


The role of need for control and self-reliance in gender and age differences in bowel cancer screening participation

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Abstract

Objective: To examine the relationships between need for control and self-reliance and barriers to bowel cancer screening to better understand the reasons for lower bowel cancer screening adherence in males and younger individuals.

Methods: Participants ($n = 506$) aged between 54 and 75 years old completed an online survey measuring demographic information, the four-factor Barriers to Home Bowel Cancer Screening Scale (BB-CanS) and a measure of Need for Control and Self-Reliance (NCSR). Model fit statistics were compared for seven path models testing the relationships between NCSR and BB-CanS factors and the moderating and mediating effects of age and gender.

Results: Models where age and gender were included as moderators showed the best fit. When compared to females and those under 60 years of age, stronger positive associations between NCSR and BB-CanS factors were evident among males ($\beta_{\text{avoidance}} = 0.539, p < 0.001$); $\beta_{\text{disgust}} = 0.558, p < 0.001$; $\beta_{\text{difficulty}} = 0.489, p < 0.001$; $\beta_{\text{autonomy}} = 0.619, p = 0.002$) and those over 60 years of age ($\beta_{\text{avoidance}} = 0.400, p < 0.001$); $\beta_{\text{disgust}} = 0.462, p < 0.001$; $\beta_{\text{difficulty}} = 0.447, p < 0.001$; $\beta_{\text{autonomy}} = 0.378, p < 0.001$).

Conclusions: When encouraging males and people aged 60 years and over to participate in bowel cancer screening, public health messages may benefit from conveying preventative health behaviour and cancer screening participation as actions that reflect self-control and self-reliance.

KEYWORDS

cancer, colorectal neoplasms, demographic factors, health behaviour, individual differences, oncology, screening

1 | BACKGROUND

Bowel cancer is responsible for 860,000 deaths worldwide each year and is the second leading cause of cancer death in men and women.¹ Fortunately, bowel cancer and pre-cancerous lesions in the bowel can be identified and successfully removed if detected early through a faecal occult blood test (FOBT). For this reason, many nations conduct population-level bowel cancer screening programs whereby

FOBT kits are mailed to all 50-74-year-old residents requiring them to collect stool samples and mail them to a pathology centre for testing. The successful implementation of such programs can substantially reduce bowel cancer-related mortality, disease burden, and social costs.^{2,3} For example, cancers detected via the Australian National Bowel Cancer Screening Program (NBCSP) are typically diagnosed earlier, cause fewer complications, and are 50% less likely to be fatal compared to those diagnosed outside of the program.^{4,5}

The efficacy of such programs is crippled, however, by low participation rates.^{6,7} Currently only 44% of kit recipients take part in the Australian NBCSP. This rate is lower among males (41%) and invitees under 60 years of age (36%).⁷ These rates highlight a concerning missed opportunity to detect bowel cancer early among males, particularly given males have a higher risk of developing the disease.⁷ Lower participation rates among males and younger invitees are common across bowel cancer screening programs internationally.⁸ However, the mechanisms responsible for lower participation for these demographic groups are not well understood. The potential influence of these demographic factors appears to be direct rather than interactive. That is, gender difference in participation rates stay relatively equal across age groups and vice versa,⁷ indicating that the effect of gender and age on barriers to bowel cancer screening should be examined independently.

Investigations into barriers to bowel cancer screening have uncovered a wide range of reasons for recipients' non-compliance. Forgetfulness, hygiene concerns, fear and screening outside of the program are some common reasons reported.⁹⁻¹³ In a recent study, a self-rating scale was developed to measure barriers to bowel cancer screening through mail-out FOBT programs and four underlying dimensions were identified that were associated with the non-return of NBCSP kits. These included feelings of disgust in reaction to stool collection (hereon referred to simply as 'disgust'); fear of, and/or an attempt to avoid negative outcomes of screening (hereon referred to as 'avoidance'); physical difficulty in completing and returning the kit (hereon referred to as 'difficulty'); and concerns over the perceived lack of autonomy associated with population screening (hereon referred to as 'autonomy').¹³ Younger respondents in this sample were more likely to report disgust and difficulty as a barrier to kit return and, among those who had not returned their most recent NBCSP kit, males reported higher levels of avoidance than females. These findings may reflect important gender and age differences in approaches to cancer-related preventative health care and help-seeking.¹⁴

Some research suggests that conformity to masculine norms may prevent younger people and males from investigating cancer symptoms. That is, the desire to appear strong, self-reliant and in control appears to conflict with help-seeking among this population.¹⁴⁻¹⁶ The Need for Control and Self-Reliance (NCSR), typically examined among males, has often been identified as a barrier to addressing mental and physical health concerns.^{17,18} As suggested in one recent study, lower bowel cancer screening rates among younger males may, in part, be due to their tendency to avoid seeking healthcare in order to maintain control and self-reliance.¹⁹ Participating in bowel cancer screening may elicit feelings of vulnerability and weakness that go against a man's desire to appear strong and fearless.²⁰

