

Demographic associations with stage of readiness to screen for colorectal cancer

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Population screening by Faecal Occult Blood Test (FOBT) has the potential to significantly reduce colorectal cancer (CRC) incidence and mortality.¹⁻³ Screening guidelines in Australia recommend screening at least once every two years with FOBT or once every five years with colonoscopy or flexible sigmoidoscopy for all adults aged 50 and over.⁴ National bowel cancer screening programs using the FOBT are currently operating in several countries including Australia, the UK, France and Japan.⁵ Australia's National Bowel Cancer Screening Program (NBCSP) commenced in August 2006, offering free FOBT screening to all those turning 55 and 65.⁶ Reduction of CRC disease burden improves with high levels of uptake; optimally, over 70%. To date, participation rates in Australia have been much lower: the pilot program achieved a rate of 45.5% (average from three sites, range 39.9%-57.7%) and the initial national roll-out reported an adjusted participation

rate of 41% in July of 2007.⁷ These figures are similar to participation rates in other established screening programs worldwide⁶ and highlight the importance of identifying factors that could potentially increase screening participation.

Large-scale health promotion programs tend to resonate with those who are more healthy, highly-educated and motivated to change their lifestyle, in other words, those who are more ready to screen.⁸ This study used the Transtheoretical Model (TTM) of behaviour change as a theoretical basis for categorising readiness to screen for CRC.⁹ The TTM traditionally uses five stages of readiness to adopt behaviour as a framework for understanding behaviour change. These stages are: precontemplation, contemplation, preparation, action and maintenance, representing sequential stages of increasing self-reported readiness to screen. The aim for health promotion programs is to move the population

Abstract

Objective: To describe the distribution of a population in southern urban Adelaide in terms of readiness to screen for colorectal cancer (CRC) by Faecal Occult Blood Test (FOBT) or colonoscopy according to the stages in the Transtheoretical Model (TTM) of behaviour change and to compare the stages according to demographic variables.

Methods: A random sample of 664 South Australians aged 50 to 74 were surveyed in June 2006. Chi-squared analyses were performed to determine if statistically significant differences on demographic variables existed between participants at different stages of readiness to screen.

Results: The precontemplation and contemplation stages when combined equated to more than half of the total respondents. Several significant differences were identified between the stages. Those in both the precontemplation and contemplation stages were older than those in the remaining stages and also had a significantly higher proportion of women when compared to the action stage. In the precontemplation stage there were significantly more respondents for whom English was a second language, and low levels of private health insurance, whereas the contemplation stage had the highest proportion of Australian-born respondents. Interestingly, levels of private health insurance were also low among those who intended to screen with colonoscopy.

Conclusions and implications: The majority of the population were not found to have progressed beyond contemplation. Certain demographic characteristics varied significantly between people at different stages of readiness to screen for CRC.

Key words: colorectal cancer, screening, stages of change, demographic variables, Faecal Occult Blood Test.

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So what?

Results indicate that the majority of the population are not screening for CRC. Knowledge of how those in different stages of readiness to screen for CRC differ according to demographic variables may have some utility for the design of effective health promotion programs to increase CRC screening compliance.

from earlier stages, where the person is not thinking about screening (precontemplation), to later higher stages where they are preparing to screen (preparation), or better yet to the action and maintenance stages where the person is engaged in screening.⁹

Past research on cancer screening behaviour and the TTM has reported that each stage is associated with a specific set of psychological and behavioural variables including perceptions of the barriers^{10,11} and benefits of screening,¹⁰ perceived susceptibility,¹⁰ past cancer screening behaviour,^{11,12} and worry.¹¹ These results suggest that the population of people at each stage differ in their constituent psychological characteristics. Knowledge of how the population differs according to stage of readiness to screen is particularly useful as it allows for an understanding of the expectations and needs of certain portions of the population, particularly those who are not preparing to screen. There is also evidence to suggest that the people at each stage differ according to demographic characteristics with past research finding those in the earlier stages of readiness to be less likely to be married and less well-educated than those in the higher stages.¹³ However, research concerning demographic differences in the stages of readiness to screen for colorectal cancer, according to the TTM, is sparse.^{11,13} Understanding of the demographic associations with stage of readiness to screen can inform health promotion programs and interventions allowing them to target specific portions of the population and increase screening participation. The aims of this study were therefore to:

1. Describe the population living in southern urban Adelaide aged between 50 and 74 by stage of readiness to screen for colorectal cancer with FOBT.
2. Compare the demographic characteristics of those at different stage of the TTM.

