et al., 2007; Libby et al., 2011).

According to the transportation theory (Green, 2006), narratives can be a particularly effective alternative for communicating cancer-related information, because stories are a form of natural communication, easy to understand and familiar to human beings (Green, 2006). More importantly, transportation into a narrative world can catalyse a perspective change from the self into the story character (Hamby et al., 2018), leading the audience to live a vicarious experience that can positively affect one's cognitions and emotions (Green, 2006). First-person narratives have already been studied as a possible intervention to promote CRC screening attendance, and the findings of prior studies generally supported the effectiveness of narrative persuasion in increasing the interest towards CRC screening or CRC screening intention (e.g., A. J. Dillard et al., 2010; Gavaruzzi et al., 2018; McGregor et al., 2015). Nevertheless, it is still unclear why exposure to this type of communication exerts positive effects on the willingness to screen for CRC (Woudstra & Suurmond, 2019). From a theoretical perspective, the positive impact of first-person narratives on CRC screening intention (vs typical informational material) may be due to the reduction of counter-argumentation, facilitation of imaginative processes, and presentation of role models (Green, 2006). However, these hypotheses have remained theoretical and without empirical tests to

determine their validity. Indeed, most studies applying narrative interventions to promote screening behaviours did not assume a theoretical framework to explain such a process (Perrier & Martin Ginis, 2017). As described in Chapter 4, this is problematic also because theory theory-driven studies produce the most effective interventions (Glanz & Bishop, 2010).

For all the reasons above, we have designed a theory-driven intervention, testing the effects of a narrative versus a didactic video on CRC screening intention, and investigating a novel interpretation to explain the potential benefits of being exposed to a story versus other types of communication. In particular, as our previous studies confirmed the critical role of emotional barriers, in the present experiment we will explore whether the potential positive effects of the two videos will be associated with the ability to remove CRC screening emotional barriers and to foster positive beliefs about the test.

For the present study, we rely again on the theory of planned behaviour (Ajzen, 1985) integrated with the emotional barriers to CRC screening (Reynolds et al., 2018). Thus, we consider intention to screen as a proxy of CRC screening behaviour, and we consider as cognitive determinants of CRC screening intention positive attitudes towards CRC screening (i.e., positive evaluations of CRC screening), subjective norms (i.e., perceived social pressure to screen), and perceived control over the own ability to screen (i.e., perceived ease or difficulty to attend CRC screening). Furthermore, we consider three anticipated emotions as affective determinants of CRC screening: disgust, embarrassment, and fear (Reynolds et al., 2018). The two main CRC screening tests, the FIT and colonoscopy, involve two of the most common stimuli eliciting disgust: the handling of body waste and the violation of the physical envelope (Reynolds et al., 2018). Our meta-analysis, Study 2 and Study 3 confirmed that this emotional barrier was significantly negatively associated with CRC screening intention and actual behaviour. In contrast, none of our findings supported the role of embarrassment as a

hindrance to CRC screening participation. However, the Italian context is particularly interesting for studying this emotional barrier because citizens are requested to have personal contacts in order to pick up the kit, whereas in other countries the kit is mailed at home (e.g., the English CRC screening programme; Public Health England, 2021). In addition, other studies carried out in Italy showed embarrassment as a barrier to CRC screening participation (Bocci et al., 2017; Briganti et al., 2009; Genovese et al., 2021). In contrast to disgust and embarrassment, fear is not only evoked by the examination procedure but is also related to the potential diagnosis—some patients avoid screening because they prefer not to know (Beeker et al., 2000). In Study 1 we found that fear of the outcome can be associated with avoidance in the CRC screening context, but Study 2 and 3 found no effect of this emotion on CRC screening intention.

Despite the importance of affective factors, research to date leaves open the question of how the impact of such emotional barriers on the decision to attend CRC screening can be reduced. In Study 2, we showed that disgust was not a significant barrier to CRC screening intention in the condition in which participants read a text with fewer references to bodily waste, whereas it hindered the intention to screen when participants read the text with more references to faeces and blood. However, the interaction between disgust and the experimental group (i.e., reading the manipulated vs original letter) did not reach conventional statistical significance. Study 3 findings showed that a reappraisal regulation strategy could help participants facing their emotional barriers to CRC screening and focus on positive aspects of screening. Another intervention that can reduce the perception of negative emotions towards CRC screening is the exposure to first-person narratives, which might reduce such emotional barriers by providing a vicarious experience.

According to the affective forecasting theory (T. D. Wilson & Gilbert, 2003, 2005), people are able to correctly predict which emotion they will experience in a given situation.

However, the intensity and duration of this emotion are generally overestimated: anticipated emotions are perceived with greater intensity than felt emotions (e.g., a person feels more disgust at imagining stool sample collection than actually doing it). The vicarious experience provided by the exposure to a first-person narrative might reduce such a gap, thus reducing the intensity of anticipated emotional barriers (A. J. Dillard et al., 2010).

In addition, narratives can be an effective instrument to foster instrumental attitudes towards a health behaviour, subjective norms and PBC (see Braddock & J. P. Dillard, 2016; Camelo et al., 2021). On the other hand, prior research found that didactic material is more effective than narrative persuasion in improving cognitive beliefs about health behaviours (see Zebregs et al., 2015). However, didactic persuasion may have no effects on the emotions associated with engaging in that behaviour (Zebregs et al., 2015), and the use of didactic-based communication strategies was criticised for privileging experts' knowledge over emotional arguments (Wise et al., 2008). In the following sections, we will further describe these two different persuasive strategies and the implications for designing Study 4.

Didactic persuasion

With the expression "didactic persuasion" we mean health education material delivered in order to change receivers' attitudes, intentions or behaviours (Arnold et al., 2022; Occa & Suggs, 2016). Didactic persuasion presents rational arguments in favour of a recommended behaviour (McQueen & Kreuter, 2010), typically using statistical information or a Frequently Asked Questions (FAQ) format (Wise et al., 2008). Thus, it is perceived as the communication of objective facts (Greene & Brinn, 2003). Indeed, didactic persuasion might be more convincing than narrative persuasion because the quality of the arguments inside the messages benefits more from statistical than anecdotal information, and a higher quality of messages arguments, in turn, produces greater effects on attitudes (Hoeken & Hustinx, 2009; Zebregs et al., 2015).

The most important characteristic of an effective persuasive didactic message is to be clear and easy to understand (Bloju & Stan, 2013; Wise et al., 2008). For instance, cancer screening communication should use common language and avoid medical terms. Second, the message should emphasise the active role of the receivers and what they can do now that they possess a certain piece of information (Bloju & Stan, 2013). In other words, educational messages promoting health behaviours should address "how to" and "when to" issues to support behavioural change (Snyder, 2007). Finally, persuasive didactic messages should be engaging and capture receivers' attention with novel information that meets their needs (Bloju & Stan, 2013; Snyder, 2007). Such novel information should also address common misconceptions (Snyder, 2007). For example, prior research found that many citizens believe that they do not have to screen if they feel well and do not present any bowel symptoms (Broc et al., 2017; Gordon & Green, 2015; Quyn et al., 2018).

Luque et al. (2018) collected information about patients' preference towards educational materials concerning CRC screening with eight focus groups. Common information needs regarded the accuracy of the FIT compared to colonoscopy, processing times to receive the test result, and clear explanations about why attending CRC screening is important. In addition, participants declared that they would prefer a doctor or a nurse to deliver educational content, especially concerning how to perform and return the faecal collection tests. Some participants also stated that videos might foster receivers' understanding of the didactic messages (Luque et al., 2018).

In the promotion of cancer prevention or early detection, didactic persuasion has been successfully adopted to foster healthy habits preventing skin cancer (e.g., education messages decreased the use of tanning beds, Greene & Brinn, 2003), to foster the attendance of cervical cancer screening (see Musa et al., 2017), and to support the development of informed choices about attending breast cancer screening, although decreasing intention to screen (see

Martínez-Alonso et al., 2017). Occa and Suggs (2016) compared the impact of using didactic versus narrative persuasion on the communication of breast cancer screening. Participants were young women (18 to 30 years old), living in Italy or in Italian-speaking Swiss cantons. Their findings showed that the didactic message was the most effective in increasing participants' awareness and knowledge about cancer and cancer screening, whereas the narrative message was the most effective in fostering positive attitudes towards screening and screening intention (Occa & Suggs, 2016).

Narrative persuasion

Narrative persuasion attempts to convince receivers to adopt a certain health behaviour through a coherent story that describes a setting, an episode, the point of view of one or more protagonists, their purposes, intentions, actions, and the consequences of the depicted events (Zebregs et al., 2015). The gists of a narrative are the presence of a conflict—unfolding across related events—until a resolution is found (Moyer-Gusé & Dale, 2017), and the presence of specific characters, whereas non-narrative communication is abstract or adopts aggregate terms (Bullock et al., 2021). Many studies in the domain of narrative persuasion empirically confirmed that stories attract the audience's attention, are memorable, and represent a useful persuasive instrument (see Hamby et al., 2018).

Good stories create a mental representation, a simulation of the events described (Moyer-Gusé & Dale, 2017), where individuals immerse themselves in the characters' shoes, sharing their feelings and goals (Tal-Or & Cohen, 2010). However, not all stories are equally immersive and persuasive, and the same story can impact each person differently (Hamby & Jones, 2022). An internal point of view (i.e., a story told in first person), the similarity between the protagonist and the audience, or positively portraying the character can ease the identification process, making a message more persuasive (Hoeken et al., 2016; Tal-Or & Cohen, 2010). Also, grammatical choices, verb tense, and deictic elements can affect

narrative transportation (see van Krieken et al., 2017).

Maybe because of these characteristics that affect narratives persuasiveness, findings on this topic have been mixed. Some research supports the superior effectiveness of stories (vs informative material) in increasing screening intention (Larkey et al., 2009), while others find no support for such difference (e.g., Lemal & Van den Bulck, 2010) or even find a preference for informative and factual health messages over affective and narrative texts (e.g., Quintiliani & Carbone, 2005). Several alternative explanations have been tested to unravel these unclear results and explain the association between narrative exposure and behavioural change. For instance, in a recent study about the Coronavirus Disease 2019 (COVID-19) vaccine, Huang and Green (2022) investigated whether persuasive narration could reduce vaccination hesitancy through the feeling of empathy for a character. In the narrative condition, a vaccination-hesitant character spoke about changing their mind about vaccines. Huang and Green (2022) expected participants to follow the character's example thanks to the empathy-related process inducing a vicarious experience. However, only affective empathy (i.e., experiencing the same emotions as the character) mediated the effect of the narrative message on vaccination intention. In contrast, cognitive empathy (i.e., seeing things from the character's point of view) did not. In addition, the story failed to be more persuasive than the didactic message, and the interpretation of this result called into question the repeated exposure effect (i.e., participants were more familiar with the informative message) and the social desirability bias (which caused ceiling effects in intention scores).

A different explanation for the reason why narratives are persuasive was tested by Bullock et al. (2021), who investigated whether stories produce behavioural change because of their better processing fluency (i.e., perceived ease or difficulty of processing new information). Their findings did not support the investigated theory. Story processing was indeed more fluent and easy than non-narrative processing, but a typical message about the

health risks of consuming too much caffeine (didactic condition) was more persuasive than a story about the same topic (narrative condition).

Although considering this variety of findings and explanations, we believe that research about storytelling as a persuasive strategy is still incomplete and open to the test of novel interpretations. By listening to a first-person narration about the screening experience, the audience might live that moment through the character, reducing the difference between anticipated and perceived emotions. It is also plausible that, aside from the vicarious experience, a first-person narrative provides more cues to better predict emotional intensity, therefore improving affective forecasting. Associating the effects of narratives on behavioural change with affective forecasting is not entirely new, as this interpretation has already been suggested by A. J. Dillard et al. (2010) but still lacks empirical support. To the best of our knowledge, the following aspects have not been examined. Do first-person narratives have different effects among people who have or have not experienced that topic? Can such an experience actually be replaced by the transportation into the story? Are the effects of stories on intention mediated by the reduced perception of emotional barriers?

The present study

Study 4 was conducted in collaboration with the Governance of Screening Programs Unit of the Local Health Authority in Bologna, Italy. Our aim was to test the effects of a video promoting CRC screening attendance through a narrative communicative tactic on CRC screening behavioural predictors, comparing it with a video based on the didactic tactic, and with a video on another topic as a baseline control condition. We preferred videos to texts because, when communicating cancer information, the audio-visual format has more positive effects than infographics on awareness, knowledge, attitudes, and intention (Occa & Suggs, 2016).

The study follows a between-participants design with three conditions: (I) a first-

person narrative communication about CRC screening, in which participants watched a video showing a man and a woman speaking of their CRC screening decision-making process and experience, (II) a didactic-based communication about CRC screening depicting two doctors, (III) a baseline condition, in which participants watched a first-person narrative video showing characters talking about their sports medical examination. The I and II conditions (i.e., exposure to a narrative or didactic video about CRC screening) test the effectiveness of the two different strategies described above to promote CRC screening, while the III condition (i.e., exposure to an unrelated video) provides non-treatment measures and help to disentangles the effects of the specific first-person narrative (I condition) from those of a generic story (III condition).

Based on the transportation theory (Green, 2006) and previous results (e.g., Kennedy et al., 2018; Larkey et al., 2009; McGregor et al., 2015), we expect participants in the narrative CRC screening video condition (vs participants in the other two conditions) to express the highest screening intentions after watching the video (hypothesis 1). However, people who have attended CRC screening in the past may be already motivated to screen (Gordon & Green, 2015); thus, we should observe a positive effect of the narrative video only for those who have never screened before. In other words, we expect past CRC screening attendance to moderate the association between the experimental condition and outcome (hypothesis 2). In addition, this positive effect should occur only when the audience feels highly transported into the story. Transported individuals are more likely to change their real-world beliefs in response to a story than their less-transported counterparts (Green, 2006). Hence, we expect transportation and identification to moderate the effect of the narrative video on CRC screening intention (hypothesis 3).

First-hand accounts of screening from peers can be reassuring (Bennett et al., 2015). Hence, we expect participants watching the narrative video about CRC screening to express

the lowest disgust (hypothesis 4a), embarrassment (hypothesis 4b), and fear (hypothesis 4c). However, if the effects of first-person narratives on emotional barriers result from a change in affective forecasting, as A. J. Dillard et al. (2010) suggest, then participants with prior screening experience should not report different emotional barriers after watching the video because they will elaborate their answers based on direct experience rather than on anticipated emotions. Thus, we expect past attendance to moderate the effect of the screening-specific narrative video on disgust (hypothesis 5a), embarrassment (hypothesis 5b), and fear (hypothesis 5c). If the vicarious experience provided by the first-person story has the same valence as actual prior experience (A. J. Dillard et al., 2010), only those who felt high transportation and identification with the protagonists (i.e., those who lived a vicarious experience) should be affected by the narrative video. Therefore, we expect the vicarious experience score (see below in *Measures*) to have the same moderation role of prior experience on the association between the video and disgust (hypothesis 6a), embarrassment (hypothesis 6b), and fear (hypothesis 6c).

Since we expect the narrative video to decrease the perception of negative emotions, and as negative emotions are significant barriers to CRC screening intention (see Studies 1–3), we expect a conditional mediated effect of the video message on the outcome through the reduction of negative emotions (hypotheses 7a, 7b, and 7c).

However, the positive effect of the video on CRC screening intention may be partially due to enhanced self-efficacy. In line with the social cognitive theory, according to which witnessing a peer's success increases the sense of self-efficacy (Bandura, 1998), we expect the participants watching the first-person narrative video about CRC screening to express a greater PBC (hypothesis 8) than the other participants. As we found in Study 2, PBC is an important booster of CRC screening intention. Hence, we expect the positive effect of the narrative video on CRC screening to be also mediated by PBC (hypothesis 9). Although the

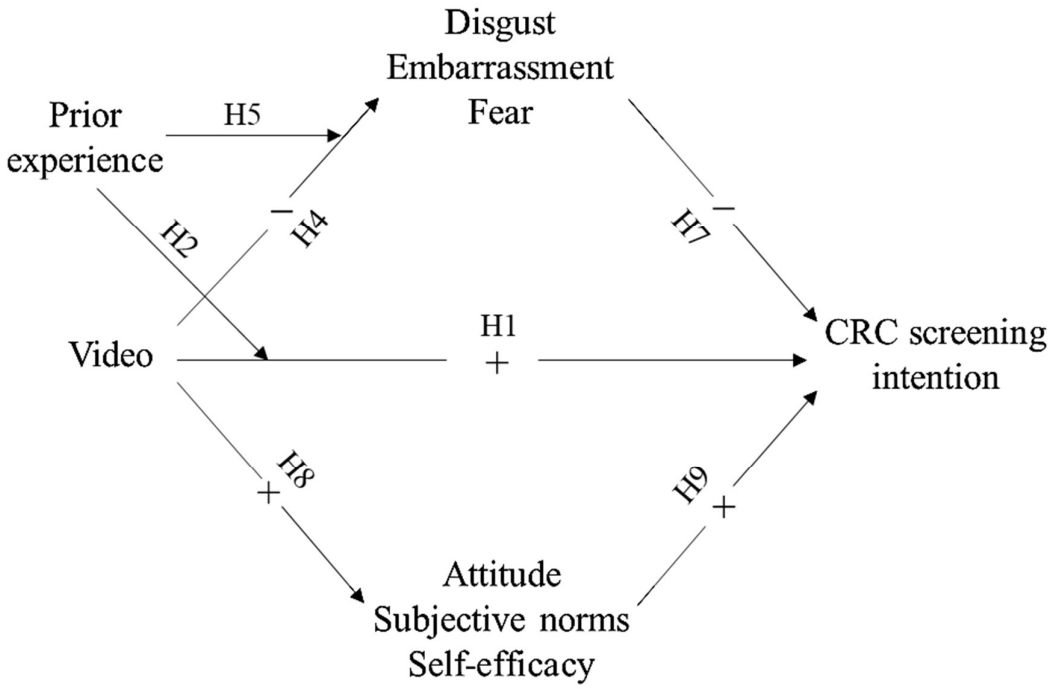
sense of self-efficacy (the perception of being able to carry out certain actions; Bandura, 1982) and PBC are differently nuanced theoretical constructs, in the present research, they will be assimilated, the latter concept being derived from the former (Ajzen, 2002).

We do not formulate specific hypotheses about attitudes and subjective norms because both experimental videos may improve them. The narrative video may improve attitudes through the identification with characters and by hindering counterarguing (Slater & Rouner, 2002). In contrast, the didactic video depicting two doctors can positively affect attitudes towards CRC screening because of the expertise of the source (Reimer et al., 2004). Both videos show two people recommending CRC screening, which might boost subjective norms. Thus, the role of these constructs will be analysed using an explorative approach.