Interestingly, traits typically described as masculine are not always unique to, or higher among males compared to females.^{21,22} In fact, some evidence suggests that NCSR are relatively equal across genders.^{18,23} In a 2019 Australian study, no relationship was found between NCSR and FOBT kit return, however, relationships were not examined separately for males and females.²³ It may be that both genders endorse the trait at relatively equal levels, but its impact is

stronger among males who are liable to feel more societal pressure to behave in ways that portray them as self-reliant and in control.^{24,25} Less evidence exists for associations between age and the NCSR. It has been suggested that as individuals approach older age (i.e., approximately 60 years and above), their desire to conform to masculine norms tends to decrease as does the negative effect these norms may have on their health behaviours.^{26,27} However, some studies suggest that masculine traits can intensify and negatively predict health behaviours as men age; particularly in honour-oriented societies.²⁸

To increase population bowel cancer screening, it is important to identify and address the distinct factors that influence barriers to bowel cancer screening among different segments of the population. The influences of gender and age on the experience of different barriers to bowel cancer screening are evident,^{7,13} however, it is unclear to what extent stereotypically masculine barriers to help-seeking, such as a NCSR, explain these differences. Currently, very little is known about the structural relationships between these variables and how they affect barriers to bowel cancer screening. The current study adopts an exploratory inductive approach to examine the relationships between NCSR and barriers to bowel cancer screening, and the potential moderating or mediating roles of age and gender.

2 | METHODS

2.1 | Participant recruitment

A survey link was promoted through paid Facebook advertising and at various local community groups or venues frequented by older Australians, such as general medical practice waiting rooms, community centres, volunteer organizations, as well as various workplaces. Invitees were offered the opportunity to win one of three grocery vouchers with a value of \$20 or \$50. Eligible participants included adults residing in Australia between the ages of 50 and 74 years (i.e., eligible participants of the Australian NBCSP).

This study forms part of a larger research project accessed by a single web link to an online survey with multiple components; findings from which are in preparation for publication at the time of writing this manuscript. Recruitment and attrition relevant to this study are outlined in Supplementary File 1. Facebook marketing records showed that 8584 individuals clicked the link to the survey displayed in the advertisement, however, the survey was opened by only 1839 people who viewed the first page containing the information and consent form. Of these people 1542 (83.8%) consented to take part in the study and went on to begin the survey (excluding two people who indicated they were below 50 years of age). Eight individuals explicitly indicated that they did not consent to take part and 289 closed the survey before providing any responses. Of the 1540 people who started the survey 1013 (65.7%) completed the entire survey. People who returned their most recent kit were more likely to complete the entire survey (75.9%) compared to those who did not return their most recent kit (68.8%), $\chi^2 = 7.55$, $p < 0.01$. Study attrition did not vary as a function of age or gender.

To reduce respondent burden, participants were randomly assigned 1:1 to complete either the Need for Self-Control Subscale (as described below) or another psychometric scale used for a different study. The final sample for this study therefore consisted of 506 adults between the ages of 50 and 74 years ($M = 61.42$, $SD = 6.97$), 59.2% identified as females, 40.0% as males (<1% did not disclose gender) and 71.5% were born in Australia, with most of the remaining participants born in the United Kingdom (13.0%) and New Zealand (4.5%). A full description of the characteristics of the sample is provided in Table 1.

2.2 | Procedure

Participants completed an anonymous online survey capturing demographic information, bowel cancer screening history, barriers to home bowel cancer screening and NCSR via the Qualtrics website. Sections relevant to this study took approximately 15 min to complete. Participants provided informed consent, and ethical approval for this research was granted by a university-based Human Research Ethics Committee (ref: H19REA291).

3 | MEASURES

3.1 | Demographic information

Participants' gender, age, income, education level and residential postcode were collected. Residential postcode was used to classify participants by geographic remoteness and socio-economic status according to the Australian Bureau of Statistics' classification systems.^{29,30}

3.2 | Bowel cancer screening behaviour history

Participants were asked whether they received a home test kit through the NBCSP ('yes', 'no' or 'I do not recall'). Those who had received the kit were asked whether they mailed it back completed ('yes' or 'o').

3.3 | Barriers to home bowel cancer screening

Participants were presented with a picture of the latest NBCSP kit with instructions and the Barriers to Bowel Cancer Home Bowel Cancer Screening Scale (BB-CanS; 14). Participants indicated how likely it was that a list of 46 barriers would prevent them from completing a home bowel cancer test kit in the future. The BB-CanS measure includes four subscales reflecting barriers of disgust (e.g., 'Collecting a stool sample is unpleasant'), physical difficulty collecting a stool sample (e.g., 'The stool collection stick is too small'), avoidance of bowel cancer screening outcomes (e.g., 'I would prefer not to know if I have cancer'), and a perceived lack of autonomy in the decision to participate in bowel cancer screen

(e.g., 'my health care is between me and my doctor'). Responses were scored on a 4-point scale from 1 = 'Not true or would not prevent me from using the test' to 4 = 'This would definitely prevent me...'. Scores for each subscale were aggregated by calculating the mean with higher scores representing greater endorsement of the hindering effect of each barrier type. Cronbach's alphas were high in the current sample ranging from $\alpha = 0.89$ for autonomy to $\alpha = 0.96$ for disgust.