Method

Questionnaire administration

Data collection was conducted in June 2006. Questionnaires were sent to 1,250 people aged 50-74 years randomly selected from the Australian electoral roll, residing in specific postcodes in southern urban Adelaide, South Australia. Participants were restricted to those aged between 50 and 74 inclusive so as to replicate Australia's National Bowel Cancer Screening Pilot Program. Clinical guidelines suggest that targeting this age group will optimise improvements to morbidity and mortality.¹⁴ Registration on the Australian electoral roll is compulsory for all Australian citizens who are over the age of 18. Postcodes were selected to avoid the areas involved in Australia's National Bowel Cancer Screening Pilot Program and were within the catchment areas for two hospitals associated with the investigators. The study

formed part of a larger study that offered CRC screening with FOBT (unpublished), therefore participants were sampled from within the associated hospitals' catchment areas in order to facilitate follow-up colonoscopy if required. People registered on those hospital's clinical high risk for CRC surveillance programs were also excluded. Both the National Pilot Program and this study included postcodes with a broad range of socio-economic levels and culturally diverse population, therefore this study is unlikely to be biased by the exclusion of the postcodes used in the National Pilot Program¹⁴ or by selecting participants from the associated hospitals' catchment areas.

Participants were mailed an 'advance notification of intention to send a survey' (n=1,250) two weeks prior to mailing the survey.¹⁵ Reminder letters were then sent six weeks from date of mailing the survey and reminder phone calls were made to all those with publicly listed phone numbers who had not returned a survey two weeks following the mailing of the reminder letters. Ethics approval was obtained from the University of Adelaide's Human Research Ethics Committee prior to commencing the project.

The Bowel Cancer Screening Questionnaire

The questionnaire included several demographic questions (age, gender, marital status, education, employment, birth country, language and private health insurance) and socio-economic status was determined by using post codes to assign an Index of Relative Socio-Economic Disadvantage. The index is derived from the Socio-Economic Index for Areas (SEIFA) and assigns disadvantage scores according to area of residence. Higher scores indicate lower levels of disadvantage (i.e. higher income, lower levels of unemployment).¹⁶ The questionnaire data used for this study formed part of a larger study that focused on social cognitive and ecological associations with readiness to participate in FOBT screening (unpublished). This study reports on the analysis of the demographic data and stages of change only.

TTM stage was determined by a predefined staging algorithm that used five forced choice questions (i.e. "Have you ever thought about screening for colorectal cancer? Yes or No?" "If you have thought about screening for colorectal cancer have you made a decision about whether or not to undergo screening? Yes, No or Undecided?") to determine stage of readiness to participate in CRC screening. Participants were provided with a brief description of FOBT, colonoscopy and flexible sigmoidoscopy prior to completing the TTM questions and those who indicated that they had made a decision to screen for CRC (action) were asked to indicate which screening test they would prefer to screen with. Therefore, despite the questionnaire predominantly

Table 1: TTM stage and behavioural description.

TTM Stage	Behavioural description
Precontemplation	Have not thought about screening for CRC
Contemplation	Have thought about screening for CRC but have not decided about whether or not to screen
Action	Have prepared to screen for CRC by either deciding to screen with FOBT, or obtaining an FOBT with the intention of completing, or have screened for CRC with FOBT
Rejection	Have thought about screening for CRC and decided not to screen
Colonoscopy Intention	Have decided to screen with colonoscopy or flexible sigmoidoscopy as opposed to FOBT

focusing on FOBT screening behaviour, participants were allowed to indicate a screening preference in order to gain an unbiased measure of their screening intentions prior to their participation in the study. The staging algorithm was designed to capture the stages of readiness described by Prochaska et al.¹⁷ and mirror items used in similar studies.^{11,18} In order to focus on those who preferred FOBT screening in later analyses (not reported here) the staging algorithm was designed to distinguish participants on the basis of their screening test preference. Final stage definitions used for this study are shown in Table 1.