The two expected models are summarised in Figures 8a and 8b.

Figure 8a.

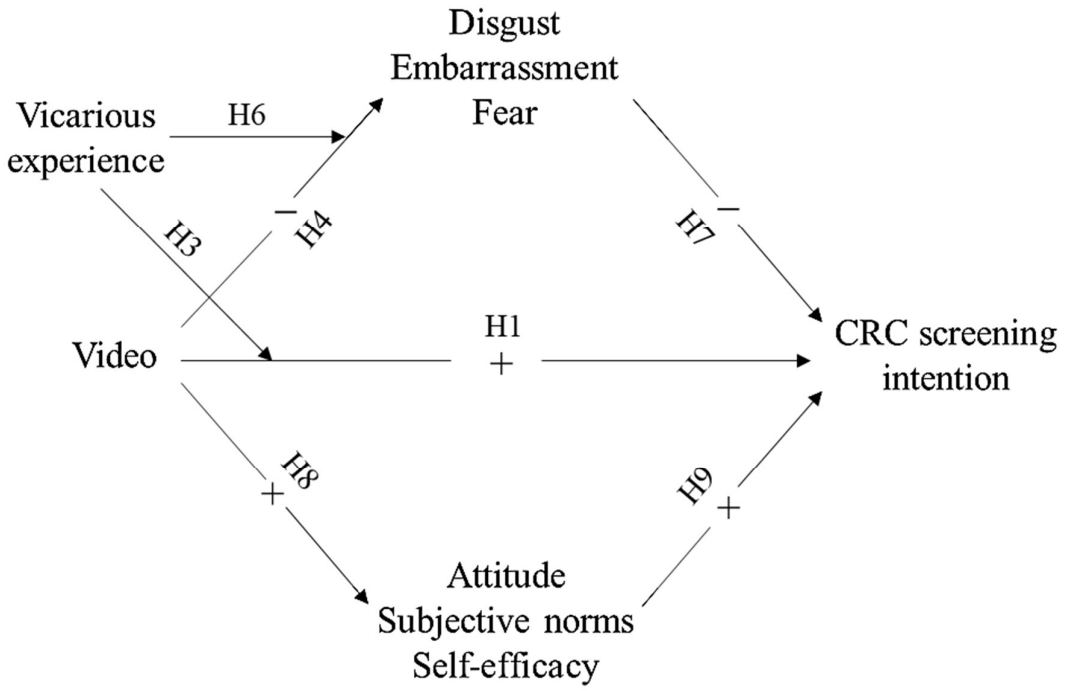
The first hypothesised model to predict CRC screening intention.



Note. Hypotheses (H) of negative effects are expressed with a minus, hypotheses of positive effects are expressed with a plus.

Figure 8b.

The second hypothesised model to predict CRC screening intention.



Note. Hypotheses (H) of negative effects are expressed with a minus, hypotheses of positive effects are expressed with a plus.

Method

Participants

We recruited participants ranging from 40 to 74 years old who were fluent in Italian using Prolific and remunerated their participation with around £1.30. To estimate the minimum sample size, we conducted an a priori power analysis (Faul et al., 2007). For α = .05, test power = .80 (i.e., the minimum recommended for social sciences; Cohen, 1988), and mean effect of f = .161 (based on the effect of first-person narratives on the perception of emotional barriers in A. J. Dillard et al., 2010, Cohen's d = .321), and based on three groups, the sample required was at least 375 people.

From 10th June to 29th October 2022, 424 people accessed our survey. Three participants denied their consent to participate, and 27 dropped out before completing the

study. Three participants were excluded because they failed both the attention checks and another 16 failed the manipulation check. The final sample included 375 participants (M_{age} = 48.59, SD_{age} = 7.44; 59% women; 70% Italian). Although all the participants spoke Italian fluently (as we declared above, it was a recruitment criterium and was also controlled with attention and manipulation checks), some of the retained participants reported having European (12%), British (8%), or a South or Northern American nationality (6%). Other nationalities included Australian (n = 3), Russian (n = 2), and Israeli (n = 1). There were no significant differences among participants' characteristics in the three conditions (Table 16).

Table 16.

Study 4. Characteristics of participants in each condition and between-group differences.

	Control video		Screening narrative video		Screening didactic video		Between-group differences
	n	%	*n*	%	*n*	%	
Gender							χ^2 (4) = 3.73, p = .497
Female	71	59%	69	55%	80	62%	
Male	50	41%	56	45%	48	38%	
Nationality							χ^2 (10) = 3.65, p = .962
Italy	87	72%	85	68%	90	70%	
United Kingdom	9	7%	13	10%	10	8%	
Other European Country	12	10%	18	14%	17	13%	
North & South America	10	8%	6	5%	7	6%	
Received a CRC diagnosis	3	3%	3	2%	6	5%	χ^2 (2) = 1.39, p = .499
With CRC familiarity	23	19%	21	17%	27	21%	χ^2 (2) = 0.81, p = .666
CRC screening experience							χ^2 (4) = 1.21, p = .876
Refused to screen	11	9%	8	6%	8	6%	
Never invited	85	70%	93	74%	96	75%	
Attended screening	25	21%	25	20%	24	19%	

Note. Participants in the control condition were on average 49 years old (SD = 7.85). Participants in the screening narrative video condition were on average 49 years old (SD = 7.69). Participants in the screening didactic video condition were on average 49 years old (SD = 6.80). The difference was not statistically significant, F (2, 371) = .26, p = .770.

Design and procedure

The present study was approved by the University of Parma Research Ethics Board (Protocol number 0282939). The experiment was conducted online, and participation was anonymous. Each participant was randomly assigned to one of the three conditions through an online link. The questionnaire was the same for all the conditions; only the video changed. Participants were blinded to our hypotheses and the assigned experimental condition. The questionnaire (see Appendix G) started with a general description of the experiment, and participants were asked to provide informed consent to participation and data treatment. Next, we briefly explained what CRC screening is and measured past attendance (two questions were used to distinguish between participants who had never been invited to screening, participants who attended CRC screening, and participants who refused to get screened). Then, participants watched one of the three videos, completed the items tapping transportation, and answered questions that did not serve for analyses but were added to foster the deictic return (i.e., creation of meaning from the video and linking this meaning to their own experience, Hamby et al., 2018). Finally, participants completed the items about the negative emotions and the positive cognitive factors associated with CRC screening, intention to screen, and sociodemographic data.

The questionnaire included two attention checks, one at the beginning and one at the end of the survey, and two manipulation checks presented right after the video (about the video's topic and who the protagonists were). The debriefing explained the purpose of the study and disclosed that the video was played by actors. At the end of the study, to guarantee equal treatment, participants had the opportunity to watch the two videos they had not seen.

Materials

The videos were written and filmed with the Governance of Screening Programs Unit of the Local Health Authority in Bologna. The scripts, translated into English, are reported in

Appendix H. Each video lasted two minutes, was filmed following a script, and featured the same two Italian actors, a man and a woman in their fifties. The actors were two health care professionals, working for the Local Health Authority in Bologna, and with some theatrical experience. They volunteered to appear in the videos.

In the narrative CRC screening video, the two actors played the part of screening patients. The man spoke about his fictional colonoscopy experience, and both spoke about their experience with the FIT. The story was about the decision-making process that convinced the protagonists to attend the screening and their experiences. In the video, the two narrators were sitting next to each other. In their speech, one narrator explicitly addressed the barrier of disgust, while the other addressed the barrier of fear. Participants in a previous qualitative study (Beeker et al., 2000) did not express fear so much about the possibility of having to undergo a colonoscopy as they did about diagnosis: the fear of discovering illness was so strong that they preferred not to know. For this reason, the narrator who dealt with the topic of fear did so in this sense, explaining why she finally changed her mind and took the test. She also spoke about the relief perceived after a negative test result. Similarly, the person addressing the issue of disgust described why he changed his mind and minimized the experience compared to what he had imagined.

In the didactic video, the actors impersonated two doctors, wearing white coats, and explained how screening works and why it is important: they explained who the target group is, how people are invited to screening, and how to collect the screening kit. They gave information about CRC and its prevention and explained the positive results that the screening programme has achieved.

In the control video, the protagonists were again two patients, and they talked about a personal experience unrelated to CRC screening: a sports medical examination.

Measures

Vicarious experience

Vicarious experience was operationalized using an adaptation of the Transportation Scale-Short Form (Appel et al., 2015). Since this scale was originally designed for reading stories, we adapted the items to the video recording format. The Transportation Scale-Short Form (Appel et al., 2015; Green & Brock, 2000) includes questions about the story in general and specific questions about the characters (A. J. Dillard et al., 2018). As the study aimed to investigate the effect of the vicarious experience during the story, four items concerned participants' transportation into the story, and another four items concerned identification with each of the narrators (e.g., "I could picture myself in the scene of the events described in the narrative" and "I could put myself in the narrator's shoes"). Participants expressed their agreement with these eight sentences on a 5-point Likert scale, with a higher score indicating greater agreement. Items were presented in a randomized order. A mean score was calculated (see preliminary analysis below for the test of unidimensionality).

Negative Emotions

Emotional barriers to bowel screening were measured through the reduced version of Reynolds et al.'s (2012, 2018) EBBS scale adapted for the Italian context (Study 1). Thus, we adopted the version of the EBBS scale measuring three emotions associated with CRC screening: faecal disgust, embarrassment, and fear of the outcome. Participants expressed their agreement with sentences about the perception of negative emotions in the CRC screening context on a 5-point Likert scale. Items were presented in a randomized order. Four items measured anticipated CRC screening-related *faecal disgust* (e.g., "The idea of gathering a sample of my own faeces makes me feel sick"; $\alpha = .91$), three measured *embarrassment* (e.g., "Imagining that other people know I am collecting stool samples for testing would be embarrassing"; $\alpha = .84$), and three measured *fear of the outcome* (e.g., "I am afraid that

giving a stool sample might lead to discovering I have cancer"; α = .76). Higher scores indicated greater agreement with the sentences. Mean scores were calculated for each subscale.

Cognitive predictors

We adapted items from Lucas et al. (2016) to operationalize cognitive predictors of CRC screening intention. *Positive attitudes* (four items, e.g., "Colorectal cancer screening is useful"; α = .72), *subjective norms* (two items, e.g., "People that I consider important in my life would like me to attend colorectal cancer screening"; $r = .56$, $p < .001$), and *PBC* (three items, e.g., "I think I can successfully use the exam kit"; α = .73) were measured. Since the affective component is already present in the definition of attitude (Ajzen & Fishbein, 2005), for simplicity's sake, we refer here to attitudes as a single predictor. Participants were asked to express their agreement with the sentences about instrumental and affective judgments about screening, social pressure to screen, and trust in one's capability to screen on a 5-point Likert scale. Items were presented in a randomized order. A mean score was calculated for each subscale. A higher score in positive attitudes, subjective norms, and PBC corresponded, respectively, to a more positive screening perception, higher perception of social pressure, and higher confidence in the self-capability to get screened.

Intention to screen

To assess *intention to screen* as a critical dependent variable, we adopted the item developed and tested in Study 3: a question asking participants when they would screen, regardless of their age, and after being formally invited to by the Local Health Authority (*within a week*, *a month*, *a year*, *I would keep procrastinating*, or *never*). Higher scores corresponded to a greater willingness to attend screening after being asked.

Data analyses

First, we ran an exploratory factor analysis to verify whether the vicarious experience

items loaded into a single factor (i.e., vicarious experience; Appel et al., 2015; A. J. Dillard et al., 2018; Green & Brock, 2000) or into two factors (i.e., transportation and identification; Chen & Bell, 2022; Hamby et al., 2018; Neil et al., 2019).

Then, to test our hypotheses, we ran two moderated mediation regression models (PROCESS model 8; Hayes, 2018), setting 5,000 bootstrap resamples. One model tested the moderation effect of prior CRC screening experience on the association between the video, the parallel mediators (i.e., emotions and cognitive variables), and the outcome (i.e., CRC screening intention). We replicated this model with vicarious experience instead of direct experience to analyse whether the former can replace the latter. Experimental conditions and prior CRC screening experience were treated as categorical variables, with the control video and not having received the invitation letter yet as reference categories. Continuous variables that defined products were mean-centred.

Results

Preliminary analyses

First, we verified whether we should treat the vicarious experience as unidimensional or bidimensional. The exploratory factor analysis supported the unidimensionality of the scale, with one large eigenvalue suggestive of a single factor and factor loadings from .658 to .782 (vicarious experience score, $\alpha = .87$).

Table 17 reports the means and standard deviations for the measures and the correlations among them. Like in Studies 1–3, fear towards a potential cancer diagnosis was the greatest emotional barrier, followed by faecal disgust, whereas embarrassment score was the lowest (Table 17). Participants expressed a high intention to screen and even a greater PBC (Table 17). In contrast with Study 2, participants expressed a greater perception of social pressure to screen than positive attitudes towards CRC screening (Table 17).

Table 17

Correlations between Study 4 variables

	M (SD)	Age	Gender	CRC Familiarity	CRC History	Actual Experience[a]	Vicarious Experience	Disgust	Embarrassment	Fear	Attitudes	Subjective norms	PBC
Vicarious Experience	3.20 (0.86)	.12*	.13*	−.05	−.01	.09							
Disgust	2.00 (1.07)	−.06	.00	−.05	−.06	−.11*	.03						
Embarrassment	1.81 (0.96)	−.11*	.01	−.07	−.04	−.04	.04	.74***					
Fear	2.51 (1.01)	−.03	.03	−.04	.01	−.09	.20***	.40***	.40***				
Attitudes	4.03 (0.81)	.14**	.05	.15**	.08	.24***	.16***	−.55***	−.53***	−.30***			
Subjective norms	4.14 (1.09)	.20***	−.01	.13**	.04	.22***	.32***	−.20***	−.28***	.03	.51***		
PBC	4.29 (0.85)	.11*	.03	.07	.00	.19***	.07	−.62***	−.63***	−.31***	.57***	.37***	
Screening intention	4.03 (1.07)	.09	−.05	.05	.03	.24***	.21***	−.30***	−.25***	−.16**	.52***	.31***	.31***

Note. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

[a] Coded as −1 = "Refused to screen", 0 = "Never invited to screen", 1 = "Attended screening".

The preliminary analyses assessed that respondents' age, gender, CRC familiarity (i.e., being related to someone who received a CRC diagnosis), or history (i.e., having received a diagnosis of CRC) did not affect their CRC screening intention (Table 17). Hence, they were not considered in the subsequent analyses.

A preliminary regression analysis assessed the effects of post-exposure emotions and cognitions on CRC screening intention. Although unnecessary for Study 4 aims, this analysis improves the comparability of the four studies presented in this dissertation. Disgust, embarrassment and fear were not significantly associated with CRC screening intention (disgust, $b = -.09$, $\beta = -.08$, $SE = .08$ $p = .258$; embarrassment, $b = .14$, $\beta = .13$, $SE = .08$, $p = .074$; fear, $b = . -.06$, $\beta = -.06$, $SE = .05$ $p = .265$). Attitudes and subjective norms boosted CRC screening intention (attitudes, $b = .50$, $\beta = .47$, $SE = .06$ $p \leq .001$; subjective norms, $b = .14$, $\beta = .13$, $SE = .06$, $p = .012$), whereas PBC had no effect on the outcome ($b = .03$, $\beta = .03$, $SE = .07$ $p = .627$).

Main analyses

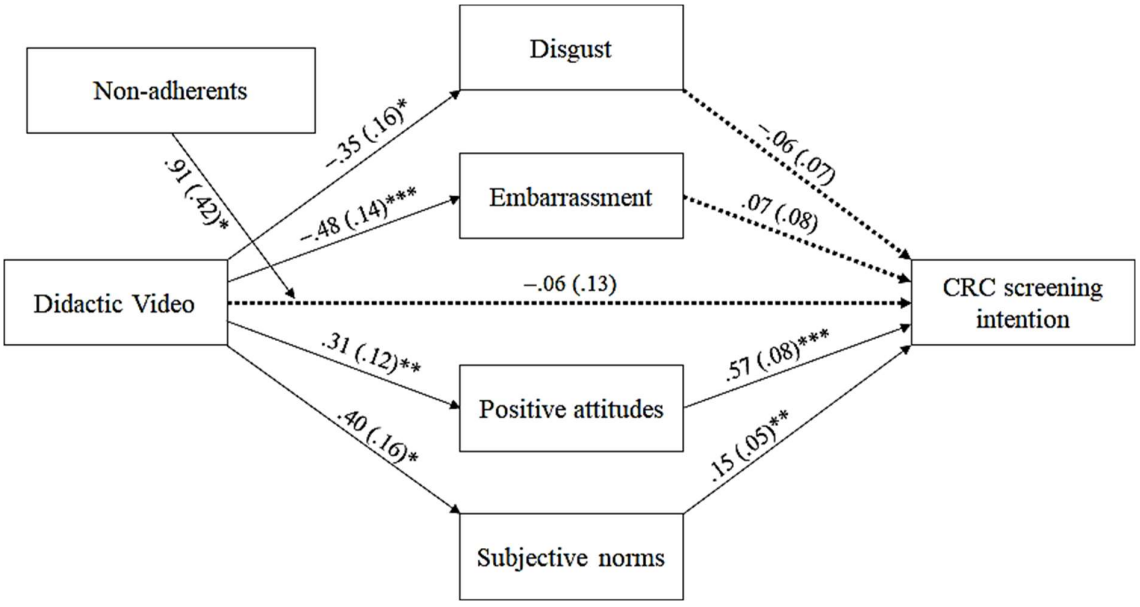
The first moderated mediation analysis assessed the effects of the screening narrative video and the didactic video (vs the control video) on CRC screening intention, both directly and through six parallel mediators, and tested the moderating effect of prior CRC screening experience on the association between the videos and the mediators, the videos and CRC screening intention (Figure 8a). Contrary to hypothesis 1, this model issued no main effect of the narrative screening video on CRC screening intention ($b = -.08$, $SE = .13$, $p = .543$). This experimental condition did not interact with having attended screening ($b = .07$, $SE = .28$, $p = .805$); thus, we rejected hypothesis 2. Contrary to hypotheses 4a–4c, the narrative screening video had no effect on disgust ($b = -.01$, $SE = .16$, $p = .944$), embarrassment ($b = -.19$, $SE = .14$, $p = .186$), and fear ($b = .06$, $SE = .15$, $p = .714$). Contrary to hypotheses 5a–5c, this effect was not moderated by prior CRC screening attendance ($p \geq .201$). Therefore, we found no

support for hypotheses 7a–7c, concerning the indirect effect of the narrative through emotions. Again, in contrast with hypotheses 8 and 9, the narrative video did not affect CRC screening intention through PBC (effect of the narrative video on PBC, $b = -.00$, $SE = .13$, $p = .995$). Finally, the narrative video did not affect positive attitudes ($b = .00$, $SE = .12$, $p \geq .999$) nor subjective norms ($b = .27$, $SE = .16$, $p = .088$).