3.4 | Need for control and self-reliance

The Need for Control and Self-reliance subscale (hereon NCSR) of the Mansfield's Barriers to Help-seeking Scale³¹ was used to measure a tendency to avoid seeking health care due to a desire to remain self-reliant and autonomous. Participants were provided with a scenario in which they were personally experiencing minor symptoms and asked to indicate the degree to which to a variety of reasons might prevent them from seeking help (e.g., 'It would seem weak to ask or help', and 'I like to make my own decisions'). Responses were provided on a 5-point scale ranging from 1 = 'not at all' to 5 = 'very much'. From the 10 items a mean score was calculated with higher scores representing higher levels of NCSR. Cronbach's alpha for the current sample was excellent at $\alpha = 0.91$.

3.5 | Statistical methods

Analyses were carried out in Mplus v8.1. Mean differences in NCSR scores were assessed across demographic group. A single intercept-only model (i.e., estimating the means and standard deviations of each barrier without predictors) and seven path models were specified to assess associations between NCSR and barriers to bowel cancer screening by probing potential moderating or mediating effects of age and gender (see Figure 1). Path models included i) a 'simple regression' model, whereby each barrier was regressed onto NCSR; ii) two 'covariates' models, whereby each barrier was regressed onto NCSR, with the addition of gender or age; iii) two 'moderation' models; whereby the relationship between NCSR and barriers to bowel cancer screening was moderated by gender or age; and iv) two 'mediation' models whereby direct and indirect paths were estimated from age or gender to each barrier (via NCSR). The bootstrapped maximum likelihood parameter estimator (i.e., MLR) was applied to all models due to its robustness to non-normality.³² Akaike and Bayesian information criteria (AIC/BIC) fit statistics were compared (independently for age and gender models) to identify the model that best fit the data.

4 | RESULTS

Means and standard deviations for each of the barriers to bowel cancer screening factors were as follows: avoidance ($M = 1.13$, $SD = 0.37$); disgust ($M = 1.19$, $SD = 0.47$); difficulty ($M = 1.14$, $SD = 0.42$), autonomy ($M = 0.15$, $SD = 0.36$). Males and individuals

TABLE 1 Sample Characteristics and means and standard deviations for Need for Control and Self-Reliance (NCSR)

	<i>n</i> (%) ^a	NCSR Mean (SD)	Test statistic
Gender			$t(501) = 2.30^b$, $d = 0.21$
Male	202 (40.0%)	1.57 (0.75)	
Female	299 (59.1%)	1.43 (0.61)	
Age group			$t(501) = 0.23$
<60 years	210 (41.6%)	1.47 (0.66)	
>60 years	295 (58.4%)	1.49 (0.68)	
Returned last NBCSP kit			$t(466) = 2.64^b$, $d = 0.25$
Yes	311 (61.4%)	1.44 (0.64)	
No	155 (30.6%)	1.61 (0.74)	
did not recall/receive a kit	36 (7.11%)	-	
Born in Australia			$t(506) = 1.54$
Yes	362 (71.5%)	1.45 (0.64)	
No	144 (28.5%)	1.56 (0.73)	
ABTI			$t(499) = 1.36$
Yes	12 (2.4%)	1.74 (0.70)	
No	490 (96.3%)	1.48 (0.67)	
Rather not say	7 (1.4%)	-	
Highest education level			$F(3,282) = 0.52$
<year 11	55 (13.0%)	1.50 (0.67)	
year 11–12	60 (12.4%)	1.44 (0.62)	
TAFE/apprenticeship	110 (22.7%)	1.52 (0.72)	
University degree	252 (52.0%)	1.46 (0.65)	
Socio-economic status			$F(4, 496) = 0.04$
1st quartile (lowest)	76 (15.1%)	1.46 (0.64)	
2nd quartile	115 (23.0%)	1.48 (0.65)	
3rd quartile	162 (32.3%)	1.49 (0.70)	
4th quartile (highest)	148 (29.5%)	1.50 (0.68)	
Geographic remoteness			$F(4, 496) = 1.11$
Major city	311 (62.1%)	1.50 (0.68)	
Inner regional	117 (23.4%)	1.41 (0.62)	
Outer regional/remote	73 (14.6%)	1.55 (0.67)	

^avalid percentage.