Action was defined as having screened for CRC with FOBT or preparing to screen with FOBT. Past and immediate prospective behaviour were combined because both clearly indicated a commitment to the targeted behaviour. Other research on CRC screening has suggested that collapsing higher readiness stages results in findings that are consistent with both the theoretical and empirical associations of stage and stage-specific characteristics.¹³ This study did not investigate maintenance of screening behaviour because of the relatively recent introduction of a public health screening program for CRC in Australia.

Those who indicated a preference for either colonoscopy or flexible sigmoidoscopy as a screening test were subsequently labelled 'colonoscopy intenders'. While this stage does not fit neatly within the TTM for CRC screening with FOBT, it was included in the study due to the large number of participants who indicated a preference for this procedure.

Statistical analysis

A series of Chi-squared tests were conducted to assess the associations between socio-demographic variables and stage of readiness to screen. Socio-demographic variables were all either categorical or dichotomous and SEIFA scores were grouped evenly into tertiles of low, medium and high using SPSS to allow for a categorical comparison. If the assumptions of the chi-squared test were not met (cell values less than 5) the Fishers Exact test was utilised.¹⁹

Results

Questionnaire response rate

The questionnaire was returned by 664 participants giving an overall response rate of 53% (664/1,250). Twenty-five participants who were deceased, had changed address or were overseas and 16 who spoke limited English were excluded from the calculation of the potential sample giving an adjusted response rate of 55% (664/1,209). In addition, nine surveys had to be excluded from the analysis due to incomplete TTM data leaving 655 valid respondents.

Characteristics and comparison of survey respondents and non-respondents

The survey respondents were predominantly Australian born (71.1%), spoke English at home (91.4%), were married (74.0%) and had completed high school (91.8%). A substantial percentage had also completed additional tertiary education (44.0%). Only 56% of respondents were still in the workforce, the remainder were predominantly retired or home carers. Only 1.7% of respondents were unemployed. The majority of respondents were aged between 50 and 64 years.

The only available demographic information for survey non-respondents was gender and postcode. Postcode was subsequently used to assign SEIFA values. Gender distributions for both survey respondents and non-respondents were similar to that of the southern urban Adelaide population²⁰ from which they were obtained and scores on the SEIFA ranged from 845 to 1,130, with the median for Adelaide being 998.¹⁶ No significant differences were found between survey respondents and non-respondents for gender [male respondents=47.9%, male non-respondents= 47.8%, $\chi^2(1)=0.063, p>0.05$] or SEIFA index of disadvantage [respondents $M=1,026.56, SD=59.78$, non-respondents $M=1,022.36, SD=57.76$; $t(1,245)=1.256, p>0.05$].

Distribution of the population according to stage of readiness to screen for CRC

Table 2 shows the distribution of the population according to the TTM stages. Most people could be described as precontemplative (35%) or engaged in CRC screening (action) (31.1%).

Table 2: Distribution of survey respondents across the stages of the TTM.

TTM stage	Percentage	Number
Precontemplation	35%	229
Contemplation	18%	118
Action	31.1%	204
Rejection	4%	26
Colonoscopy Intention	11.9%	78
Total	100%	655

Significant demographic differences between TTM stages

Chi-squared analyses indicated that several socio-demographic differences existed between people in the different stages of the TTM. Only variables for which these differences were significant are reported; frequency distributions are shown in Table 3.

Age: Analysis of the age of those currently in each of the stages identified several significant differences (Fishers exact test= 16.042, $p < 0.001$). More than 50% of respondents in the precontemplation and contemplation stages were aged between 50-54 and 55-59 years whereas the action, rejection and colonoscopy intention groups were younger. Those who had rejected screening were predominantly older (60-64 years and 70-74 years), however, the percentage of those aged 65-69 among the rejection stage was significantly lower than in the other stages.

Gender: Gender distribution differed significantly between people in the different decision stages with the action stage being the only stage to have a higher percentage of men than women [$\chi^2(4) = 9.59$, $p < 0.05$].