However, this model showed unexpected significant effects of the didactic video (Figure 9). This video did not affect CRC screening intention but significantly interacted with having refused to attend the test (Figure 9).

Figure 9.

First moderated mediation. N = *375. Moderated mediation model (PROCESS Model 8) with the didactic video as the independent variable, prior CRC screening experience as the moderator, and six parallel mediators (negative emotions and cognitive constructs).*



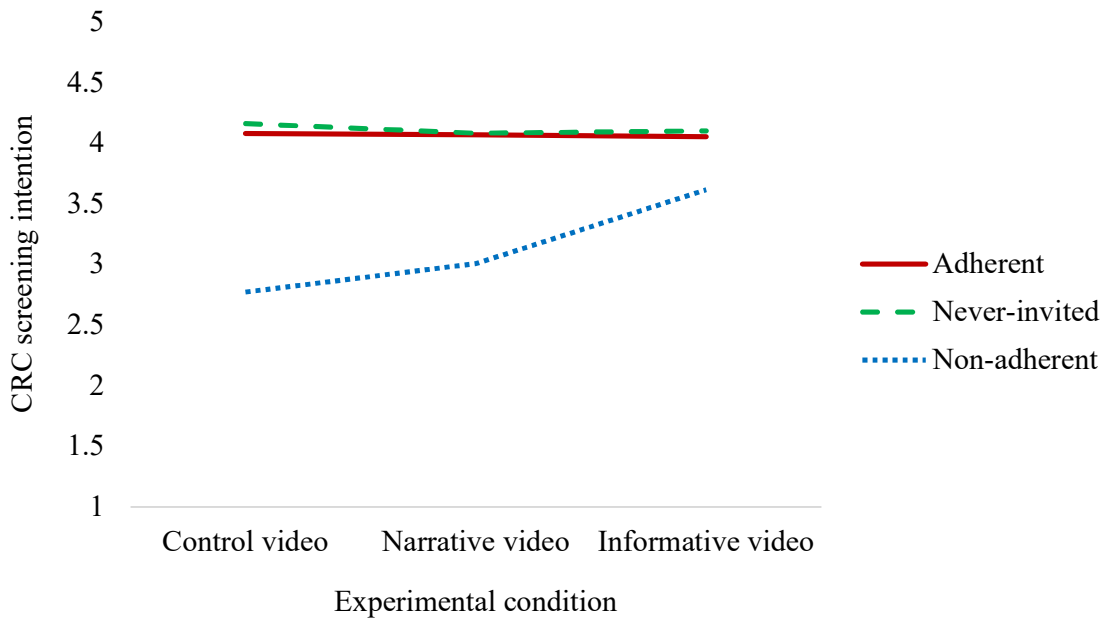
Note. Only significant interactions and only mediators with one or more significant paths are depicted. Dotted lines indicate non-significant paths. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

Single slope analysis (Figure 10) showed that only participants who had refused to get tested for CRC expressed a greater intention to screen after watching the didactic video (vs

the control video). This didactic video also significantly reduced disgust and embarrassment (Figure 9). In addition, it significantly increased positive attitudes and subjective norms (Figure 9). For those participants who had never received an invitation to screen (but not the others), this positive effect indirectly boosted CRC screening intention (conditional indirect effect [CIE] through positive attitudes, b = .18, SE = .07, 95% CI [.05, .32]; CIE through subjective norms, b = .06, SE = .04, 95% CI [.01, .15]).

Figure 10.

Single slope analysis for the moderating effect of prior experience on the association between the experimental condition and CRC screening intention in Study 4.

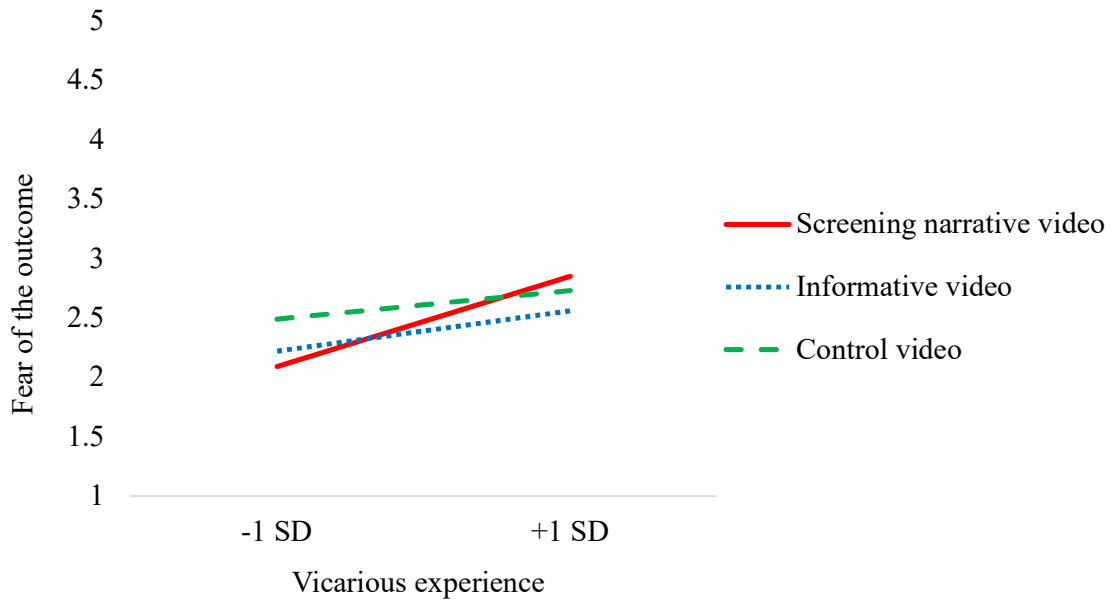


The second moderated mediation analysis replaced prior experience with vicarious experience (Figure 8b). Again, we found no support for most of our hypotheses (please see Appendix I), and we also rejected the expected moderation role of vicarious experience (hypothesis 3, please see Appendix I). There was only one exception: the impact of the narrative video on fear was significantly moderated by vicarious experience (hypothesis 6c, b = .30, SE = .15, p = .042). However, this result was not in the expected direction: participants

who felt highly immersed in the story and identified with the protagonists reported higher levels of fear than less engaged participants (Figure 11).

Figure 11.

Single slope analysis for the moderating effect of vicarious experience on the association between the experimental condition and fear of the outcome.



Discussion

The research on the use of narrative persuasion to promote CRC screening is in its initial stages, and it still needs to unravel how and why stories impact the decision-making process of CRC screening (Woudstra & Suurmond, 2019). This study examined whether a narrative video increased CRC screening intention more than a traditional informative (i.e., didactic) or a control video. It empirically tested two interpretations of the mechanisms underlying narrative persuasion, one concerning the mental simulation of screening and the following changes on affective forecasting, and the other concerning the boost of PBC due to witnessing a peer's success (see Woudstra & Suurmond, 2019).

Contrary to our hypotheses, the narrative video (vs a control video) did not foster CRC screening intention (hypothesis 1), nor interacted with prior (hypothesis 2) or vicarious

screening experience (hypothesis 3); it had no effect on emotions (hypotheses 4a–4c), nor on cognitive factors (hypothesis 8; i.e., PBC). Consequently, it did not indirectly affect CRC screening intention through these constructs (hypotheses 7a–7c, 9). The effectiveness of the narrative video might have been hindered by affective resistance, which implies the perception of the stories as inauthentic and corny, the rejection of the emotions expressed by the characters and their cognitive arguments (Appel, 2022). Unfortunately, we did not measure the participants' perceived realism about the story, so as to test this possible interpretation.

In addition, our findings did not support either of the two investigated interpretations of the narrative persuasion effects. Prior and vicarious screening experience did not moderate any effects of the narrative video on disgust and embarrassment (hypotheses 5a, 5b, 6a, and 6b). This means that those who did not live a CRC screening experience and people who vicariously did through their transportation into the story (A. J. Dillard et al., 2010) did not reduce the gap between anticipating and recalling an emotion. Having ever attended CRC screening did not change the effects of the narrative video on fear (hypothesis 5c). In addition, unexpectedly we found that highly engaged participants (i.e., participants who reported a strong vicarious experience) reported more fear than low engaged participants (i.e., participants who reported a weak vicarious experience) after watching the narrative video (hypothesis 6c). Hence, the present findings do not support that exposure to a story can change affective forecasting and seem more in line with the empathy-related processes theorised by Huang and Green (2022): participants might have absorbed the fear expressed by the two protagonists. Concerning PBC, witnessing a peer's success did not boost participants' perceived ease in performing the screening test. However, this could be due to the narrative itself since the effects of stories on self-efficacy occur when the exam procedure

is described (Woudstra & Suurmond, 2019) and, in this narrative video, it was only mentioned.

On the other hand, the video depicting two doctors speaking about screening (i.e., the didactic video) boosted CRC screening intention among participants who had received an invitation letter but refused to get screened, and boosted CRC screening intention through positive attitudes and subjective norms among those participants who had not yet received the invitation letter.

For the former, being exposed to a convincing message from a trustable source (i.e., the two doctors) might have enhanced the cognitive dissonance deriving from having refused to attend CRC screening and the evidence of its utility. This dissonance could translate into a psychological discomfort that needs to be reconciled (Ent & Gerend, 2016). When people are not sufficiently motivated to attend an unpleasant medical screening, thinking about engaging in that cancer detection exam may cause the development of negative attitudes towards the efficacy or the necessity of such an examination just to reconcile their refusal (Ent & Gerend, 2016). However, our didactic video effectively improved participants' attitudes towards CRC screening, thus eliciting the cognitive dissonance people try to avoid. In addition, the didactic video positively affected subjective norms, which probably contributed to changing normative beliefs that people developed to justify their CRC screening avoidance. Although cognitive dissonance primarily regards oneself, and others' behaviours are less likely to induce dissonance (Ent & Gerend, 2016), previous studies on CRC screening showed that people who refuse to screen expect the same behaviours by the other invitees, which constitutes a further justification for avoiding screening (Stoffel et al., 2019). In the didactic video, one of the two doctors mentions that 6 million Italians have attended CRC screening (i.e., the number of Italian citizens that attended CRC screening from 2018 to 2020, Osservatorio Nazionale Screening, 2021), and this might have challenged participants' beliefs

about the social acceptance of the screening test. In other words, since people are motivated to settle the conflict between their beliefs (i.e., attitudes and subjective norms) and their behaviour (i.e., refusing to screen), formulating the intention to screen is a way of restoring consistency and alleviating cognitive dissonance.

Cognitive dissonance might also explain why the didactic video benefited those participants who are not in the screening target yet. When individuals are not candidates for a medical examination yet, they do not need to avoid that medical examination. Therefore, they do not need to form negative attitudes towards that exam in order to justify their refusal to engage in an unpleasant medical treatment. Indeed, people who are not yet candidates for a medical treatment are more prone to form positive attitudes towards that treatment, even when it is portrayed as invasive and unpleasant (Ent & Gerend, 2016). For these participants, cognitive dissonance might increase the likelihood of future attendance because their need for internal coherence will encourage them to behave accordingly to those preliminary positive attitudes (Ent & Gerend, 2016).

The didactic video is the one most likely to trigger cognitive dissonance because it is generally perceived as more realistic than narrative persuasion (Kennedy et al., 2018). Moreover, we know that patients rarely recognise persuasive techniques when implemented by doctors, thus opposing weak resistance (Lafata et al., 2015). In addition, it is possible that the didactic video met participants' needs for factual information (Quintiliani & Carbone, 2005) and effectively simulated a chat with two physicians recommending screening, which is one of the most robust interventions to promote CRC screening (see Chapter 4).

Some limitations of the present study should be noted. The key drawbacks were not assessing the effects of the videos on behaviour and, again, relying only on self-reported measures. However, using intention measures allowed us to protect participants' privacy and include people approaching the recommended age to screen (i.e., who were not allowed to

participate in the organised screening programme yet). In addition, although intention is an imperfect proxy of behaviour (Murphy et al., 2013), the two constructs are strongly associated (Cooke & French, 2008). Furthermore, self-reports are good indicators of feeling states because they effectively capture subjective experiences (J. P. Dillard et al., 2017).

Nevertheless, we acknowledge that a quantitative cross-sectional design might be too restrained to investigate the complex mechanisms of narrative persuasion and its effects on emotional barriers. Therefore, further studies should use a mixed-method longitudinal approach, exploring the thoughts and feelings aroused by the videos both quantitatively and qualitatively, and assessing cause-effects relationships that could not be established in the present work. Further studies should also shed light on the roles of affective resistance (Appel, 2022) and cognitive dissonance, important factors that we failed to measure. In order to reduce the impact of affective resistance, we suggest video recording real people speaking of their experience with CRC screening. Using actors might have negatively affected the perceived realism of the narrative video, even though we chose this procedure to guarantee the comparability of the three experimental conditions. This means that the subsequent debriefing, revealing that the two doctors were actually actors, may have neutralised the positive effects of the didactic video, provoking the extension of the doubt about the content of the videos. If this is the case, participants could have alleviated the cognitive dissonance with the restoration of the pre-exposure beliefs. Further studies should adopt a prospective design to investigate these potential negative consequences. Finally, we recognise that recruiting a convenience sample limited the external and ecological validity of the present findings.

With the aforementioned limitations in mind, the present findings also have several strengths. Although narrative persuasion is a multifaceted process, most prior works failed to consider its effects on emotions and subsequent effects on behavioural change (Hamby et al.,

2018). In the present study, we analysed both cognitive and affective outcomes of a first-person narrative in a specific theory-driven framework, the theory of planned behaviour (Ajzen, 1985) enriched with the emotional barriers to CRC screening (Reynolds et al., 2018). This was important because only theory-based research can explain the mechanisms underlying the effects of narrative persuasion on screening behaviour (Perrier & Martin Ginis, 2017). Our study empirically tested for the first time the theory for which narration impacts affective forecasting, and its findings seem to prove otherwise. The narrative video included several topics that are typically addressed individually (Woudstra & Suurmond, 2019): it had an "experience" component (i.e., what the screening was like), a "process" component (i.e., the description of how the protagonists took the decision to screen) and an "outcome" component (i.e., the expression of feelings of relief after having attended screening). Another merit of this study was using videos and not texts. Promoting CRC screening through an audio-visual medium is an effective strategy to reach people with low literacy (Mbanda et al., 2021; Woudstra & Suurmond, 2019) who are the most reluctant to screen (von Wagner et al., 2011). Finally, this study contributes to extending the research on narrative persuasion to new linguistic populations. Prior studies were mainly conducted with English-speaking samples; thus, we cannot be sure that the existing findings can be applied and generalised to other linguistic populations (Occa & Sugg, 2016). To the best of our knowledge, only Gavaruzzi et al. (2018) tested the effects of narrative persuasion on the CRC screening intention of Italian-speaking participants, but they used text narratives. Their findings showed that a relief-based narrative (i.e., feeling relieved after receiving a negative FIT or FOBT result) was more effective in boosting CRC screening intention than an informative leaflet. However, in contrast with the didactic video we tested, their informative text did not simulate the chat with a physician. This might explain why we found different results. The presence of two (fictional) doctors might have been the core of the effectiveness

of the didactic video. Indeed, the most effective intervention to promote CRC screening seems to be the recommendation by physicians (see Goodwin et al., 2019; Sarma et al., 2019) and, although the present findings should be considered with caution, we suggest that such an intervention can be vicariously administered through a cost-effective video depicting doctors explaining CRC risks and how screening works, which partially solve the implementation issues described in Chapter 4 (e.g., the lack of public resources to implement one-to-one interventions).

Chapter 7:

General Discussion

CRC screening low attendance is a serious problem for CRC prevention. Health psychology can provide important conceptual and empirical tools for deepening knowledge in this field. Following this approach, the first aim of this series of studies was to investigate the effects of socio-psychological determinants on CRC screening participation with a focus on emotional barriers. Understanding why people attend or avoid screening is the first step to designing theory-driven interventions promoting CRC screening attendance. Consistent with this, we also explored whether three interventions could lever on these socio-psychological factors to boost CRC screening intention. In particular, our second aim was to explore how the perception or the impact of negative emotions associated with CRC screening (i.e., disgust, embarrassment, fear) can be reduced, and how to foster cognitive facilitators of CRC screening intention (i.e., positive attitudes towards CRC screening, subjective norms, PBC).

Disgust, embarrassment and fear can hinder the attendance of CRC screening because we are naturally inclined to avoid contaminants (e.g., the contact with faeces to collect the stool sample), social exclusions (e.g., being sanctioned for violating the cultural taboo of dealing with faeces), and menaces (e.g., an inauspicious diagnosis) in order to protect our psychical and psychological wellbeing (Reynolds et al., 2018). Nevertheless, the immediate avoidance of a threatening stimulus, such as a faecal collection test or a colonoscopy, is what can be truly fatal in the long run.

Beyond emotional barriers, social cognition models suggest that cognitive factors can improve the willingness to screen. In particular, studies applying the theory of planned behaviour (Ajzen, 1985) showed that a positive evaluation of the CRC screening (i.e., attitudes), the perception of the social pressures to screen (i.e., subjective norms) and the

perceived ease of engaging in this behaviour (i.e., PBC) increased CRC screening intention, and thus actual attendance (Cooke & French, 2008).

The examination of previous studies investigating affective or cognitive predictors of CRC screening, summarised in the present dissertation, revealed some areas of knowledge gaps and possible improvements. First, such line of research often exclusively focused on affective (e.g., Basch et al., 2016; Davis et al., 2017) or cognitive factors (e.g., Denters et al., 2015; von Wagner et al., 2019) as determinants of CRC screening behaviour. Furthermore, research on the effects of the emotions associated with CRC screening typically focused on a single affect (e.g., Consedine, Ladwig, et al., 2011; Vrinten et al., 2015). These approaches may result in a partial view of why people decide to get screened or not, because such a choice more likely depends on a combination of perceptions, beliefs, evaluations (e.g., screening benefits, significant others' expectations) and feelings (e.g., disgust towards the procedure, fear of the outcome) associated with that potential behaviour (Kiviniemi, Ellis, et al., 2018; Reynolds et al., 2018).