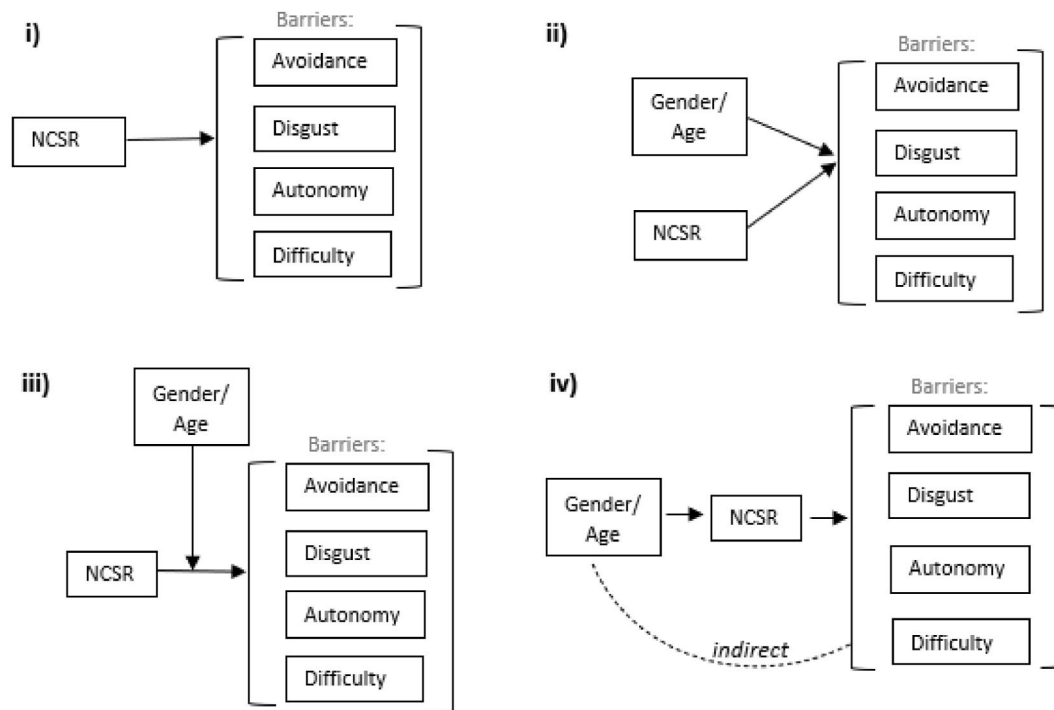
^bTest statistic significant at $p < 0.05$.

Abbreviations: ABTI, Aboriginal or Torres Strait Islander; -, not analysed; NBCSP, National Bowel Cancer Screening Program.

who did not return their most recent NBCSP kit had slightly higher NCSR scores (see Table 1).

To confirm whether age and gender interactions with NCSR should be treated independently, each barrier and NCSR was regressed onto an age by gender interaction term. No significant age by gender interactions were apparent (all $p > 0.05$). According to AIC and BIC values, model fit improved incrementally when comparing

the intercept only model (AIC: 2027.80, BIC: 2061.50) to the simple regression (AIC: 790.09, BIC: 865.92) and to both covariate models including gender (AIC: 736.66, BIC: 845.97) and age (AIC: 776.50, BIC: 869.13). The gender moderation model demonstrated slightly better fit than the covariate model (AIC: 721.88, BIC: 831.20) and according to AIC only, this was also the case for the age moderation model (AIC: 771.98, BIC: 881.46). AIC and BIC increased to over



Notes: Gender/age denotes that age and gender were tested as moderators and mediators in separate models; separate paths were estimated from NCSR to each barrier.

FIGURE 1 Visual depiction of path models to be tested

1000 for both mediation models demonstrating relatively poorer fit (see Supplementary File 2 for full statistics and model descriptions). As such the moderation models for age and gender were selected as the most suitable model. To investigate moderations further, interaction effects were examined, and simple slopes analyses were conducted to compare the strength and direction of relationships between NCSR and each barrier for males versus females and younger (<60) versus older (≥ 60) participants.

4.1 | The moderating influence of gender

According to the path model ii) including gender (i.e., the covariates models) NCSR was positively associated with avoidance ($\beta = 0.334$, $p < 0.001$); disgust ($\beta = 0.362$, $p < 0.001$); difficulty ($\beta = 0.336$, $p < 0.001$); autonomy ($\beta = 0.312$, $p < 0.001$). Being male was associated with slightly higher levels of avoidance ($\beta = -0.146$, $p < 0.001$) and autonomy ($\beta = -0.155$, $p < 0.001$) but not difficulty or disgust.

Path model iii) showed that the gender by NCSR interaction effect was significant for all four barriers to bowel cancer screening (all $p < 0.01$). Simple slopes analyses showed that NCSR was significantly and positively associated with each barrier for both males ($\beta_{\text{avoidance}} = 0.539$, $p < 0.001$); $\beta_{\text{disgust}} = 0.558$, $p < 0.001$; $\beta_{\text{difficulty}} = 0.489$, $p < 0.001$; $\beta_{\text{autonomy}} = 0.619$, $p = 0.002$) and females ($\beta_{\text{avoidance}} = 0.143$, $p = 0.016$); $\beta_{\text{disgust}} = 0.237$, $p = 0.004$; $\beta_{\text{difficulty}} = 0.196$, $p = 0.014$; $\beta_{\text{autonomy}} = 0.134$, $p = 0.033$), however, these relationships were much stronger among males (see Figure 2).