A similar issue also concerns the research line on how to promote CRC screening. Research testing interventions to foster CRC screening attendance rarely considered the effects of those interventions on emotional barriers, and very few studies investigated how to reduce the perception or the impact of negative emotions on CRC screening. An exception was the research line about changing the CRC screening procedure to reduce the disgust towards these cancer detection exams (e.g., Chambers, Callander, et al., 2016; Deutekom et al., 2010; Osborne et al., 2018). However, until new screening tests that avoid activating this emotional reaction are concretely available, communication campaigns could strive to improve CRC screening participation by addressing these barriers and fostering the perception of the effectiveness, easiness, and social acceptance of this cancer detection exam.

To investigate the effects of socio-psychological factors on the willingness to attend

CRC detection exams, and to test three interventions aimed at improving the perception of CRC screening, we selected a specific theoretical framework taking into account the importance of assessing and targeting both affective and cognitive determinants of the CRC screening behaviour, and the importance of considering multiple affects associated with CRC screening. Thus, we chose to rely on the theory of planned behaviour (Ajzen, 1985) integrated with anticipated emotional reactions (Conner et al., 2015), which we addressed with the emotional barriers to CRC screening (i.e., disgust, embarrassment, and fear; Reynolds et al., 2018).

Overall, our main findings point at disgust as the main emotional barrier to CRC screening intention, and at fear of the outcome as the primary negative emotion hindering actual CRC screening attendance.

Disgust is an emotional reaction that drives the avoidance of diseases (Curtis, 2011) but, in the CRC screening context, the immediate and instinctive need to avoid infections (derived from the contact with faeces; Curtis, 2011) presses on intention and behaviour more than the desire of avoiding an uncertain future cancer diagnosis. Evidence for the role of disgust in the CRC screening context consistently emerged from the findings of our meta-analysis, those of Study 2, and those of Study 3. In contrast, in Study 4, participants' intention to screen was not affected by disgust, probably because the context put more salience on the social dimension of CRC screening (i.e., the social acceptance of CRC screening, the pressure to screen perceived from significant others), whereas the interventions tested in Study 2 and 3 emphasised internal motivations (i.e., disgust, positive personal attitudes towards CRC screening, and PBC).

The chance of an early detection of CRC might demotivate patients to cope with disgust and attend CRC screening. Indeed, our findings showed that fear of the exam outcome was associated with the avoidance of medical examinations (Study 1). Some people

are so frightened by the possibility of being ill, a condition that could be diagnosed with cancer screening, that they prefer to avoid engaging in the completion of faecal collection tests. This is in line with the qualitative study by Palmer et al. (2014) in which, talking about CRC screening in a focus group, a person declared to avoid getting tested because "what I don't know is not there" (Palmer et al., 2014, p. 1708). Thus, certain people are not inclined to cope with disgust because collecting a stool sample might have a dreadful outcome.

In contrast, individuals who are aware of and believe in the effectiveness of early detection to prevent CRC might be more likely to perceive the struggle of dealing with disgust as worthy. Indeed, in line with the meta-analysis by Cooke and French (2008), positive attitudes towards CRC screening emerged as the main cognitive booster of CRC screening intention in both the studies we carried out (Study 2 and 4). For those individuals, who associate CRC screening with strong positive attitudes, avoiding these exams because of disgust will likely produce cognitive dissonance (Festinger, 1957).

In comparison with attitudes, subjective norms and PBC seemed to be differently activated by contextual factors. Our findings showed that subjective norms boosted CRC screening intention only in Study 4. Conversely, we found a positive effect of PBC on the willingness to screen in Study 2, but not in Study 4. It is possible that the experimental task in Study 2 (i.e., reading the invitation letter and the included kit instructions) was successful in highlighting personal motivations to get screened (e.g., the convenience of completing the test at home) or to avoid CRC screening (i.e., disgust), but it could not activate any association between CRC screening and social pressure, being a standard and impersonal text. We initially thought that deciding to attend CRC screening could constitute a private matter and a choice that is weakly or not affected by social pressure. However, the findings of Study 4 challenged this interpretation. Indeed, the video recordings of two actors (Study 4) might have activated a social dimension that was latent in Study 2. The videos levered on the

social acceptance of CRC screening both explicitly and implicitly, by showing two characters who have attended CRC screening or who talked about CRC screening without any embarrassment, and recommending to get tested. At the same time, the experimental videos in Study 4 gave little space to the CRC screening procedure per se, and we know that messages about an exam procedure are the most likely to affect PBC (Woudstra & Suurmond, 2019).

Finally, none of our findings showed that embarrassment could hinder CRC screening intention or attendance. Thus, our research does not support the role of embarrassment as an emotional barrier to CRC screening. These findings are in contrast with the study of Bocci et al. (2017). However, these authors did not consider disgust, therefore the observed effects of embarrassment might have been ascribable to the co-variation with this other emotion. Indeed, even when we found significant correlations between embarrassment and CRC screening intention or behaviour, this association turned out to be irrelevant when the effects of disgust and fear were controlled for. Overall, in our four studies, embarrassment was always the weakest emotion expressed in association with CRC screening. Considering that participants expressed a strong perception of subjective norms, we believe that embarrassment did not hinder CRC screening because this detection exam is perceived as socially accepted. Nevertheless, it should also be noted that here we refer to the embarrassment associated with faecal collection tests, and not with endoscopic exams. In contrast, Bocci et al. (2017) asked participants if they considered colonoscopy embarrassing, which might further explain why our findings differ.

As far as persuasive communication is concerned, our findings showed that campaigns promoting CRC screening should adopt low-intensity emotional messages rather than high-intensity emotional messages. Indeed, we found that reducing the repetition of bodily waste expressions (e.g., faeces and blood) in a text concerning CRC screening (i.e., the

invitation letter) strengthened the positive effects of PBC on CRC screening intention (Study 2). Furthermore, in Study 3 we found that participants who tended to adopt a reappraisal regulation strategy (i.e., who downregulate negative emotions by purposefully ignoring the negative aspects of a situation in favour of positive aspects) could effectively neutralise the effects of disgust on CRC screening intention. Thus, persuasive messages should help the receivers to reappraise their negative emotions towards CRC screening, which can be pursued with low-intensity emotional stimuli, whereas high-intensity stimuli hinder the adoption of reappraisal strategies (Sheppes et al., 2014).

Another suggestion in this regard emerges from the findings of Study 3: it is worth formulating messages levering on both cognitive and affective attitudes towards CRC screening. In our experiment, this condition resulted as more persuasive than a control message without any lever, whereas messages including only an affective or cognitive lever had no effect on CRC screening intention.

Finally, our findings unexpectedly showed that didactic messages can be more persuasive than stories. The invitation letter manipulated in Study 2 (which explains how to attend CRC screening) and the infographics tested in Study 3 (which mentioned the benefits of CRC screening) can be classified as didactic messages, which are usually considered more effective in targeting beliefs than emotions (Zebregs et al., 2015). Thus, in Study 4 we tested whether the promotion of CRC screening could be furtherly improved using narratives, which should reduce the perception of negative emotions associated with CRC screening (A. J. Dillard et al., 2010), and foster positive attitudes, subjective norms and PBC (Braddock & J. P. Dillard, 2016; Camelo et al., 2021). On the contrary, the narrative video did not improve CRC screening intention, whereas the didactic video reduced participants' perception of disgust and embarrassment, improved attitudes and subjective norms, and indirectly enhanced intention to screen, but only among participants who had not yet received the invitation letter.

For those participants who had received an invitation letter but refused to get screened, the didactic video increased CRC screening intention directly.

The greatest advantage of the didactic video over the narrative and control videos might have been the presence of two fictional doctors describing CRC screening and its benefits. Their presence probably made the didactic video more realistic, thus eliciting a stronger cognitive dissonance in the receivers. The positive effects of the didactic video on attitudes and subjective norms showed that this persuasive message might have convinced participants of the screening utility and its social acceptance. Thus, participants might have felt the need to form intentions accordingly to these preliminary positive beliefs. For those participants who had received an invitation letter but refused to attend screening, the video elicited a dissonance between their past behaviour and the evidence of screening importance not only as an instrument of early diagnosis, but as a way of preventing CRC. Thus, forming intentions to screen is a first step for restoring internal consistency and alleviating cognitive dissonance. However, this interpretation remains theorical because we failed to operationalise the cognitive dissonance state.

We acknowledge that this was not the only weakness of the here outlined series of studies. The present research suffers from a number of other limitations, several of which have been noted and described in the previous chapters. Our initial research project was severely simplified to meet the circumstances dictated by the Covid-19 pandemic or by other organisational constraints. For instance, we could not send the manipulated invitation letter to a sample population in place of the original letter to assess the effects of this intervention on actual behaviour, because the delivery system of our research partner, the Local Health Authority in Bologna, did not contemplate sending different versions of the letters to different citizens. We could not host participants in a laboratory set, thus we were obliged to conduct the experiments online. These issues, together with privacy ones, prevented us from adopting

behavioural outcomes (e.g., accepting a screening kit before the debriefing or accessing screening attendance data), and we had to rely on self-report measures.

Participants' answers might differ from how they actually behave in certain situations, and hypothetical scenarios have been criticised as replacement for real-life contexts (Baumeister et al., 2007). In particular, self-report measures of intention and affects do not capture the full extent of emotions' impact on behaviour (Lawton et al., 2009). Self-reports can be inaccurate because these measures suffer from response bias, such as reflecting self-presentational concerns rather than actual attitudes or behaviours (Ajzen, 2005; Baumeister et al., 2007), and people can be poor estimators of their own emotions (Lawton et al., 2009). Nevertheless, self-reports are considered a reliable instrument to measure affect in terms of experiential feeling states (J. P. Dillard et al., 2017; D. M. Williams et al., 2018), and the absence of face-to-face interactions with the researchers or other participants should reduce the social desirability bias (Klasko-Foster et al., 2020). Intention might be an imprecise measure for other reasons: although the theory of planned behaviour considers intention as a proxy of behaviour (Ajzen, 1985), many studies found that the intention-behaviour gap is quite large (see Sheeran & Webb, 2016), and people who intend to screening are often unsuccessful in pursuing their goals (Le Bonniec et al., 2021). It is most likely that the questionnaires administered for the present studies were not completed at a crucial moment, when participants actually had to decide on CRC screening attendance. Thus, their answers could have been detached and could have reflected unrelated internal states (Lawton et al., 2009). With a cool head, participants might have underestimated their feelings towards CRC screening and overestimated their intention to screen even if such answers were not affected by social desirability bias.

We also failed to design longitudinal studies. Therefore, although in the present dissertation we adopted some causal terms for the sake of fluency, readers should be cautious

in assessing cause-effect relationships from our findings. Indeed, the cross-sectional design of the here outlined four studies prevents us from establishing causal consequences of our main predictors and interventions on CRC screening intention.

Qualitative approaches are also notably assent in the present series of studies. We acknowledge that exploring the role of affective and cognitive factors through qualitative methods might give greater insight into citizens' expectations and beliefs about this cancer detection exam. However, previous qualitative studies have already assessed the association between CRC screening and negative emotions in Italy (Briganti et al., 2009; Genovese et al., 2021; Valent et al., 2020). Thus, we believe that a further qualitative study could not contribute to the existing research on the emotional barriers to CRC screening. On the other hand, only the study by Bocci et al. (2017) assessed the effects of embarrassment and fear on CRC screening attendance with a quantitative approach. Furthermore, to the best of our knowledge, no quantitative research had ever quantified the impact of disgust on the willingness to attend CRC screening, or actual attendance. Nevertheless, a qualitative approach could be helpful to analyse further the perception of our interventions and their effects on the willingness to screen.

For all these reasons, in the present dissertation we cannot claim to have fully captured the determinants of the decisions regarding CRC screening. However, our research line exceeded prior studies, which exclusively considered affective and cognitive predictors of CRC screening intention or focused on a single emotion. Thus, our studies can be considered a preliminary but further step in the research about CRC screening promotion.

A final important limitation of these four studies concerns the nature of the samples. We recruited non-probabilistic samples. Thus, our findings cannot be extended to the screening target population. Our recruitment strategies mainly involved personal contacts and advertisement on social media, with the exception of Study 4 (i.e., recruitment through the

platform Prolific). In these samples, the population that refused to get screened for CRC is underrepresented, probably because the same barriers to CRC screening attendance also elicited avoidance towards answering questions about this cancer detection exam. It is unlikely that participation was affected by participants' perceived expertise on the subject, meaning that participants with no prior experience of CRC screening thought to lack enough information to answer our questions, because in Studies 2–4 (in Study 1 we did not distinguish between participants who refused screening and participants not invited yet) we recruited more participants who are too young to be in the screening target (n = 599) than participants with prior screening attendance (n = 400). Participants who refused to get screened after receiving a formal invitation should have been about the same number of participants who got screened, since half of the screening target actually attend the test. However, these participants were less than one-fifth of CRC screening adherents (n = 72). Thus, we might have incurred in Type I errors, namely rejecting hypotheses that could have been correct (e.g., the role of embarrassment as a CRC screening barrier). However, overall we recruited a total sample of 1,354 participants and results are quite consistent across the studies. Thus, we believe that our findings are robust enough.

To overcome the limitations of the studies outlined above, further research should strive to create ecologically valid experiments by integrating the interventions in actual CRC screening programmes, and by recruiting probabilistic samples. A particular effort should be devoted to recruiting people who have refused to get screened, citizens who feel distant from institutions and the health care system, and citizens with a low socioeconomic status. Indeed, these characteristics could affect the perception of CRC screening (Kiviniemi, Klasko-Foster, et al., 2018) and yield the most interesting insights for comparative research and application purposes.

Further studies should use more objective measures of emotions and cognitions, such

as using facial expression recognition systems, implicit measures or even neuropsychological and neuroimaging techniques, and should rely on behavioural measures, such as the FIT or FOBT kit collection or actual attendance. Prospective studies should assess whether the main predictors of the present research and the interventions suggested actually have a causal impact on CRC screening perception and participation.

In addition, new lines of research might further improve our understanding of the decisions related to CRC screening and the design of persuasive communication. For instance, research should furtherly explore the role of embarrassment. In the present work (Studies 1–4), we measured only the embarrassment associated with faecal collection tests because of our effort to not emphasise the role of colonoscopy. However, the previous study by Bocci et al. (2017) found that the embarrassment associated with the colonoscopy procedure was a significant barrier to CRC screening attendance. Thus, research should disentangle these two different types of embarrassment and their effects on CRC screening decisions.

Further studies should try to purposefully encourage the reappraisal of disgust with messages explicitly recognising that faecal collection or invasive exams can elicit disgust, normalising this reaction and suggesting how to overcome it. This does not necessarily contradict our findings concerning the need to minimise the number of disgusting cues and readers' attentional focus on disgust, because in those studies participants did not receive any specific instruction about how to cope with disgust. In contrast, in a previous research unrelated to health communication, Wong et al. (2021) tested whether messages including clear reappraisal instructions could reduce participants' behavioural avoidance of a disgusting stimulus (i.e., a dead cockroach). Their findings showed that the explicit mention of disgust, when combined with arguments aimed at changing participants' point of view on the stimulus (i.e., primary appraisal) or at explaining how to cope with this emotion, did not backfire.

Indeed, reading those messages reduced participants' perceived likelihood of catching germs (i.e., the primary source of disgust) from touching the experimental stimulus, and increased participants' perceived ability to reappraise disgust (Wong et al., 2021). Thus, further studies might apply Wong et al. (2021)'s research in the context of CRC screening promotion, and explore whether similar persuasive communication interventions can effectively reduce patients' disgust towards CRC detection exams and subsequent avoidance.

Similarly, more research is needed to understand how persuasive messages can help patients to reappraise their fear of the exam outcome, for instance emphasising that screening allows the removal of polyps before they develop into cancer. The use of humour could also be beneficial in this sense, and should be further explored. Indeed, the preliminary research on this topic is quite promising. For example, Carcioppolo et al. (2020) investigated whether a message including both fear and humour appeals was more effective than a standard fear appeal in increasing colonoscopy intentions, and found that the mixed message (i.e., the message with both fear and humour appeals) was the most persuasive for those participants who were particularly worried about cancer.

Another strategy that should be further explored to change the perception of CRC screening is gamification, a *nudge* (see Chapter 4) applying the mechanics of games to different contexts, such as health promotion (Sardi et al., 2017). Gamification increases the motivation to engage in health behaviours and fosters positive cognitive beliefs about that behaviour (see Sardi et al., 2017). In addition, gamification improves the affective associations towards the health behaviour in question (Sardi et al., 2017). The age of the screening target might cast doubts about the effectiveness of this nudge in promoting CRC detection exams. However, previous studies found that gamification is also beneficial for adults older than 55, particularly in the health domain (see Koivisto & Malik, 2021). There are several gamification techniques that could be tested in the CRC screening context

(Gamston et al., 2021; Koivisto & Malik, 2021), such as trivia questions to increase awareness, fun facts (e.g., "Did you know that Ryan Reynolds, the Hollywood star, engaged in a colonoscopy because he lost a bet? It turned out that he was the actual winner: the doctors found and removed a colon polyp before it could develop into cancer"), chances to win prizes (e.g., attending screening enrols patients to a lottery, thus the screening kit becomes a sort of lottery ticket) or presenting the screening procedure as a series of challenges and quests (e.g., checking a box for every screening step and being exposed to a 48 hours countdown to bring the stool sample to the pharmacy).

In the present dissertation, we have constantly focused on patients' points of view and on the effects of their disgust on CRC screening intention. However, it seems reasonable to believe that participants' perceptions of CRC screening might be affected by external factors. Indeed, as we have already described, our findings seem to show that CRC screening is perceived as socially accepted and people can feel a social pressure to screen. Nevertheless, further research might explore the indirect effects of the disgust perceived by other significant actors of the CRC screening process, such as health care professionals, on overall screening attendance rates. For instance, what is the reaction of pharmacists when patients bring the stool sample? Do they display disgust? What immediate feedback do they give to patients that choose to screen? Similarly, investigating general practitioners' implicit perception of CRC screening might help design one-to-one interventions with the patients. Another question might be whether disgust hinders the research on this topic and the creation or spread of promotional campaigns. We have already described in the Introduction of the present dissertation that there are hundreds more psychological studies on breast cancer screening than on CRC screening. In addition, a quick hashtag analysis (i.e., a report about how many times a hashtag has been used in a certain period on social media and websites) revealed that, in the period between the 20th and 27th of January 2023, the hashtag

#breastcancerscreening was used 59 times, the hashtag #cervicalcancerscreening was used 69 times, whereas #colorectalcancerscreening was used only 16 times (BrandMentions, 2023). This is in line with a recent scoping review collecting studies about social media interventions to improve cancer screening attendance, which identified only three studies (out of 23) about CRC screening. Thus, paradoxically (or maybe in part for this reason), the mass screening programme that has the lowest screening attendance rates is the least studied and the least promoted. We insist that further studies and public efforts are needed to understand how to change the overall perception of CRC detection exams, not only those of screening potential patients, and actually modify such perception.