4.2 | The moderating influence of age

A small age by NCSR interaction effect was observed for all four barriers to bowel cancer screening (all $p < 0.01$). According to the path model ii) including age (i.e., the covariates model), being 60 years old or older was not significantly associated with any of the barriers to bowel cancer screening. Simple slopes analyses showed that NCSR positively predicted each barrier for those under 60 years of age ($\beta_{\text{avoidance}} = 0.257$, $p = 0.013$; $\beta_{\text{disgust}} = 0.305$, $p = 0.002$; $\beta_{\text{difficulty}} = 0.186$, $p = 0.017$; $\beta_{\text{autonomy}} = 0.220$, $p = 0.022$) and these relationships were somewhat stronger for those over 60 years of age ($\beta_{\text{avoidance}} = 0.400$, $p < 0.001$); $\beta_{\text{disgust}} = 0.462$, $p < 0.001$; $\beta_{\text{difficulty}} = 0.447$, $p < 0.001$; $\beta_{\text{autonomy}} = 0.378$, $p < 0.001$) (see Figure 3). In a post hoc analysis, an age by gender by NCSR interaction term was tested with no significant findings.

5 | DISCUSSION

On average the tendency to avoid health-related help-seeking due to a NCSR was low in this sample. However, those with higher tendencies were moderately more likely to report that several barriers would prevent them from completing a bowel cancer screening home test kit. Overall, the effect of NCSR was relatively equal across barriers explaining between 10% and 13% of shared variance in avoidance, disgust, difficulty and autonomy. This finding suggests that people with an avoidant attitude towards health-related help-seeking

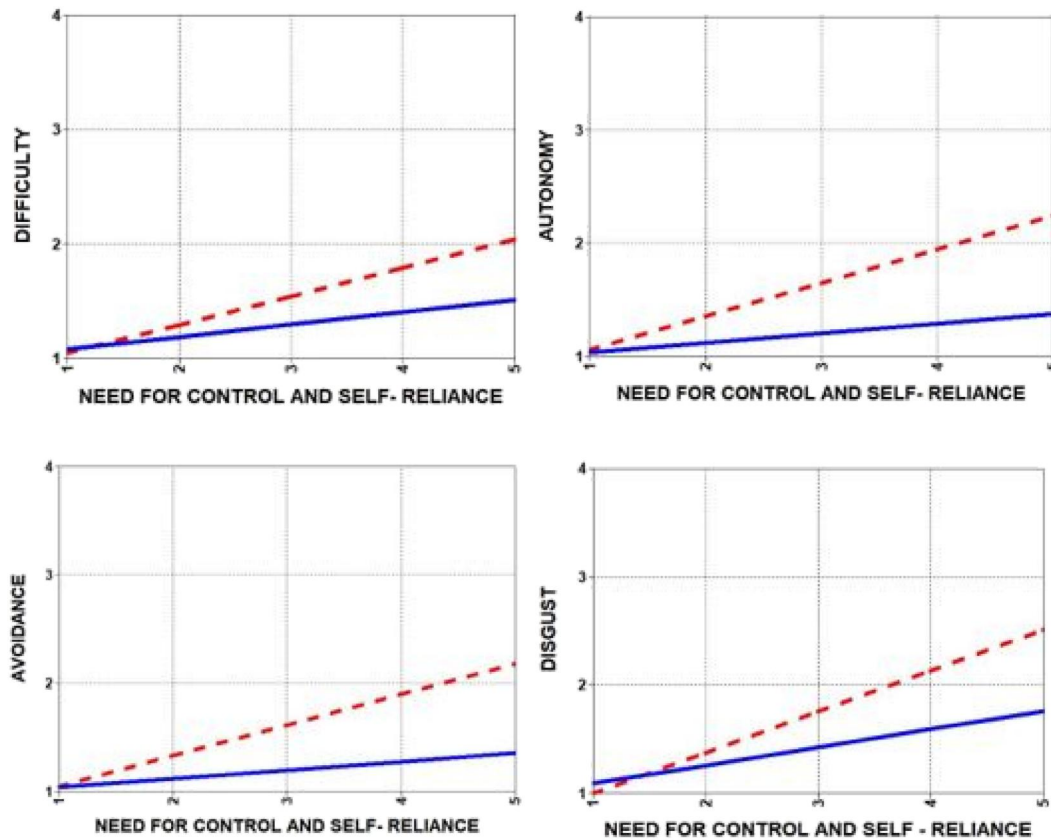


FIGURE 2 Linear relationships between barriers to bowel cancer screening and Need for Control and Self-Reliance (NCSR) for males (dashed line) and females (solid line)

may be more likely to endorse or perceive barriers to home bowel cancer screening in general. Alternatively, individual differences in overall resistance to health-related activity could underly both NCSR and the barriers measured, explaining the shared variance.

Importantly, the current findings uncovered gender and age differences in how NCSR relates to barriers to bowel cancer screening. NCSR did not vary greatly between males and females, yet NCSR had a much stronger impact on males' reporting of each barrier to completing a home bowel cancer screening kit, accounting for substantial variance in avoidance (29%), disgust (31%), difficulty (24%) and autonomy (38%) for males. Females with a high NCSR also tended to endorse these barriers, but to a much lesser degree, with NCSR accounting for just 2%–6% of variance in each barrier. These findings may reflect the way in which typically masculine traits manifest differently for males and females in terms of their health behaviour.³³

It has long been suggested that males experience stronger societal pressure to behave in ways that portray self-reliance and being 'in control'.^{34–36} In the context of healthcare, these masculine norms may manifest as avoidant behaviour or attitudes when it comes to preventive care such as bowel cancer screening. Studies in Australia and the United States have shown that females utilise primary and preventative health care services more often than males.^{37,38} These differences are likely due to a complex array of biological, psychosocial and environmental variables that are beyond the scope of this

study. Nevertheless, it indicates a proactive approach to preventative health that may override the effects of NCSR on females' approaches to help-seeking.