In sum, the research on CRC screening promotion is still in its infancy, and many research lines deserve further exploration. However, we believe the current research significantly contributed to the existing state of the art.

To the best of our knowledge, no study had previously assessed the role of disgust in the CRC screening context with a meta-analytical approach. Then, our correlational and experimental works expanded the research summarised in the meta-analysis to a cultural context never examined before, Italy. Research about disgust or investigating persuasive communication as an instrument to promote cancer screening programmes were mainly conducted in English-speaking countries (Occa & Suggs, 2016; Rozin et al., 2008). Our studies answer the need to investigate other linguistic populations, as Occa and Suggs (2016) suggested, because the effects identified in certain cultural groups cannot be applied a priori to different populations (Deutekom et al., 2010; Fung et al., 2008; Occa & Suggs, 2016). Thus, studying novel contexts always adds something new to existing research (Chapple et al., 2008), and it is an essential first step for designing interventions.

We adopted a comprehensive perspective on the socio-psychological determinants of CRC screening behaviours, whereas previous studies tended to focus either on affective or

cognitive factors, or focused on a single emotion (e.g., anticipated regret). This research line allowed us to analyse the effects of emotions over and above cognitive factors, and to control for potential confounding effects derived from the co-variation between different affects. Thus, we could confirm the relevance of disgust in the CRC screening context and question the role of embarrassment.

Finally, we tested three theory-driven interventions that levered on the identified socio-psychological determinants of CRC screening participation to foster intention to screen. Each experimental study added a piece to the understanding of CRC screening decisions and had practical implications for the promotion of CRC screening. For instance, our findings showed the benefits of avoiding an overabundance of terms associated with bodily waste (Study 2), that citizens who are approaching the age to screen for CRC and those who have been already invited might benefit from the same message (Study 3), and a video can effectively create a vicarious chat with doctors recommending CRC screening (Study 4).

Each of these interventions can be potentially implemented on a different medium. Although the effects of combining two or more of the interventions outlined here should be tested, the present dissertation might be used for the design of an integrated communication plan (i.e., to design a campaign that coherently transmits the same values, with different messages, on multiple devices). The present findings might suggest how to improve the wording of the messages about CRC screening (i.e., reducing the repetition of the words associated with faeces and blood), starting from the invitation letters (Study 2), which type of message should be included on information leaflets and printed advertisements or, considering the square format of the infographics tested, posted on Instagram (i.e., messages levering on affective and cognitive arguments; Study 3); and which content should be spread on audio-visual traditional (e.g., a television spot) or digital (e.g., YouTube or Facebook) devices (i.e., educational videos starring doctors).

Changing the perception of CRC screening, and turning it from being considered a disgusting and scary exam into an unoffensive habit, might be a great challenge. However, public policies and the scientific community should keep striving to achieve this goal, because even small increases in screening attendance rates can translate into a significant prevention of new cases of CRC or into an early detection (Chambers, Callander, et al., 2016; Rottoli et al., 2022). Thus, improving the perception of CRC detection exams can ultimately save several lives.

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Appendix A

Survey Flow (Study 1)

Standard: Block 1
Standard: Block 2
Branch: New Branch
    If
        If Con la presente dichiara di essere stato informato/a, prima di partecipare allo studio, del dirit...
            Non acconsento
                Is Selected
        Or Ha dai 45 ai 69 anni?
            No
                Is Selected
        Or Vive in Italia attualmente?
            No
                Is Selected
        Or Le è mai capito in passato di avere una diagnosi di tumore al colon-retto?
            Sì
                Is Selected
    Block: Message
    EndSurvey
Standard: Block 3
Standard: Block 4
Standard: Block 5
Standard: background
Standard: debriefing
EndSurvey:
Standard: Message

Survey (Study 1):

Start of Block: Block 1

Questionario sulla percezione dello screening per il tumore al colon-retto

Salve, sono una dottoranda dell'Università di Parma. Per la mia tesi di dottorato sto svolgendo una ricerca su come le persone percepiscono lo screening per il tumore al colon-retto. Nell'ambito di questo progetto, Le chiedo di rispondere ad un breve questionario. La Sua partecipazione è molto importante per me, e richiederà circa 8 minuti.

Può interrompere la compilazione del questionario in qualsiasi momento.

Non ci sono risposte giuste o sbagliate, mi interessano soltanto le Sue sincere opinioni. Le chiedo cortesemente di rispondere con assoluta onestà.

Le garantisco il più assoluto anonimato sulle Sue risposte e Le assicuro il trattamento dei Suoi dati nel

massimo rispetto delle norme della privacy (D.Lgs. 196/03 e UE GDPR 679/2016).

End of Block: Block 1

Start of Block: Block 2

Con la presente dichiara di essere stato informato/a, prima di partecipare allo studio, del diritto di interrompere la partecipazione in qualsiasi momento, senza fornire alcuna motivazione. Dichiara di essere stato informato/a dello scopo del presente studio e del fatto che i dati rimarranno anonimi. Dichiara di essere a conoscenza del fatto che solo le persone che conducono la ricerca potranno avere accesso ai dati, limitatamente ai fini della loro elaborazione e alla pubblicazione anonima dei risultati a fine scientifico.
Per ulteriori informazioni può rivolgermi alla responsabile della ricerca Giulia Scaglioni (giulia.scaglioni@unipr.it).

- ○ Acconsento
- ○ Non acconsento

Ha dai 45 ai 69 anni?

- ○ Sì
- ○ No

Vive in Italia attualmente?

- ○ Sì
- ○ No

Le è mai capito in passato di avere una diagnosi di tumore al colon-retto?

- ○ Sì
- ○ No

End of Block: Block 2

Start of Block: Message

Display This Question:

If Con la presente dichiara di essere stato informato/a, prima di partecipare allo studio, del dirit... = Non acconsento

Or Ha dai 45 ai 69 anni? = No

Or Vive in Italia attualmente? = No

Or Le è mai capito in passato di avere una diagnosi di tumore al colon-retto? = No

La ringrazio tantissimo per l'interesse, ma non soddisfa i requisiti di partecipazione allo studio. Purtroppo non potrà proseguire con la compilazione del questionario. Mi scuso per l'inconveniente.

End of Block: Message

Start of Block: Block 3

Attenzione:
Una volta premuto il tasto per proseguire (→) non sarà più possibile tornare a questa pagina.
Si richiede cortesemente di leggere con attenzione.

In cosa consiste lo screening per il tumore al colon-retto? Lo screening per il tumore al colon-retto viene eseguito ogni due anni ed è rivolto a persone di età compresa tra i 50 e i 70-74 anni. In Italia, quasi tutte le regioni conducono lo screening per il tumore al colon-retto con il test del sangue occulto nelle feci: ai cittadini viene fornito un kit per raccogliere a casa un piccolo campione di feci, che verrà poi analizzato per verificare che non presenti tracce di sangue invisibili a occhio nudo. Poiché le eventuali tracce di sangue possono essere un indizio della presenza di forme tumorali oppure di polipi che, in futuro, potrebbero degenerare in cancro, se il test del sangue occulto nelle feci è positivo, il cittadino o la cittadina vengono invitati ad eseguire degli esami di approfondimento. Una tipica procedura di screening per il tumore al colon-retto comincia con il ricevimento della lettera d'invito. La lettera va poi consegnata in farmacia, dove si ritirerà un kit composto da un flaconcino e una busta di plastica. Per raccogliere il campione, bisogna aprire il flacone e usare il bastoncino al suo interno. Dopodiché, una volta prelevato il materiale organico, si reinserisce il bastoncino nel flacone, si chiude il tappo, e lo si mette nella busta di plastica. La busta va riconsegnata in farmacia.
Fonti:
Ministero della salute (salute.gov.it)
Azienda Unità Sanitaria Locale di Bologna (ausl.bologna.it)

End of Block: Block 3

Start of Block: Block 4

Immagini di ricevere una lettera d'invito allo screening per il tumore al colon-retto. Di seguito troverà una lista di frasi che a volte le persone dicono in questa occasione. Le chiediamo cortesemente di indicare quanto è d'accordo con ciascuna di esse. Per favore, esprima il Suo grado di accordo su una scala da 1 a 5, dove 1 significa "per niente d'accordo" e 5 "molto d'accordo".

	1 - per niente d'accordo	2	3	4	5 - del tutto d'accordo
Raccogliere un campione delle mie feci con un bastoncino è davvero disgustoso	○	○	○	○	○
Temo che, fornendo un campione di feci, io possa scoprire di avere il cancro	○	○	○	○	○
Sarei così preoccupato/a per la diagnosi di cancro al colon-retto che eviterei di fare il test per la ricerca del sangue occulto nelle feci	○	○	○	○	○
Mi sento male all'idea di dover raccogliere un campione delle mie feci	○	○	○	○	○
Tenere in mano il kit con dentro il campione delle mie feci è disgustoso	○	○	○	○	○
Dare un campione di feci per lo screening è davvero imbarazzante	○	○	○	○	○
Immaginare che altre persone sappiano che sto raccogliendo un campione di feci per lo screening sarebbe imbarazzante	○	○	○	○	○
Raccogliere un campione delle mie feci è così disgustoso che penso che potrei vomitare	○	○	○	○	○
Mi sentirei umiliato/a se qualcuno trovasse il kit che mi è stato dato per raccogliere il campione di feci	○	○	○	○	○
Mi preoccuperei che il test per la ricerca del sangue occulto nelle feci possa trovare qualcosa che non va in me	○	○	○	○	○

End of Block: Block 4

Start of Block: Block 5

Adesso vorremmo capire quanto conosce lo screening per il tumore al colon-retto. Le chiediamo cortesemente di indicare se le seguenti informazioni sono vere o false. Non è un esame, non abbia

paura di dare la risposta sbagliata.

Alla fine del questionario, se Le interessa, potrà verificare quale risposta era corretta.

Solo gli uomini si possono ammalare di tumore al colo-retto.

- ○ Vero
- ○ Falso
- ○ Non saprei

Da quando è iniziato lo screening, la mortalità del tumore al colon-retto è diminuita del 30%.

- ○ Vero
- ○ Falso
- ○ Non saprei

Grazie allo screening, si può prevenire lo sviluppo del cancro al colon-retto.

- ○ Vero
- ○ Falso
- ○ Non saprei

In Italia, si ammala di tumore al colon-retto una persona su 30.

- ○ Vero
- ○ Falso
- ○ Non saprei

La probabilità di dover fare un esame di accertamento (colonscopia) dopo il test per la ricerca del sangue occulto è di 1 su 10.

- ○ Vero
- ○ Falso
- ○ Non saprei

Le persone che hanno l'età per fare lo screening ricevono la lettera di invito ogni anno.

- ○ Vero
- ○ Falso
- ○ Non saprei

Il cittadino o la cittadina usano il kit per raccogliere il campione di feci direttamente in ospedale. Il kit, quindi, NON viene usato a casa

- ○ Vero
- ○ Falso
- ○ Non saprei

Prima di raccogliere il campione di feci, bisogna osservare una dieta particolare

- ○ Vero
- ○ Falso
- ○ Non saprei

Il campione di feci NON può essere raccolto durante il ciclo mestruale

- ○ Vero
- ○ Falso
- ○ Non saprei

Una volta raccolto il campione, si può conservare il flacone per settimane prima di portarlo ad analizzare

- ○ Vero
- ○ Falso
- ○ Non saprei

End of Block: Block 5

Start of Block: debriefing

Il questionario è quasi finito.

Prima di congedarci, La informo che questo studio ha l'obiettivo di costruire uno strumento di misurazione delle barriere emotive che possono ostacolare l'adesione allo screening per il tumore al

colon-retto.

Per favore, indichi se esprime il Suo consenso all'utilizzo dei dati:

- ○ Acconsento
- ○ Non acconsento

Dichiara di possedere i requisiti di partecipazione (età tra i 45 e i 69 anni, attualmente residente in Italia, senza una storia pregressa di tumore al colon-retto); di aver letto attentamente domande e istruzioni; di essere stato informato/a rispetto agli obiettivi dello studio; di aver ricevuto soddisfacenti garanzie sulla riservatezza delle informazioni fornite?

- ○ Sì
- ○ No

Per qualsiasi domanda, dubbio, o aggiornamento sulla ricerca può contattarmi all'indirizzo e-mail giulia.scaglioni@unipr.it
Di seguito può trovare le risposte corrette alle domande sullo screening al colon-retto:

Solo gli uomini si possono ammalare di tumore al colo-retto.
FALSO. Il tumore al colon-retto è la seconda forma tumorale più diffusa tra le donne, e la terza tra gli uomini.

Da quando è iniziato lo screening, la mortalità del tumore al colon-retto è diminuita del 30%.
VERO.

Grazie allo screening, si può prevenire lo sviluppo del cancro al colon-retto.
VERO. Lo screening protegge dalla formazione di tumori perché permette di individuare e rimuovere i polipi che potrebbero evolvere in forme tumorali maligne.

In Italia, si ammala di tumore al colon-retto una persona su 30.
FALSO. In Italia si ammalano di tumore al colon-retto 1 uomo su 13, e 1 donna su 21.

La probabilità di dover fare un esame di accertamento (colonscopia) dopo il test per la ricerca del sangue occulto è di 1 su 10.
FALSO. È la metà: 5 persone su 100.

Le persone che hanno l'età per fare lo screening ricevono la lettera di invito ogni anno.

FALSO. Lo screening viene eseguito ogni due anni.

Il cittadino o la cittadina usano il kit per raccogliere il campione di feci direttamente in ospedale, il kit NON viene usato a casa.
FALSO. La raccolta del campione di feci va fatta a casa.

Prima di raccogliere il campione, bisogna osservare una dieta particolare.
FALSO.

Il campione di feci NON può essere raccolto durante il ciclo mestruale.
VERO.

Una volta raccolto il campione, si può conservare il flacone per settimane prima di portarlo ad analizzare.
FALSO. Il flacone può essere conservato al massimo per 48 ore.

End of Block: debriefing

Appendix B

Original version	Back-translation from the items translated in Italian
Collecting a sample of my own faeces/poo on a swab stick is really nasty	Collecting a sample of my own feces with a stick is really disgusting.
I am afraid that giving a stool sample might lead to discovering I have cancer	I'm afraid that, if I give a stool sample, I might find out I have cancer.
I would be so concerned about being diagnosed with bowel cancer that I would avoid testing	I would be so worried about being diagnosed with colorectal cancer, that I would avoid testing.
The idea of having to gather a sample of my own faeces makes me feel sick	I feel sick at the thought of collecting a sample of my own feces.
Holding a container of my own faeces is disgusting	Holding the kit with my own stool sample in it is disgusting.
I would worry that stool testing would find something wrong with me	I'd be worried that the fecal occult blood test would find something wrong with me.
Giving a stool/faecal sample for testing is really embarrassing	Giving a stool sample for screening is really embarrassing.
Imagining that other people know I am collecting stool samples for testing would be embarrassing	Imagining other people knowing I'm collecting a stool sample for screening would be embarassing.
Collecting my own faeces/poo is so disgusting I think I would gag	Collecting a sample of my own feces is so disgusting, I think I might vomit.
I would feel humiliated if someone found a faecal collection kit I had been given	I would feel humiliated if someone found the kit I was given to collect the stool sample

Appendix C

Original invitation letter (changes highlighted in yellow)

(Page 1)

Centro Coordinamento Screening
Via Montebello, 6 40121 Bologna

INVITATION TO FAECAL OCCULT BLOOD TEST

Dear Sir/Madam,

the Local Health Authority of Bologna invites you to perform **the Faecal Occult Blood Test** to participate to the Screening Programme for the prevention of colorectal cancer.

In order to adhere to invitation, you have to:

- **GO TO A PHARMACY WITH THIS LETTER, YOUR HEALTH CARD AND AN IDENTITY DOCUMENT** and you can pick up a kit to perform the test;
- Collect the sample according to the **INSTRUCTIONS to perform the test** placed on the next page;
- **ONLY** return the test tube **TO A PHARMACY**;

The list of the pharmacies participating in the Screening Programme is available at **https://www.ausl.bologna.it**

The invitation is valid for 12 months from the printing date in the top left-hand corner, **BUT**

WE INVITE YOU TO ADHERE TO THE INVITATION AS SOON AS POSSIBLE;

The test is **free of cost**, along with any further subsequent investigations.

If the test is negative, the result will be sent to you by mail.

If further investigations will be required, you will be contacted by telephone by the Screening Center's health staff.

For any doubts or further information, please contact us:

- ✓ by using the email address centro.screening@ausl.bologna.it indicating name, family name, date of birth and telephone number
- ✓ by using the TOLL-FREE NUMBER 800-314858 on Monday, Tuesday, Wednesday, Thursday 10 am - 2 pm, Friday 10 am - 12 pm

We are waiting for you!

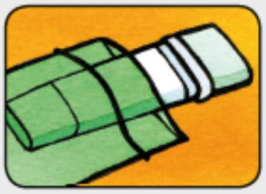
The Health Director of the AUSL of Bologna

(Page 2)

Centro screening
Via Montebello, 6 - 40121 Bologna
NUMERO VERDE 800 31 48 58
Centro.screening@ausl.bologna.it

Azienda USL di Bologna
Sede Legale: Via Castiglione, 29 - 40124 Bologna
Tel. +39.051.6225111 fax +39.051.6584923
Codice fiscale e Partita Iva 02406911202

INSTRUCTIONS FOR COLLECTING THE STOOL SAMPLE FOR FAECAL OCCULT BLOOD TESTING



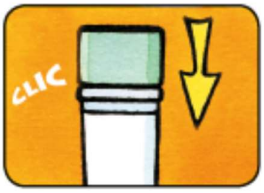
1. at the pharmacy, you were provided with a kit made up of a test tube and a plastic envelope.

2. first of all, you need to collect a stool sample in a clean and dry container.

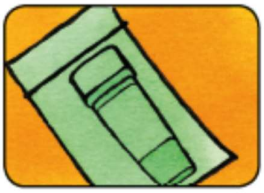
3. open the test tube taking care not to spill the liquid contained in the tube.

4. then randomly scrape the tip of the stick over the faeces (3 or 4 points are sufficient).

5. now you can reinsert the stick into the tube, taking care not to soil the outside of the tube. Close it carefully.



6. close the test tube by exerting a slight pressure on the cap.



7. then place the flask in the dedicated plastic envelope and **keep it in a refrigerator until it is returned within 48 hours.**

WE REMIND YOU THAT:

- it is not necessary to follow any special diet before collecting the faeces.
- do not collect the stool sample during your period.
- in case of visible bleeding from the colon, consult your family doctor before

performing the test.

- for further information please contact the Screening Centre at the contact details provided on the invitation letter.