There was no significant relationship evident between age and NCSR in the current study, however, the barriers to home bowel cancer screening experienced by participants 60 years and older were somewhat higher for those with higher levels NCSR. This finding was unexpected given that prior research suggests that masculine norms tend to lose their effect on behaviour as they age.^{26,27} Potentially, the current finding reflects that old-fashioned views around the virtues of self-reliance and control in healthcare are becoming outdated and therefore have a stronger impact on the health attitudes of older generations.³⁹ However, as older cohorts have higher bowel cancer screening participation rates, there are perhaps other biopsychosocial pressures that override the influence of NCSR to drive their higher screening participation.

5.1 | Clinical implications

This study highlights the detrimental effect of self-reliant approaches to health care. Such approaches can exacerbate barriers to bowel cancer screening, particularly for males, and may provide some insight into why males are less likely to return home bowel cancer screening tests. An Australian RCT demonstrated that men's participation in the

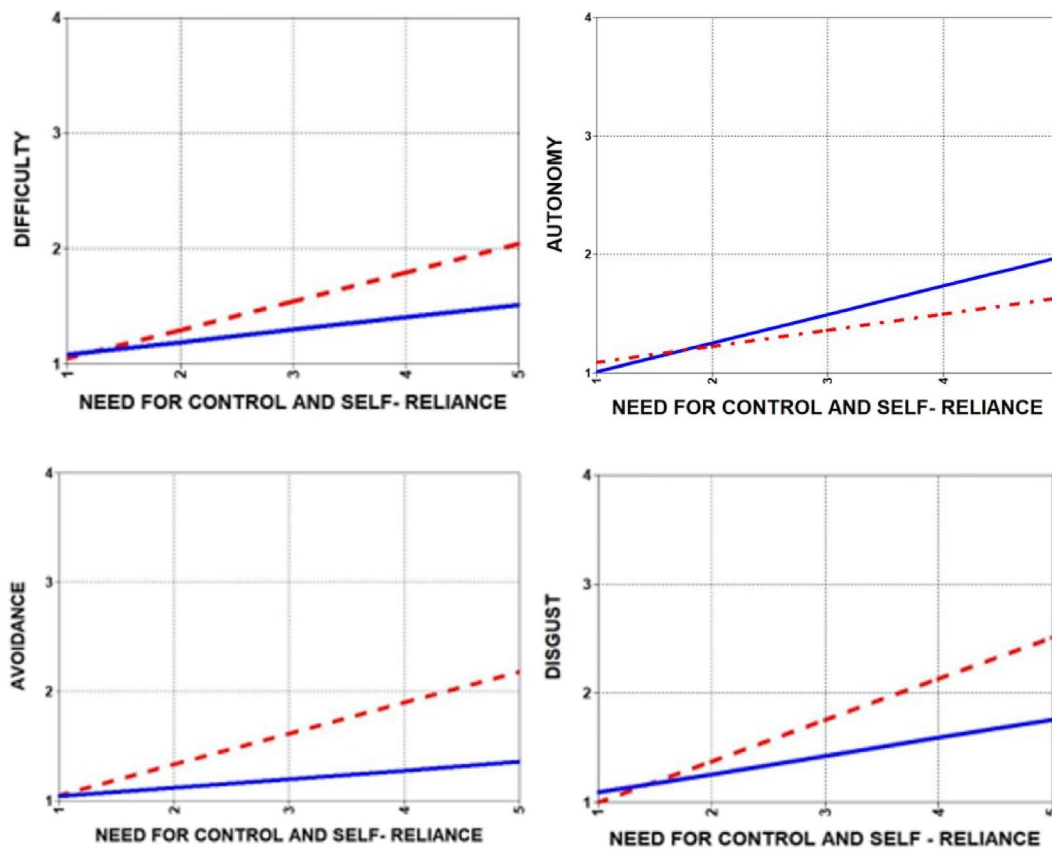


FIGURE 3 Linear relationships between barriers to bowel cancer screening and Need for Control and Self-Reliance (NCSR) for participants under 60 years old (dashed line) and over 60 years old (solid line)

NBCSP was improved by a targeted advanced notification letter highlighting the increased chance of developing bowel cancer in men.⁴⁰ Such interventions may benefit further through framing participation in the NBCSP in a way that is in line with masculine norms. For example, through messages such as 'take control of your health', and 'screen at home when and how it suits you'. Such strategies may also encourage other preventative health measures such as vaccinations, screening for other cancers and general check-ups.

Finally, efforts to reduce age disparities in bowel cancer screening participation are not likely to benefit from interventions to reduce self-reliant approaches to health. Further research is needed to understand the mechanisms that drive low participation in younger recipients of bowel cancer screening kits.