Manipulated invitation letter

(Page 1)

Dear Sir/Madam,

the Local Health Authority of Bologna invites you to perform **the Faecal Occult Blood (FOB) test** to participate to the Screening Programme for the prevention of colorectal cancer.

In order to adhere to invitation, you have to:

- **GO TO A PHARMACY WITH THIS LETTER, YOUR HEALTH CARD AND AN IDENTITY DOCUMENT** and you can pick up a kit to perform the test;

- Collect the sample according to the **INSTRUCTIONS to perform the test** placed on the next page;

- **ONLY** return the test tube **TO A PHARMACY**;

The list of the pharmacies participating in the Screening Programme is available at **https://www.ausl.bologna.it**

The invitation is valid for 12 months from the printing date in the top left-hand corner, **BUT WE INVITE YOU TO ADHERE TO THE INVITATION AS SOON AS POSSIBLE**;

The test is **free of cost**, along with any further subsequent investigations.

If the test is negative, the result will be sent to you by mail.

If further investigations will be required, you will be contacted by telephone by the Screening Center's health staff.

For any doubts or further information, please contact us:

- ✓ by using the email address centro.screening@ausl.bologna.it indicating name, family name, date of birth and telephone number
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We are waiting for you!

The Health Director of the AUSL of Bologna

(Page 2)

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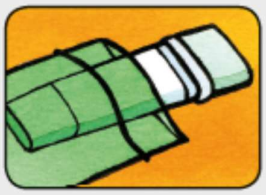
INSTRUCTIONS FOR COLLECTING THE STOOL SAMPLE



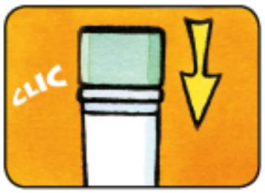
1. at the pharmacy, you were provided with a kit made up of a test tube and a plastic envelope.

2. first of all, you need to collect a stool sample in a clean and dry container.

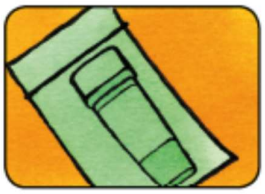
3. open the test tube taking care not to spill the liquid contained in the tube.

4. then randomly scrape the tip of the stick over the sample (3 or 4 points are sufficient).

5. now you can reinsert the stick into the tube, taking care <u>not to soil</u>
the outside of the tube. Close it carefully.



exerting a slight pressure on the cap.



7. then place the flask in the dedicated plastic envelope and **keep it in a refrigerator until it is returned within 48 hours.**

WE REMIND YOU THAT:

- it is not necessary to follow any special diet before collecting the sample.
- do not collect the sample during your period.
- in case of visible bleeding from the colon, consult your family doctor before

performing the test.

- for further information please contact the Screening Centre at the contact details provided on the invitation letter.

Appendix D

Survey flow (Study 2):

Block: Default Question Block
Standard: Block 1
Standard: Block 2
Branch: New Branch
    If
        If La ringrazio tantissimo per l'interesse, ma non soddisfa i requisiti di partecipazione allo studi...
            Is Displayed
    EndSurvey: Advanced
BlockRandomizer: 1 - Evenly Present Elements
    Standard: Experimental Letter
    Standard: Control Letter
Standard: Block 5
Standard: Block 6
Standard: Block 7
Standard: Block 8
Standard: Block 9
Standard: Block 10
EndSurvey

Survey (Study 2):

Start of Block: Default Question Block

Questionario sulla percezione della lettera d'invito allo screening per il tumore al colon-retto
Salve, mi chiamo Giulia Scaglioni e sono una dottoranda dell'Università di Parma.
Per la mia tesi di dottorato sto svolgendo una ricerca su come le persone percepiscono lo screening per il tumore al colon-retto.
Nell'ambito di questo progetto, Le chiedo cortesemente di leggere una simulazione della lettera d'invito relativa a questo screening, e di rispondere ad un breve questionario. Lo studio prevede che i partecipanti, in modo casuale, leggano una simulazione di una lettera che veniva usata dall'Azienda Unità Sanitaria Locale di Bologna, o una versione della stessa leggermente modificata.
La Sua partecipazione è molto importante per me, e richiederà circa 15 minuti. Può interrompere la compilazione del questionario in qualsiasi momento.
Non ci sono risposte giuste o sbagliate, mi interessano soltanto le Sue sincere opinioni. Le chiedo cortesemente di rispondere con assoluta onestà.
Le garantisco il più assoluto anonimato sulle Sue risposte e Le assicuro il trattamento delle risposte da lei fornite nel massimo rispetto delle norme della privacy (D.Lgs. 196/03 e UE GDPR 679/2016).

End of Block: Default Question Block

Start of Block: Block 1

Con la presente acconsente a partecipare allo studio e dichiara:
- di essere stato informato/a, prima di partecipare allo studio, del diritto di interrompere la partecipazione in qualsiasi momento, senza fornire alcuna motivazione.
- di essere stato informato/a dello scopo del presente studio e del fatto che i dati rimarranno anonimi.
- di essere conoscenza del fatto che solo le persone che conducono la ricerca potranno avere accesso alle sue risposte, limitatamente ai fini della loro elaborazione e alla pubblicazione anonima dei risultati a fine scientifico.

Per ulteriori informazioni può rivolgersi alla responsabile della ricerca Giulia Scaglioni (giulia.scaglioni@unipr.it).

- ○ Acconsento
- ○ Non acconsento

Ha più di 40 anni?

- ○ Sì
- ○ No

Attualmente è residente nel territorio di competenza dell'Azienda USL di Bologna?
Qui può trovare in ordine alfabetico l'elenco dei Comuni di competenza dell'AUSL di Bologna:
Argelato, Alto Reno Terme, Anzola dell'Emilia, Bazzano, Baricella, Bentivoglio, Bologna, Budrio, Calderara di Reno, Camugnano, Casalecchio di Reno, Castel d'Aiano, Castel di Casio, Castel Maggiore, Castello d'Argile, Castello di Serravalle, Castenaso, Castiglione dei Pepoli, Crespellano, Crevalcore, Gaggio Montano, Galliera, Granaglione, Granarolo dell'Emilia, Grizzana Morandi, Lizzano in Belvedere, Loiano, Malalbergo, Marzabotto, Minerbio, Molinella, Monghidoro, Monte San Pietro, Monterenzio, Monteveglio, Monzuno, Ozzano dell'Emilia, Pianoro, Pieve di Cento, Porretta Terme, Sala Bolognese, San Benedetto Val di Sambro, San Giorgio di Piano, San Giovanni in Persiceto, San Lazzaro di Savena, San Pietro in Casale, Sant'Agata Bolognese, Sasso Marconi, Savigno, Valsamoggia, Vergato, Zola Predosa

- ○ Sì
- ○ No

Le è mai capitato in passato di ricevere una diagnosi di tumore al colon-retto?

- ○ Sì
- ○ No

End of Block: Block 1

Start of Block: Block 2

Display This Question:
If Con la presente acconsente a partecipare allo studio e dichiara - di essere stato inform... = Non acconsento
Or Ha più di 40 anni? = No
Or Attualmente è residente nel territorio di competenza dell'Azienda USL di Bologna? Qui può trov... = No
Or Le è mai capitato in passato di ricevere una diagnosi di tumore al colon-retto? = Sì

La ringrazio tantissimo per l'interesse, ma non soddisfa i requisiti di partecipazione allo studio. Purtroppo non potrà proseguire con la compilazione del questionario. Mi scuso per l'inconveniente.

End of Block: Block 2
Start of Block: Experimental letter

Di seguito troverà una simulazione della lettera d'invito allo screening per il tumore al colon-retto.
La preghiamo di leggere con attenzione il **titolo**, il **testo** e le **istruzioni riportate**.
La informiamo che il tempo trascorso su questa pagina sarà misurato e usato nelle analisi.

Timing
First Click
Last Click
Page Submit
Click Count

Attenzione:
Una volta premuto il tasto per proseguire (→) non sarà più possibile tornare a questa pagina

----- First page -----

----- Second page -----

End of Block: Experimental letter
Start of Block: Control letter

Di seguito troverà una simulazione della lettera d'invito allo screening per il tumore al colon-retto.
La preghiamo di leggere con attenzione il **titolo**, il **testo** e le **istruzioni riportate**.
La informiamo che il tempo trascorso su questa pagina sarà misurato e usato nelle analisi.

Timing
First Click
Last Click
Page Submit
Click Count

Attenzione:
Una volta premuto il tasto per proseguire (→) non sarà più possibile tornare a questa pagina

----- First page -----

----- Second page -----

End of Block: Control letter

Start of Block: Block 5

Ricorda il titolo della lettera?

- ○ Invito a ricerca sangue occulto
- ○ Invito a FOB Test

End of Block: Block 5

Start of Block: Block 6

Immagini di aver ricevuto veramente la lettera che ha appena esaminato, e di dover decidere se partecipare o meno allo screening.
Quanto è probabile che lei si trovi nelle seguenti situazioni?

Esprima tale probabilità su una scala da 1 a 5, dove 1 significa "per niente probabile" e 5 "molto probabile".

	1 - per niente d'accordo	2	3	4	5 - del tutto d'accordo
Raccogliere un campione delle mie feci con un bastoncino è davvero disgustoso	○	○	○	○	○
Temo che, fornendo un campione di feci, io possa scoprire di avere il cancro	○	○	○	○	○
Sarei così preoccupato/a per la diagnosi di cancro al colon-retto che eviterei di fare il test per la ricerca del sangue occulto nelle feci	○	○	○	○	○
Mi sento male all'idea di dover raccogliere un campione delle mie feci	○	○	○	○	○
Tenere in mano il kit con dentro il campione delle mie feci è disgustoso	○	○	○	○	○
Dare un campione di feci per lo screening è davvero imbarazzante	○	○	○	○	○
Immaginare che altre persone sappiano che sto raccogliendo un campione di feci per lo screening sarebbe imbarazzante	○	○	○	○	○

Raccogliere un campione delle mie feci è così disgustoso che penso che potrei vomitare	○	○	○	○	○
Mi sentirei umiliato/a se qualcuno trovasse il kit che mi è stato dato per raccogliere il campione di feci	○	○	○	○	○
Mi preoccuperei che il test per la ricerca del sangue occulto nelle feci possa trovare qualcosa che non va in me	○	○	○	○	○

End of Block: Block 6
Start of Block: Block 7

Adesso per favore indichi il suo grado di accordo verso le seguenti frasi selezionando il relativo punteggio su una scala che va da 1 (per niente d'accordo) a 5 (del tutto d'accordo).

	1 - per niente d'accordo	2	3	4	5 - del tutto d'accordo
Quando mi arriverà la lettera di screening, farò il test per il sangue occulto nelle feci	○	○	○	○	○
Sono intenzionato/a a partecipare allo screening per il tumore al colon-retto	○	○	○	○	○
Le persone che sono importanti per me mi consiglierebbero di fare lo screening per il tumore al colon-retto	○	○	○	○	○
Le persone che sono importanti per me vorrebbero che io partecipassi allo screening per il tumore al colon-retto	○	○	○	○	○
Penso che riuscirei a ritirare e riconsegnare il kit in farmacia	○	○	○	○	○
Penso che riuscirei a raccogliere il campione di feci con il kit ritirato in farmacia	○	○	○	○	○
Ritengo che lo screening per il tumore al colon-retto sia utile	○	○	○	○	○
Ritengo che fare lo screening per il tumore al colon-retto sarebbe una perdita di tempo	○	○	○	○	○

Fare lo screening per il tumore al colon-retto sarebbe un'esperienza negativa	○	○	○	○	○
Lo screening per il tumore al colon-retto comporta dei benefici per le persone che partecipano	○	○	○	○	○
Sarei felice di fare lo screening per il tumore al colon-retto	○	○	○	○	○
Lo screening per il tumore al colon-retto presenta molti svantaggi	○	○	○	○	○
L'idea di dovermi sottoporre a una colonscopia, in caso di esito positivo del test, mi spinge a non voler partecipare allo screening	○	○	○	○	○

End of Block: Block 7

Start of Block: Block 8

Ai fini delle analisi, vorremmo capire qual è la sua predisposizione a percepire emozioni negative. Per favore legga ogni affermazione e indichi quanto spesso si trova in situazioni simili.

	Mai	Raramente	Qualche volta	Spesso	Sempre
Evito le cose disgustose	○	○	○	○	○
Quando mi sento disgustato, temo di svenire	○	○	○	○	○
Mi spaventa sentire che ho la nausea	○	○	○	○	○
Provo repulsione	○	○	○	○	○
Le cose disgustose mi danno il volta stomaco	○	○	○	○	○
Faccio smorfie disgustate	○	○	○	○	○
Quando noto di avere la nausea, ho paura di vomitare	○	○	○	○	○

Provo disgusto	○	○	○	○	○
Quando mi sento fisicamente debole, mi spavento	○	○	○	○	○
Trovo che qualcosa mi disgusti	○	○	○	○	○
Mi imbarazza provare disgusto	○	○	○	○	○
Penso che provare disgusto mi faccia male	○	○	○	○	○

End of Block: Block 8

Start of Block: Block 9

Il questionario è quasi terminato. Risponda per favore a queste ultime domande.

Qual è il Suo genere?

- ○ Uomo
- ○ Donna
- ○ Preferisco non rispondere

Quanti anni ha?

_____

In quale Comune risiede?

▼ Argelato ... Zola Predosa

Qual è la sua nazionalità?

_____

Qual è il Suo titolo di studio?

- ○ Scuola dell'obbligo
- ○ Diploma di scuola media superiore
- ○ Laurea triennale
- ○ Laurea magistrale
- ○ Titolo di studio post-universitario

Qual è la Sua condizione lavorativa?

- ○ Studente/Studentessa
- ○ Lavoratore/Lavoratrice autonomo/a
- ○ Lavoratore/Lavoratrice dipendente
- ○ Pensionato/a
- ○ Disoccupato/a e/o in cerca di lavoro
- ○ Altro _____

Come descriverebbe la sua passata partecipazione allo screening per il tumore al colon-retto?

- ○ Non ho mai ricevuto la lettera d'invito e non ho mai fatto il test
- ○ Non ho mai ricevuto la lettera d'invito, ma ho già fatto un test
- ○ Ho ricevuto la lettera d'invito una volta sola, e ho aderito allo screening
- ○ Ho ricevuto una lettera d'invito allo screening, ma non ho aderito
- ○ Ho ricevuto pù lettere d'invito, ma non ho mai fatto il test
- ○ Quando mi arriva la lettera d'invito, non sempre aderisco allo screening
- ○ Faccio lo screening tutte le volte che ricevo l'invito
- ○ Altro (specificare sotto) _____

Nella Sua famiglia, ci sono o ci sono stati casi di tumore al colon-retto?

- ○ Sì, dei miei familiari sono malati o si sono ammalati di tumore al colon-retto
- ○ No, in famiglia non ho mai avuto casi di tumore al colon-retto
- ○ Preferisco non rispondere

Display This Question:
If Nella Sua famiglia, ci *sono o* ci *sono stati casi di tumore al colon-retto? = Sì, dei miei familiari sono malati o si sono ammalati di tumore al colon-retto*

Specificare il grado di parentela della persona che si è o si era ammalata

_____

Questa è l'ultima domanda. Indichi il suo grado di accordo rispetto alla seguente frase.

	1	2	3	4	5
Partecipare allo screening e scoprire di non avere niente mi darebbe serenità					
Potrei rammaricarmi di non aver fatto lo screening					

End of Block: Block 9

Start of Block: Block 10

Consenso finale

Il questionario è finito. La ringrazio per la partecipazione. Il presente studio potrebbe aiutarci a capire come redigere testi d'invito allo screening più efficaci, e a capire meglio quali barriere ostacolano la partecipazione dei cittadini e delle cittadini a questo programma di prevenzione.
Le ricordo che per qualsiasi domanda, dubbio, o aggiornamento sulla ricerca può contattarmi all'indirizzo e-mail giulia.scaglioni@unipr.it

Acconsente all'uso delle risposte fornite?

- ○ Sì
- ○ No

Dichiara di aver letto attentamente la lettera, le domande e le istruzioni; di essere stato informato/a rispetto agli obiettivi dello studio; di aver ricevuto soddisfacenti garanzie sulla riservatezza delle informazioni fornite?

- ○ Sì
- ○ No

End of Block: Block 10

Appendix E


IL PROGRAMMA DI PREVENZIONE ONCOLOGICA DEL SISTEMA SANITARIO OFFRE LA POSSIBILITÀ DI SOTTOPORSI GRATUITAMENTE ALLO SCREENING PRECOCE DEL TUMORE DEL COLON-RETTO
È importante ed è utile sottoporsi all'esame per individuare precocemente la malattia e intervenire in maniera tempestiva per sconfiggerla.
Ritira il kit per la ricerca del sangue occulto nelle feci e fai lo screening.


IL PROGRAMMA DI PREVENZIONE ONCOLOGICA DEL SISTEMA SANITARIO OFFRE LA POSSIBILITÀ DI SOTTOPORSI GRATUITAMENTE ALLO SCREENING PRECOCE DEL TUMORE DEL COLON-RETTO
Scoprire di stare bene, dopo aver partecipato allo screening, ti farà sentire sollevato e più sereno.
Ritira il kit per la ricerca del sangue occulto nelle feci e fai lo screening.


IL PROGRAMMA DI PREVENZIONE ONCOLOGICA DEL SISTEMA SANITARIO OFFRE LA POSSIBILITÀ DI SOTTOPORSI GRATUITAMENTE ALLO SCREENING PRECOCE DEL TUMORE DEL COLON-RETTO
È importante ed è utile sottoporsi all'esame per individuare precocemente la malattia e intervenire in maniera tempestiva per sconfiggerla.
Scoprire di stare bene, dopo aver partecipato allo screening, ti farà sentire sollevato e più sereno.
Ritira il kit per la ricerca del sangue occulto nelle feci e fai lo screening.


SCREENING PRECOCE DEL TUMORE DEL COLON-RETTO
Il programma di prevenzione oncologica del Sistema Sanitario offre la possibilità di sottoporsi gratuitamente allo screening precoce del tumore del colon-retto.
Ritira il kit per la ricerca del sangue occulto nelle feci e fai lo screening.