5.2 | Study limitations

The current study was undertaken on a large sample that was largely representative of the Australian population in terms of demographic characteristics. However, it is important to note that people who had returned their most recent kit and those in higher SES brackets were over-represented, whereas cultural and gender diversity was under-represented. Caution must therefore be applied in generalising these findings to diverse demographic groups. Self-selection and response bias may have also led to skewed

reporting of health behaviours and attitudes. Despite this, sufficient variance in the scales measured and the robust analysis techniques meant shared variance could be reliably detected. Research and established psychological theory suggests that attitudes precede health behaviours,⁴¹ however, the reverse is also conceivable. For this reason, it is important not to infer causation on the basis of these cross-sectional data.

6 | CONCLUSION

A desire to remain self-reliant and in control in lieu of seeking health care is associated with higher reports of barriers that prevent participation in bowel cancer screening, particularly among males and people aged 60 years and over. When encouraging these cohorts to participate in programs such as the NBCSP, public health messages should convey preventative health behaviour and cancer screening participation as actions that reflect self-control and self-reliance.

AUTHOR CONTRIBUTIONS

Conception and design: Belinda C. Goodwin, Larry Myers, Michael J. Ireland, Kirsten N. McKenna. Data collection: Kirsten N. McKenna, Larry Myers. Analysis and interpretation: Belinda C. Goodwin. Drafting or critiquing manuscript: Belinda C. Goodwin, Kirsten N. McKenna, Laura E. Anderson, Michael J. Ireland, Larry Myers.

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We would like to acknowledge all of the research participants who took part in the study.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

The questionnaire and methodology for this study was approved by the Human Research Ethics committee of the University of Southern Queensland (ref: H19REA291).

PARTICIPANT CONSENT STATEMENT

All participants provided consent to take part in the research through an online consent form.

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REFERENCES

- Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA A Cancer J Clin*. 2018;68(6):394-424. <https://doi.org/10.3322/caac.21492>
- Lew JB, St John DJB, Xu XM, et al. Long-term evaluation of benefits, harms, and cost-effectiveness of the National Bowel Cancer Screening Program in Australia: a modelling study. *Lancet Public Health*. 2017;2(7):e331-40.
- Wong MC, Ching JY, Chan VC, Sung JJ. The comparative cost-effectiveness of colorectal cancer screening using faecal immunochemical test vs. colonoscopy. *Sci Rep*. 2015;5(1):13568. <https://doi.org/10.1038/srep13568>
- Australian Institute of Health and Welfare. Analysis of Bowel Cancer Outcomes for the National Bowel Cancer Screening Program; 2018.
- Ananda S, Wong H, Faragher I, et al. Survival impact of the Australian national bowel cancer screening programme. *Intern Med J*. 2016;46(2):166-171.
- Navarro M, Nicolas A, Ferrandez A, Lanas A. Colorectal cancer population screening programs worldwide in 2016: an update. *World J Gastroenterol*. 2017;23(20):3632. <https://doi.org/10.3748/wjg.v23.i20.3632>
- Australian Institute of Health and Welfare. *National Bowel Cancer Screening Program Monitoring Report 2021* [Internet]. AIHW. <https://www.aihw.gov.au/reports/cancer-screening/nbcsp-monitoring-report-2021/summary>
- Klabunde C, Blom J, Bulliard JL, et al. Participation rates for organized colorectal cancer screening programmes: an international comparison. *J Med Screen*. 2015;22(3):119-126.
- Worthley DL, Cole SR, Esterman A, et al. Screening for colorectal cancer by faecal occult blood test: why people choose to refuse. *Intern Med J*. 2006;36(9):607-610.
- Hall NJ, Rubin GP, Dobson C, et al. Attitudes and beliefs of non-participants in a population-based screening programme for colorectal cancer. *Health Expect*. 2015;18(5):1645-1657.
- Chapple A, Ziebland S, Hewitson P, McPherson A. What affects the uptake of screening for bowel cancer using a faecal occult blood test (FOBT): a qualitative study. *Soc Sci Med*. 2008;66(12):2425-2435.
- Goodwin BC, March S, Crawford-Williams F, Chambers SK, Dunn J. I'm not doing that." an in-depth examination of nonparticipation in mail-out bowel cancer screening programs. *Transl Behav. Med*. 2020;10(6):1515-1524.
- Goodwin BC, Myers L, Ireland MJ, et al. Barriers to home bowel cancer screening. *Psycho Oncol*. 2021;30(10):1756-1764.
- Fish JA, Prichard I, Ettridge K, Grunfeld EA, Wilson C. Psychosocial factors that influence men's help-seeking for cancer symptoms: a systematic synthesis of mixed methods research. *Psycho Oncol*. 2015;24(10):1222-1232.
- Goodwin BC, Ralph N, Ireland MJ, et al. The role of masculinities in psychological and emotional help seeking by men with prostate cancer. *Psycho Oncol*. 2020;29(2):356-363.
- Oster C, McGuinness C, Duncan A, Turnbull D. Masculinity and men's participation in colorectal cancer screening. *Psychol Men Masc*. 2014;16(3):254. <https://doi.org/10.1037/a0038154>
- Boman EK, Walker GA. Predictors of men's health care utilization. *Psychol Men Masc*. 2010;11(2):113. <https://doi.org/10.1037/a0018461>
- Fennell KM, Hull M, Jones M, Dollman J. A Comparison of Barriers to Accessing Services for Mental and Physical Health Conditions in a Sample of Rural Australian Adults [Internet]. Vol 18; 2018. <https://www.rrh.org.au/journal/article/4155/>
- Rogers CR, Perdue DG, Boucher K, et al. Masculinity barriers to ever completing colorectal cancer screening among American Indian/Alaska native, black, and white men (ages 45-75). *Int J Environ Res Publ Health*. 2022;19(5):3071. <https://doi.org/10.3390/ijerph19053071>
- Bosson J, Vandello JA, Caswell TA. Precarious manhood. In 2013. p. 115-130.
- Smiler AP. Conforming to masculine norms: evidence for validity among adult men and women. *Sex Roles*. 2006;54(11-12):767-775.
- Parent MC, Smiler AP. Metric invariance of the conformity to masculine norms inventory-46 among women and men. *Psychol Men Masc*. 2013;14(3):324. <https://doi.org/10.1037/a0027642>
- Goodwin BC, March S, Ireland M, Manksi D, Ford M, Dunn J. Geographic variation in compliance with Australian colorectal cancer screening programs: the role of attitudinal and cognitive traits. *Rural remote health*. 2019;19(3):4957. <https://doi.org/10.22605/rrh4957>
- George A, Fleming P. Factors affecting men's help-seeking in the early detection of prostate cancer: implications for health promotion. *J Men's Health GenD*. 2004;1(4):345-352.
- Buckley J, Ó Tuama S. 'I send the wife to the doctor' - Men's behaviour as health consumers. *Int J Consum Stud*. 2010;34(5):587-595.
- Peak T, Gast JA. Aging men's health-related behaviors. *SAGE Open*. 2014;4(4):2158244014558044. <https://doi.org/10.1177/2158244014558044>
- Calasanti T, Pietilä I, Ojala H, King N. Men, bodily control, and health behaviors: the importance of age. *Health Psychol*. 2013;32(1):15-23.
- Bock J, Brown R, Green K. Aging with honor: examining ambivalent ageism and interpersonal risk-factors for suicide as explanations for the honor-suicide link. *J Soc Clin Psychol*. 2019;38:721-750. <https://doi.org/10.1521/jscp.2019.38.9.721>
- Australian Bureau of Statistics. *Australian Statistical Geography Standard (ASGS): Correspondences*. ABS; 2011. <https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1270.0.55.006July%202011?OpenDocument>. Accessed November 7, 2019.