Appendix F

Survey flow (Study 3):

Block: Default Question Block
Branch: New Branch
If
If Informativa per il trattamento dati Lei è invitato a prendere parte ad uno studio che si propone...
No, non acconsento
Is Selected
EndSurvey:
Standard: Block 2
Branch: New Branch
If
If Consenso informato alla partecipazione alla ricerca Gentile Signora/Signore, Lei è invitata/o a...
Non acconsente alla partecipazione
Is Selected
EndSurvey:
Standard: Block 3
Branch: New Branch
If
If Ha un'età compresa tra i 40 e gli 80 anni?
No
Is Selected
Or Attualmente risiede in Italia?
No
Is Selected
Or Le è mai capito in passato di ricevere una diagnosi di tumore al colon-retto?
Sì
Is Selected
Block: End
EndSurvey:
Standard: Block 4
Standard: Block 6
Standard: Block 5
Standard: Block 7
BlockRandomizer: 1 - Evenly Present Elements
Block: Affective message
Block: Cognitive message
Block: Control message
Block: Combined message
Standard: Block 13
Standard: Block 14
Standard: Debriefing

Survey (Study 3):

Start of Block: Default Question Block

Salve, Se ha tra i 40 e gli 80 anni, risiede in Italia, e non ha mai ricevuto in passato diagnosi di tumore al colon-retto, è invitato a prendere parte ad uno studio che si propone di testare materiali per promuovere lo screening del tumore al colon-retto. Lo studio è condotto da Giulia Scaglioni, dottoranda del Dipartimento di Discipline Umanistiche, Sociali e delle Imprese Culturali dell'Università di Parma, da Miriam Capasso e Marcella Bianchi, dottorande del Dipartimento di Studi Umanistici dell'Università di Napoli Federico II. Prima di cominciare lo studio, Le chiediamo cortesemente di leggere le caratteristiche e le modalità di svolgimento dello studio nella pagina Consenso informato alla partecipazione alla ricerca; e di decidere se fornire i consensi richiesti.

End of Block: Default Question Block

Start of Block: Block 2

Consenso informato alla partecipazione alla ricerca

Gentile Signora/Signore,

Lei è invitata/o a prendere parte a una ricerca su come la percezione dello screening per il tumore al colon-retto possa cambiare in base a caratteristiche individuali e fattori situazionali. La responsabile di tale progetto di ricerca è la dottoranda di ricerca Giulia Scaglioni, in collaborazione con Miriam Capasso e Marcella Bianchi.

Prima di decidere se partecipare è importante che abbia tutte le informazioni necessarie per aderire in modo consapevole e responsabile. Le chiediamo di leggere questo testo e, prima di iniziare, di porre a chi le ha proposto questo studio tutte le domande che ritiene opportune. Per scaricare questo documento, prema sul titolo in azzurro.

Breve descrizione e Obiettivi Il presente progetto di ricerca sperimentale persegue l'obiettivo di testare gli effetti di alcuni messaggi sulla percezione dello screening per il tumore del colon-retto, e di analizzare come la stessa sia influenzata da caratteristiche personali. Per raggiungere questo obiettivo, i ricercatori impegnati nel progetto si propongono di somministrare ai partecipanti un questionario e di mostrare loro un breve messaggio.

Che cosa comporta la partecipazione allo studio? La partecipazione al presente progetto di ricerca comporta leggere un breve messaggio e rispondere ad alcune domande inerenti allo screening per il tumore al colon-retto.

Benefici, disagi e/o rischi potenziali della partecipazione La partecipazione allo studio è volontaria e a titolo gratuito. Per i partecipanti la collaborazione non comporta nessun tipo di rischio o disagio. I ricercatori si attendono informazioni su come promuovere lo screening per il tumore al colon-retto tramite strumenti testuali.

Ritiro dallo studio Lei ha il diritto di ritirarsi in qualsiasi momento da questo studio e di revocare il suo consenso alla partecipazione, anche senza preavviso o motivazione specifica. In tal caso, non saranno raccolti ulteriori dati. Poiché i dati sono anonimi e sarebbe impossibile risalire alle sue

risposte precedenti, verranno conservati tutti i dati raccolti fino al momento del ritiro dallo studio.

Restituzione Lei ha diritto a richiedere informazioni sui risultati e sull'esito della ricerca. A tal fine, può rivolgersi a Giulia Scaglioni: giulia.scaglioni@unipr.it

Misure previste per tutelare l'anonimato I dati saranno raccolti in forma anonima.
In ogni caso i dati saranno utilizzati esclusivamente per scopi scientifici e statistici e nel rispetto della normativa vigente sulla protezione dei dati personali. I risultati della ricerca saranno pubblicati in forma riassuntiva e in nessun caso eventuali brevi citazioni saranno riconducibili a singole persone.

Contatti Per qualsiasi informazione e chiarimento su questo studio o per qualsiasi necessità può rivolgersi a Giulia Scaglioni, giulia.scaglioni@unipr.it, che sarà a sua disposizione per ulteriori informazioni o chiarimenti.

Consenso informato alla partecipazione alla ricerca

Il/la sottoscritto/a

DICHIARA

- di aver letto il suddetto foglio informativo ricevuto, di aver compreso sia le informazioni in esso contenute e di aver avuto ampio tempo ed opportunità di porre domande ed ottenere risposte soddisfacenti dal personale addetto;
- di aver compreso che la partecipazione allo studio è del tutto volontaria e libera, che ci si potrà ritirare dallo studio in qualsiasi momento, senza dover dare spiegazioni e senza che ciò comporti alcuno svantaggio o pregiudizio;
- di aver compreso la natura e le attività che la partecipazione allo studio comportano e i relativi eventuali rischi;

Conseguentemente, il/la sottoscritto/a

○ Acconsente a partecipare allo studio, nella consapevolezza che tale consenso è manifestato liberamente ed è revocabile in ogni momento senza che ciò comporti alcuno svantaggio o pregiudizio

○ Non acconsente alla partecipazione

End of Block: Block 2

Start of Block: Block 3

Per cominciare, le chiediamo cortesemente di rispondere a qualche domanda su di Lei.

Ha un'età compresa tra i 40 e gli 80 anni?

- ○ Sì
- ○ No

Attualmente risiede in Italia?

- ○ Sì
- ○ No

Le è mai capito in passato di ricevere una diagnosi di tumore al colon-retto?

- ○ Sì
- ○ No

End of Block: Block 3

Start of Block: End

La ringraziamo per la sua collaborazione, purtroppo non rientra nel target del presente studio.

End of Block: End

Start of Block: Block 4

Quanti anni ha?

_____

Qual è il suo genere?

- ○ Donna
- ○ Uomo
- ○ Preferisco non rispondere

In quale provincia abita?

▼ Agrigento ... Viterbo

Qual è il Suo titolo di studio?

- ○ Scuola dell'obbligo
- ○ Diploma di scuola media superiore
- ○ Laurea
- ○ Titolo di studio post-universitario

Qual è la Sua condizione lavorativa?

- ○ Lavoratore/Lavoratrice autonomo/a
- ○ Lavoratore/Lavoratrice dipendente
- ○ Pensionato/a
- ○ Disoccupato/a
- ○ Altro

End of Block: Block 4

Start of Block: Block 6

La preghiamo di rispondere a queste due domande selezionando un punteggio da 1 a 5, dove 1 significa “poco attento” e 5 “molto attento”. Lasci il cursore su 0 per non rispondere alla domanda.

	0 1 2 3 4 5
In generale, quanto si direbbe attento alla prevenzione di possibili malattie?	
In generale, quanto si direbbe interessato ai programmi di prevenzione delle malattie?	

End of Block: Block 6

Start of Block: Block 5

Sotto troverà una serie di affermazioni che riguardano diversi comportamenti in situazioni in cui entrano in gioco le emozioni. Per favore, ordini tutte queste frasi da quella in cui riconosce di più (la metta al primo posto) a quella in cui si riconosce meno (all'ultimo posto).

Per mettere in ordine le frasi, prema su ciascuna di esse e Le trascini nella posizione desiderata.

- Per sentirmi meglio (ad esempio, felice/contento/sollevato/di buon umore), cerco di guardare le cose da una prospettiva diversa.
- Per non stare male (ad esempio, essere triste/in collera/di cattivo umore), cerco di guardare

le cose da una prospettiva diversa.

- Cerco di controllare i miei sentimenti provando a cambiare il modo di considerare la situazione in cui mi trovo.
- Scelgo di intraprendere attività che mi aiutano a sentirmi bene.
- Evito le situazioni che potrebbero turbarmi.
- Mi tengo alla larga dalle persone che mi mettono di cattivo umore.

End of Block: Block 5

Start of Block: Block 7

In cosa consiste lo screening per il tumore al colon-retto?

In Italia esistono diversi programmi locali che offrono gratuitamente la possibilità di fare lo screening per il tumore al colon-retto (ricerca del sangue occulto nelle feci). Molti di questi programmi hanno cadenza biennale, e tendenzialmente sono offerti alla popolazione compresa tra i 50 e i 74 anni (alcuni programmi prevedono una fascia d'età più limitata). Una tipica procedura di screening per il tumore al colon-retto comincia con il ricevimento di un invito a fare lo screening (es., una lettera dall'Azienda Sanitaria Locale). Questo invito è necessario per ritirare un kit che è composto da un flaconcino e da una busta di plastica. Il kit serve a raccogliere un campione di feci. Una volta usato, bisogna riconsegnare il kit affinché un laboratorio lo possa analizzare per individuare eventuali tracce di sangue. Tipicamente, il ritiro e la riconsegna del kit avviene in farmacie convenzionate.

Ha mai ricevuto un invito formale (es. lettera di invito) a fare lo screening per il tumore al colon-retto?

- ○ Sì
- ○ No

Ha mai fatto lo screening per il tumore al colon retto?
(Con "screening" intendiamo un esame periodico di controllo, non un esame diagnostico dovuto alla presenza di sintomi)

- ○ Sì
- ○ No

End of Block: Block 7

Start of Block: Display of the messages

La preghiamo di leggere attentamente il seguente messaggio. Le faremo delle domande specifiche sul suo contenuto.

--- Experimental messages ---

End of Block: Display of the messages

Start of Block: Block 13

Quali di queste parole erano contenute nel messaggio appena letto?

Selezioni **una o più** opzioni

- ☐ Utile e importante
- ☐ Sereno e sollevato
- ☐ Efficace e felice
- ☐ Nessuna tra queste

Immagini di essere stato/a formalmente invitato/a a fare lo screening per il tumore al colon-retto (a prescindere dalla Sua età). Nell'invito è riportato il messaggio che ha letto nella schermata precedente. Come pensa che si comporterebbe?

- ○ Non farei lo screening
- ○ Farei lo screening nel giro di una settimana
- ○ Farei lo screening nel giro di un mese
- ○ Farei lo screening entro un anno
- ○ Penserei di fare lo screening, ma continuerei a rimandare

---

Nello stesso contesto (è stato/a invitato/a a fare lo screening e nell'invito è riportato il messaggio che ha letto nella schermata precedente), quanto è probabile che Lei si trovi nelle seguenti situazioni? Esprima tale probabilità su una scala da 1 a 5, dove 1 significa "per niente probabile" e 5 "molto probabile".

	1 - per niente d'accordo	2	3	4	5 - del tutto d'accordo
Penserei che raccogliere un campione delle mie feci con un bastoncino è davvero disgustoso	○	○	○	○	○

Avrei paura che, fornendo il campione di feci, io possa scoprire di avere il cancro	○	○	○	○	○
Sarei così preoccupato/a per la diagnosi di cancro al colon-retto che eviterei di fare il test per la ricerca del sangue occulto nelle feci	○	○	○	○	○
Mi sentirei male all'idea di dover raccogliere un campione delle mie feci	○	○	○	○	○
Penserei che tenere in mano il kit con dentro il campione delle mie feci è disgustoso	○	○	○	○	○
Riterrei davvero imbarazzante consegnare il campione di feci per l'analisi in laboratorio	○	○	○	○	○
Mi sentirei imbarazzata/o se delle persone scoprissero che ho raccolto un campione delle mie feci	○	○	○	○	○
Sarei nauseata/o dall'idea di raccogliere un campione delle mie feci	○	○	○	○	○
Sarebbe umiliante se qualcuno trovasse il mio kit per raccogliere il campione di feci	○	○	○	○	○
Mi preoccuperei che il test per la ricerca del sangue occulto nelle feci possa trovare qualcosa che non va in me	○	○	○	○	○

End of Block: Block 13

Start of Block: Block 14

Il questionario è quasi finito.

Le chiediamo nuovamente di immaginare di aver ricevuto un invito a fare lo screening contenente il messaggio che ha letto prima. Su una scala da 1 a 5, dove 1 significa "per niente d'accordo" e 5 "molto d'accordo", come valuterebbe ciascuna delle seguenti affermazioni? d'accordo" e 5 "molto d'accordo", come valuterebbe ciascuna delle seguenti affermazioni?

	1	2	3	4	5
Partecipare allo screening per il tumore al colon-retto per me sarebbe utile	○	○	○	○	○
In assenza di sintomi, partecipare allo screening per il tumore al colon-retto non serve	○	○	○	○	○
Dopo aver fatto lo screening per il tumore del colon-retto, mi sentirei più sereno	○	○	○	○	○
Mi sentirei sollevato dopo aver fatto lo screening per il tumore al colon-retto	○	○	○	○	○

Dopo aver ricevuto l'invito a fare lo screening quanto sarebbe intenzionato su una scala da 1 a 5 dove 1 significa "per niente intenzionato" e 5 "molto intenzionato", a compiere ognuna di queste azioni entro una settimana (a prescindere dalla Sua età)?

Ritirare il kit

- ○ 1 - Per niente intenzionato
- ○ 2
- ○ 3
- ○ 4
- ○ 5 - Molto intenzionato

Usare il kit per raccogliere il campione di feci

- ○ 1 - Per niente intenzionato
- ○ 2
- ○ 3
- ○ 4
- ○ 5 - Molto intenzionato

Conservare il campione raccolto fino alla sua riconsegna per l'analisi in laboratorio (massimo 48 ore)

- 1 - Per niente intenzionato
- 2
- 3
- 4
- 5 - Molto intenzionato

Portare il campione raccolto a far analizzare

- 1 - Per niente intenzionato
- 2
- 3
- 4
- 5 - Molto intenzionato

Sulla stessa scala da 1 a 5, quanto sarebbe intenzionato a sottoporsi a colonscopia nel caso di esito positivo del test (ossia nel caso in cui sia presente del sangue nelle feci)?

- 1 - Per niente intenzionato
- 2
- 3
- 4
- 5 - Molto intenzionato

End of Block: Block 14

Start of Block: Debriefing

Il questionario è finito. La ringrazio per la partecipazione.

Il presente studio potrebbe aiutarci a capire gli effetti e l'efficacia di diversi messaggi che fanno leva su argomentazioni cognitive (es. utilità) o affettive (es. senso di sollievo).

Ogni messaggio è stato creato ad hoc per lo studio dalle sperimentatrici e non è allegato a nessun reale invito allo screening. Oltre al messaggio cognitivo e al messaggio affettivo, abbiamo incluso una combinazione dei due e una cosiddetta "condizione di controllo", ossia un messaggio neutrale.

Con il presente studio, vogliamo anche indagare come la percezione dello screening cambi in base all'età e alla strategia di regolazione delle emozioni, ossia al modo in cui le persone reagiscono alle proprie emozioni.

Di seguito può vedere tutti i messaggi assegnati casualmente ai partecipanti. Le ricordo che per qualsiasi domanda, dubbio, o aggiornamento sulla ricerca può contattarci all'indirizzo e-mail

giulia.scaglioni@unipr.it

Grazie ancora,

Dott.sse Giulia Scaglioni, Miriam Capasso e Marcella Bianchi

--- Four messages ---

End of Block: Debriefing

Appendix G

Survey flow (Study 4):

EmbeddedData

PROLIFIC_PIDValue will be set from Panel or URL.

Standard: Intro

Standard: Block 1

Standard: Block 2

Standard: Block 3

BlockRandomizer: 1 - Evenly Present Elements

Standard: narrative video

Standard: didactic video

Standard: control video

Standard: Block 5

Standard: Block 6

Standard: Block 7

Standard: Block 8

Standard: Block 9

EndSurvey: Advanced

Survey (Study 4):

Start of Block: Intro

Test di video sullo screening per il tumore al colon-retto

Salve,

La invitiamo a prendere parte ad uno studio che si propone di testare materiali per comunicare lo screening del tumore al colon-retto.

Lo studio è condotto da Giulia Scaglioni, dottoranda del Dipartimento di Discipline Umanistiche, Sociali e delle Imprese Culturali dell'Università di Parma, in collaborazione con l'Azienda Unità Sanitaria Locale di Bologna.

Prima di cominciare lo studio, Le chiediamo cortesemente di leggere le caratteristiche e le modalità di svolgimento dello studio nella pagina Consenso informato alla partecipazione alla ricerca; e di decidere se fornire i consensi richiesti.

ID

Questo campo si compilerà automaticamente

End of Block: Intro

Start of Block: Block 1

Consenso informato alla partecipazione

1. Titolo, Responsabile progetto

Gentile Signora/Signore, Lei è invitata/o a prendere parte alla ricerca *Video e percezione dello screening per il tumore al colon-retto*, di cui è responsabile la dottoressa Giulia Scaglioni. Prima di decidere se partecipare, è importante che abbia tutte le informazioni necessarie per aderire in modo consapevole e responsabile. Le chiediamo di leggere questa pagina e di porre a chi le ha proposto questo studio tutte le domande che ritiene opportune.

2. Breve descrizione e Obiettivi

Il progetto di ricerca sperimentale *Video e percezione dello screening per il tumore al colon-retto* persegue l'obiettivo di testare gli effetti di alcuni filmati sulla percezione dello screening per il tumore del colon-retto. Per raggiungere questo obiettivo, i ricercatori impegnati nel progetto si propongono di somministrare ai partecipanti un questionario e di mostrare loro un video dalla durata di circa due minuti e mezzo.

3. Che cosa comporta la partecipazione allo studio?

La partecipazione a questo progetto di ricerca comporta guardare un video e rispondere ad alcune domande inerenti allo screening per il tumore al colon-retto.

4. Benefici, disagi e/o rischi potenziali della partecipazione

La partecipazione allo studio è volontaria e a titolo gratuito. Per i partecipanti la collaborazione non comporta nessun tipo di rischio o disagio. I ricercatori si attendono informazioni su come promuovere lo screening per il tumore al colon-retto tramite strumenti audiovisivi.

5. Ritiro dallo studio

Lei ha il diritto di ritirarsi in qualsiasi momento da questo studio e di revocare il suo consenso alla

partecipazione, anche senza preavviso o motivazione specifica. In tal caso, non saranno raccolti ulteriori dati. Poiché i dati sono anonimi e sarebbe impossibile risalire alle sue risposte precedenti, verranno conservati tutti i dati raccolti fino al momento del ritiro dallo studio.

6. Restituzione

Lei ha diritto a richiedere informazioni sui risultati e sull'esito della ricerca. A tal fine, può rivolgersi a Giulia Scaglioni: giulia.scaglioni@unipr.it

7. Misure previste per tutelare l'anonimato

I dati saranno raccolti in forma anonima.