30. Australian Bureau of Statistics. *ABS.Stat SEIFA by Local Government Area (LGA)*. ABS; 2011. http://stat.data.abs.gov.au/Index.aspx?DataSetCode=ABS_SEIFA_LGA. Accessed November 7, 2019.
31. Mansfield AK, Addis ME, Courtenay W. Measurement of men's help seeking: development and evaluation of the barriers to help seeking scale. *Psychol Men Masc*. 2005;6(2):95. <https://doi.org/10.1037/1524-9220.6.2.95>
32. Muthén LK, Muthén BO. *Mplus User's Guide*. 8th ed. Muthén & Muthén; 2017.
33. Sloan C, Conner M, Gough B. How does masculinity impact on health? A quantitative study of masculinity and health behavior in a sample of UK men and women. *Psychol Men Masc*. 2015;16(2):206. <https://doi.org/10.1037/a0037261>
34. Hennessy M, Mannix-McNamara P. Gendered perspectives of men's health and help seeking: implications for public health and health promotion. *Int J Med Health Sci Res*. 2014;1(2):13-28.
35. Kimmel MS. Fear, shame, and silence in the construction of gender identity. *Theor Masculinities*. 1994:119-141.
36. Creighton G, Oliffe JL. Theorising masculinities and men's health: a brief history with a view to practice. *Health Sociol Rev*. 2010;19(4):409-418.
37. Vaidya V, Partha G, Karmakar M. Gender differences in utilization of preventive care services in the United States. *J Wom Health*. 2012; 21(2):140-145.
38. Parslow R, Jorm A, Christensen H, Jacomb P, Rodgers B. Gender differences in factors affecting use of health services: an analysis of a community study of middle-aged and older Australians. *Soc Sci Med*. 2004;59(10):2121-2129.
39. Moore A, Grime J, Campbell P, Richardson J. Troubling stoicism: sociocultural influences and applications to health and illness behaviour. *Health*. 2013;17(2):159-173.
40. Zajac IT, Duncan AC, Flight I, et al. Theory-based modifications of an advanced notification letter improves screening for bowel cancer in men: a randomised controlled trial. *Soc Sci Med*. 2016;165:1-9. <https://doi.org/10.1016/j.socscimed.2016.06.036>
41. Sheeran P, Maki A, Montanaro E, et al. The impact of changing attitudes, norms, and self-efficacy on health-related intentions and behavior: a meta-analysis. *Health Psychol*. 2016;35(11):1178. <https://doi.org/10.1037/hea0000387>

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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