In ogni caso, i dati saranno utilizzati esclusivamente per scopi scientifici e statistici e nel rispetto della normativa vigente sulla protezione dei dati personali. I risultati della ricerca saranno pubblicati in forma riassuntiva e in nessun caso eventuali brevi citazioni saranno riconducibili a singole persone.

8. Contatti

Per qualsiasi informazione e chiarimento su questo studio o per qualsiasi necessità può rivolgersi a Giulia Scaglioni, giulia.scaglioni@unipr.it, che sarà a sua disposizione per ulteriori informazioni o chiarimenti.

Il/la sottoscritto/a DICHIARA:

di aver letto il *Consenso informato alla partecipazione*, di aver compreso le informazioni in esso contenute e di aver avuto ampio tempo ed opportunità di porre domande ed ottenere risposte soddisfacenti dal personale addetto;

di aver compreso che la partecipazione allo studio è del tutto volontaria e libera, che ci si potrà ritirare dallo studio in qualsiasi momento, senza dover dare spiegazioni e senza che ciò comporti alcuno svantaggio o pregiudizio;

di aver compreso la natura e le attività che la partecipazione allo studio comportano e i relativi eventuali rischi;

Conseguentemente, il/la sottoscritto/a

○ Acconsente a partecipare allo studio, nella consapevolezza che tale consenso è manifestato liberamente ed è revocabile in ogni momento senza che ciò comporti alcuno svantaggio o pregiudizio

○ Non acconsente a partecipare allo studio

End of Block: Block 1

Start of Block: Block 2

In cosa consiste lo screening per il tumore al colon-retto?

Lo screening per il tumore al colon-retto viene eseguito ogni due anni e generalmente è rivolto a persone di età compresa tra i 50 e i 69 anni. Una tipica procedura di screening per il tumore al colon-retto comincia con il ricevimento della lettera d'invito. La lettera va poi consegnata in farmacia, dove si ritirerà un kit composto da un flaconcino e una busta di plastica. Il kit servirà a raccogliere un campione di feci, che verrà poi riconsegnato in farmacia. La farmacia provvederà a far arrivare il campione in un laboratorio, dove verrà analizzato per controllare se presenta tracce di sangue.

Ha mai ricevuto la lettera d'invito allo screening per il tumore al colon-retto?

○ Sì

○ No

Ha mai partecipato allo screening per il tumore al colon-retto?

○ Sì, ho partecipato allo screening almeno una volta

○ No, non ho mai partecipato allo screening

End of Block: Block 2

Start of Block: Block 3

Ora Le verrà chiesto qual è il suo colore preferito e Le chiediamo cortesemente di selezionare "Verde" come risposta. Questa domanda, infatti, vuole verificare quanta attenzione sta dedicando al questionario.

Qual è il suo colore preferito?

- ○ Rosso
- ○ Blu
- ○ Verde
- ○ Arancione
- ○ Marrone

End of Block: Block 3

Start of Block: videos

Le chiediamo cortesemente di guardare e di ascoltare questo video dall'inizio alla fine. Le domande che seguiranno riguarderanno il suo contenuto. La freccia per proseguire comparirà alla fine del video.

--- Video ---

End of Block: videos

Start of Block: Block 5

Di cosa parlava il video che ha appena visto?

- ○ Di una visita medica per richiedere il certificato di idoneità sportiva
- ○ Della mammografia
- ○ Dello screening per il tumore al colon-retto
- ○ Non mi ricordo

Chi erano i protagonisti del video?

- ○ Due persone che hanno fatto una visita medica o lo screening
- ○ Due medici in camice bianco
- ○ Due voci fuori campo (nessuna persona appariva nel video)
- ○ Non mi ricordo

End of Block: Block 5

Start of Block: Block 6

Adesso per favore indichi il suo grado di accordo con le seguenti affermazioni selezionando il relativo punteggio su una scala che va da 1 (per niente d'accordo) a 5 (molto d'accordo).

	1	2	3	4	5
Mentre guardavo il video, riuscivo ad immaginare me stessa/o compiere le azioni citate	○	○	○	○	○
Mi sono sentita/o mentalmente coinvolta/o dai contenuti del video	○	○	○	○	○
Mentre guardavo il video, volevo sapere come andava a finire	○	○	○	○	○
Guardare il video ha avuto un impatto emotivo su di me	○	○	○	○	○
Mentre guardavo il video, ho avuto un'immagine molto vivida del protagonista maschile	○	○	○	○	○
Mentre guardavo il video, ho avuto un'immagine molto vivida della protagonista femminile	○	○	○	○	○
Mi sono immedesimata/o con la protagonista femminile	○	○	○	○	○
Mi sono immedesimata/o con il protagonista maschile	○	○	○	○	○

End of Block: Block 6

Start of Block: Block 7

Per favore, scriva qui sotto almeno un pensiero che ha avuto guardando il video e un sentimento che ha provato.

_____

Risponda cortesemente alle seguenti domande indicando un punteggio da 1 a 5, dove 1 significa "per niente" e 5 significa "moltissimo".

Quanto questo video L'ha fatta sentire chiamato/a in causa?

- ○ 1 - per niente
- ○ 2
- ○ 3
- ○ 4
- ○ 5 - moltissimo

Quanto pensa che il contenuto del video La riguardi personalmente?

- ○ 1 - per niente
- ○ 2
- ○ 3
- ○ 4
- ○ 5 - moltissimo

Quanto questo video Le ha ricordato delle esperienze che ha effettivamente vissuto?

- ○ 1 - per niente
- ○ 2
- ○ 3
- ○ 4
- ○ 5 - moltissimo

Quanto ha pensato come sarebbe stato se gli eventi citati nel video fossero capitati a Lei?

- ○ 1 - per niente
- ○ 2
- ○ 3
- ○ 4
- ○ 5 - moltissimo

Secondo Lei, quanto è probabile per una persona con le sue stesse caratteristiche (età, genere, stile di vita) sviluppare un tumore al colon-retto?

Esprima questa probabilità con un numero da 1 a 5, dove 1 significa "per niente probabile" e 5 "molto probabile"

- ○ 1 - per niente probabile
- ○ 2
- ○ 3
- ○ 4
- ○ 5 - molto probabile

End of Block: Block 7

Start of Block: Block 8

Dopo la visione del video, qual è la Sua percezione dello screening per il tumore al colon-retto?

	1 - per niente d'accordo	2	3	4	5 - del tutto d'accordo
Raccogliere un campione delle mie feci con un bastoncino è davvero disgustoso	○	○	○	○	○
Temo che, fornendo un campione di feci, io possa scoprire di avere un tumore	○	○	○	○	○
Sarei così preoccupato/a per la diagnosi di tumore al colon-retto che eviterei di fare il test per la ricerca del sangue occulto nelle feci	○	○	○	○	○
Mi sento male all'idea di dover raccogliere un campione delle mie feci	○	○	○	○	○
Tenere in mano il kit con dentro il campione delle mie feci è disgustoso	○	○	○	○	○
Mi preoccuperei che il test per la ricerca del sangue occulto nelle feci possa trovare qualcosa che non va in me	○	○	○	○	○

Dare un campione di feci per lo screening è davvero imbarazzante	○	○	○	○	○
Immaginare che altre persone sappiano che sto raccogliendo un campione di feci per lo screening sarebbe imbarazzante	○	○	○	○	○
Pensare di raccogliere un campione delle mie feci mi fa provare un senso di nausea	○	○	○	○	○
Mi sentirei mortificato/a se qualcuno trovasse il kit che mi è stato dato per raccogliere il campione di feci	○	○	○	○	○

Per favore, esprima il Suo grado di accordo su una scala da 1 a 5, dove 1 significa “per niente d’accordo” e 5 “molto d’accordo”.

	1	2	3	4	5
Non avrei problemi ad andare in farmacia per ritirare il kit dello screening	○	○	○	○	○
Avrei difficoltà a riconsegnare il campione di feci in farmacia	○	○	○	○	○
Sono certo/a che riuscirei a raccogliere il campione di feci	○	○	○	○	○
Partecipare allo screening per il tumore al colon-retto per me sarebbe utile	○	○	○	○	○
Partecipare allo screening per il tumore al colon-retto per me sarebbe negativo	○	○	○	○	○
Per me sarebbe spiacevole fare lo screening per il tumore del colon-retto	○	○	○	○	○
Sarei felice di fare lo screening per il tumore del colon-retto	○	○	○	○	○
Le persone che sono importanti per me vorrebbero che io partecipassi allo screening per il tumore al colon-retto	○	○	○	○	○

Le persone che sono importanti per me mi consiglierebbero di fare lo screening per il tumore al colon-retto	○	○	○	○	○

Immagini di essere stato/a formalmente invitato/a a fare lo screening per il tumore al colon-retto dalla sua Azienda Sanitaria Locale (a prescindere dalla Sua età). Come pensa che si comporterebbe?

- ○ Non farei lo screening
- ○ Farei lo screening nel giro di una settimana
- ○ Farei lo screening nel giro di un mese
- ○ Farei lo screening entro un anno
- ○ Penserei di fare lo screening, ma continuerei a rimandare

Dopo aver visto questo video, quanto è probabile che Le capiti di parlare dello screening con qualcuno (es. amici, parenti)?
Esprima tale probabilità su una scala da 1 a 5, dove 1 significa "per niente probabile" e 5 significa "molto probabile"

- ○ 1 - per niente probabile
- ○ 2
- ○ 3
- ○ 4
- ○ 5 - molto probabile

Per favore ora indichi il suo grado di accordo con la seguente affermazione su una scala da 1 a 4, dove 1 significa “per niente d’accordo”, 2 significa "non d'accordo", 3 significa "d'accordo" e 4 “molto d’accordo”.

Tutti i giorni vado al lavoro percorrendo a nuoto il Mar Mediterraneo

- ○ 1 - per niente d'accordo
- ○ 2 - non d'accordo
- ○ 3 - d'accordo
- ○ 4 - molto d'accordo

End of Block: Block 8

Start of Block: Block 9

Il questionario è quasi finito.

Risponda per favore a queste ultime domande.

Quanti anni ha?

_____

Qual è il Suo genere?

- ○ Uomo
- ○ Donna
- ○ Preferisco non rispondere

Ha mai ricevuto una diagnosi di tumore al colon-retto?

- ○ Sì
- ○ No

Un Suo familiare ha mai ricevuto una diagnosi di tumore al colon-retto?

- ○ Sì
- ○ No

End of Block: Block 9

Il questionario è finito. La preghiamo di leggere il testo seguente prima di lasciare questa pagina. Il codice di completamento è

1043F95E

La ringrazio per la sua partecipazione.

Le comunichiamo che i protagonisti del video sono personaggi di fantasia interpretati da attori. Di seguito può vedere gli altri due video dell'esperimento o rivedere il video che le era stato assegnato casualmente.

--- Videos ---

All'interno del questionario erano presenti due item per misurare l'attenzione ad esso dedicata: la

domanda sui colori e quella sull'andare al lavoro a nuoto. Per quanto riguarda quest'ultima, solo le risposte che indicano l'essere in disaccordo dimostrano l'attenzione verso la domanda.

Il presente studio potrebbe aiutarci a capire gli effetti e l'efficacia di tre tipi diversi di video che promuovono lo screening per il tumore al colon-retto. Ogni partecipante allo studio è stato assegnato casualmente a uno dei tre video, e tutti hanno risposto alle stesse domande.

Ci aspettiamo che il video con la narrazione in prima persona sull'esperienza di screening sarà il più efficace.

Il video relativo all'idoneità sportiva funge da condizione di base, da confronto per capire se 1. è la narrazione in sé ad essere efficace o quella specifica; 2. se gli altri due video sono più efficaci rispetto al non ricevere un intervento specifico di promozione dello screening.

Le ricordo che per qualsiasi domanda, dubbio, o aggiornamento sulla ricerca può contattarmi all'indirizzo e-mail giulia.scaglioni@unipr.it

Grazie ancora,

Dott.ssa Giulia Scaglioni

Appendix H

Didactic video

Context: A man and a woman wearing white coats are sitting in an empty room. They smile, the tone is colloquial.

Framing: Medium shot of the protagonists at the beginning and during the introductions. Close-up when they talk.

The video starts with the protagonists introducing themselves (I am doctor Antonio...).

Actor: “If you are between 50 and 69 years old, every two years you will receive an invitation letter for faecal occult blood screening. What is faecal occult blood testing? It consists of analysing a small stool sample for traces of blood not visible to the naked eye. Colorectal cancer screening allows us to detect benign tumours in the intestinal mucosa, before they become dangerous. So it is not just a matter of treating the disease when it is still in its early stages, but of preventing it. There are screening programmes throughout the entire Country. The examinations are covered by the national health care service, and it is important to adhere even when no symptoms are present. How can one attend CRC screening? One has to go to a pharmacy, show the invitation letter, and collect the stool sample kit. The kit consists of a test tube and a plastic bag. By unscrewing the cap of the test tube, you will find a stick. The stick has to be inserted in several places in the faecal sample, and then put back into the test tube”.

Actress: “Now, you will have to take the kit back to the pharmacy. The pharmacy will send the sample to the laboratory for blood detection. The presence of blood in the faeces can be due to many causes, including haemorrhoids. This is why, in the event of a positive test, investigative examinations, such as a colonoscopy, are required. Many people think it is a painful examination, but today we have less invasive and more patient-tolerable techniques available. Moreover, this procedure has several benefits. For instance, if you undergo a colonoscopy, you do not have to repeat the screening for at least five years. Not to mention that prevention saves your life. Thanks to screening programmes, the death rate of colorectal cancer has decreased by 30%. And that's just with the 6 million Italians who attend CRC screening, just think if everyone who receives the invitation attended!”.

Narrative video

Context: A man and a woman wearing normal clothes are sitting in an empty room. They smile, the tone is informal.

Framing: Medium shot of the protagonists at the beginning and during the introductions. Close-up when they talk.

Actor: “The first time I received the invitation letter to screen for colon-rectal cancer I threw it away. The idea of having to put a sample of my stool in a test tube made me feel sick. Besides, I was healthy, I felt fine, I didn't want to take the risk of having to undergo a colonoscopy. But my wife insisted: do the test, do the test. And so, when I got the letter again, I made her happy. And thank goodness! I perform the test for occult blood in the faeces, which by the way was not as impressive as I thought, and the result was positive. The local health authority called me to schedule a colonoscopy. I thought it would hurt more, but it was perfectly tolerable. With the colonoscopy, they saw that I only had a small, still harmless formation. They removed it and that was the end of the story. Now I attend CRC screening every time I get the letter, for my own peace of mind!”.

Actress: “When I received the letter for screening, I immediately felt anxious. What if they found something? I preferred not to know... I asked my doctor if it was really necessary to perform this test. The doctor was quite vague, he told me: -Come on, do it-. And I kept thinking about it, getting anxious. At some point, after thinking it over, I decided to perform the test. But I kept putting it off and putting it off... to avoid forgetting, in the end, I put the letter in my bag. I always pass by the pharmacy, sooner or later I had to stop! In fact, I stopped, took the stool collection vial and performed the test. Fortunately, I received a negative result, there was no blood in my stool sample. Knowing that I was healthy finally gave me peace of mind. In hindsight, I can say that knowing that I am not ill is much better than being left with doubt”.

Control video

Context: A man and a woman wearing normal clothes are sitting in an empty room. They smile, the tone is informal.

Framing: Medium shot of the protagonists at the beginning and during the introductions. Close-up when they talk.

Actor: “It was my gym that asked me to provide a medical certificate of fitness for sporting activity. Since I do not perform in competitive activities, I could get it either from the gym doctor or from my doctor. With the gym doctor, taking appointments is a bit complicated because he receives once a week. In addition, I preferred to be seen by someone I trusted. It was for these reasons that I chose to visit my doctor. One afternoon, since I was free, I went there, sat in the waiting room, and waited patiently for my turn. The visit was quite quick: he asked me a few questions, asked if I was OK, felt my lungs to see if everything was fine, and then took my blood pressure. That worried me a bit! But everything was normal, luckily!”

Actress: “I needed the certificate because I do competitive activities. When you are involved in professional competitions, it's your club that fills out the form to request a sports examination. I took the form, went to the CUP [facility where you can book medical examinations], and I booked the visit at a clinic. On the day of the appointment, I went to this health facility. The doctor marked my weight and height. At such times I always feel a bit embarrassed, in awe, but the doctor was very kind and very professional. We continued the visit with chest auscultation and pressure measurement. Since it was a visit for competitive activity, they did an electrocardiogram at rest and one under stress. The first one I did lying on the couch, while for the second one we used a treadmill. I also had a spirometry, which is a test where they make you put a clamp on your nose, which is quite annoying, and you have to breathe into a mouthpiece. Everything went well, they re-certified my sports fitness, and for the next twelve months I'm good to go!”

Appendix I

Contrary to hypothesis 1, the model assessing the effects of the narrative video on CRC screening intention, as a function of vicarious experience, issued no main effect of the narrative screening video on the main outcome (b = –.10, SE = .12, p = .381). Vicarious experience did not interact with the narrative screening video (b = .09, SE = .13, p = .489), thus we rejected hypothesis 3. Contrary to hypotheses 4a–4c, the narrative screening video had no effect on disgust (b = –.02, SE = .14, p = .910), embarrassment (b = –.11, SE = .13, p = .389) and fear (b = –.14, SE = .13, p = .270). However, embarrassment was reduced by the informative video (b = –.33, SE = .12, p = .008). We found no support for hypotheses 6a and 6b, since vicarious experience did not moderate the effects of the narrative video on disgust (narrative video * vicarious experience, b = –.05, SE = .14, p = .753) or embarrassment (narrative video * vicarious experience, b = –.19, SE = .14, p = .195). We found no support for hypotheses 7a–7c, concerning the conditional mediated effect through negative emotions (conditional index effect [CIE] through disgust = .01, bootstrapped SE = .02, bootstrapped 95% CI [–.03, .05]; CIE through embarrassment = –.01, bootstrapped SE = .02, bootstrapped 95% CI [–.06, .04]; CIE through fear = –.03, bootstrapped SE = .03, bootstrapped 95% CI [–.10, .01]). Again, in contrast with hypotheses 8 and 9, the narrative video did not affect CRC screening intention through self-efficacy (effect of the narrative video on self-efficacy, b = –.04, SE = .11, p = .743; CIE through self-efficacy = .00, bootstrapped SE = .01, bootstrapped 95% CI [–.03, .03]. Finally, the narrative video did not affect positive attitudes (b = –.15, SE = .10, p = .150), nor subjective norms (b = –.08, SE = .13, p = .574).

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