Birth country: The contemplation stage had the highest proportion of Australian born respondents (85%, $\chi^2(4) = 15.25$, $p < 0.01$).

Language spoken at home: The percentage of those who spoke a language other than English at home was substantially larger in the precontemplation stage (13.2%) compared to the other stages (Fishers exact test= 13.973, $p < 0.01$); double that of the closest group (6.5%, colonoscopy intenders).

Private health insurance: The majority of respondents reported having private health insurance, however, the proportion was considerably lower in both the colonoscopy intenders (65.8%) and precontemplators (66.5%) than in the action (81.1%), contemplation (79.3%) and rejection (76.9%) stages [$\chi^2(4) = 16.12$, $p < 0.01$].

Discussion

Certain demographic variables varied between populations at different stages of readiness to screen for CRC. The distribution of respondents across the five stages showed that only 31.1% of respondents had either screened for CRC or were preparing to screen for CRC and the two earliest stages of readiness (the precontemplation and contemplation stages) together accounted for more than half of the sample. However, only a small portion of the population (4%) had rejected screening altogether. These results highlight the importance of understanding the variables associated with the earlier stages of the TTM, as well as those who have rejected screening, in order to plan and target behavioural interventions aimed at moving the population out of these stages and into the action stage.

Interestingly, 11.9% of respondents had decided to screen for CRC with colonoscopy or flexible sigmoidoscopy as opposed to FOBT. It is possible that those who indicated a preference for colonoscopy are those for whom FOBT is not a suitable test, i.e. those who are experiencing symptoms of CRC.⁴ However, it may also reflect a preference for a doctor-initiated approach to screening or poor self efficacy for FOBT.

Table 3: Demographic variables by stage of readiness to screen.

Variable	p Value	TTM stages									
		Precontemplation		Contemplation		Action		Rejection		Colonoscopy Intention	
		(N= 229)		(N= 118)		(N= 204)		(N= 26)		(N= 78)	
		n	%	n	%	n	%	n	%	n	%
Age band	0.000										
50-54		68	29.7	32	27.4	36	17.8	5	19.2	13	16.9
55-59		63	27.5	34	29.1	62	30.7	5	19.2	17	22.1
60-64		41	17.9	29	24.8	46	22.8	8	30.8	24	31.2
65-69		26	11.4	11	9.4	37	18.3	2	7.7	13	16.9
70 & over		31	13.5	11	9.4	21	10.4	6	23.1	10	13
Gender	0.048										
Male		111	48.5	48	41	114	56.4	11	42.3	32	41.6
Female		118	51.5	69	59	88	43.6	15	57.7	45	58.4
Born in Aust.	0.004										
Yes		152	66.4	100	85.5	140	69.3	20	76.9	53	68.8
No		77	33.6	17	14.5	62	30.7	6	23.1	24	31.2
Lang other than English	0.006										
Yes		30	13.2	6	5.1	9	4.5	0	0	5	6.5
No		198	86.8	111	94.9	191	95.5	26	100	72	93.5
Health insurance	0.003										
Yes		151	66.5	92	79.3	163	81.1	20	76.9	48	65.8
No		76	33.5	24	20.7	38	18.9	6	23.1	25	34.2

Notes: Sample sizes for individual demographic variables may not equal total due to missing values

Lang other than English = participants who spoke a language other than English at home

If the latter is true this may affect participation in large-scale screening programs that use FOBT. It is also important that any misconceptions about the efficacy of FOBT screening are addressed so as to avoid placing additional strain on colonoscopy services.

Women, and those younger people in the target population, were less likely to be in the action stage than older people and men. These results highlight the need to capture the interest of these specific groups when developing public information campaigns. Both findings are consistent with previous research, which has found lower levels of participation among women who believe that CRC is a 'man's disease'^{11,21} or that this is not a relevant disease for their age group.^{21,22} The fact that both younger age and being female were found to differentiate those in the earlier stages from those in the action stage is particularly relevant for screening campaigns in Australia. As information concerning age and gender is publicly available from the electoral roll, health promoters could potentially implement targeted interventions using simple demographic data.

The rejection stage was characterised by a larger proportion of the population between the ages of 60 and 64 but with a substantially smaller proportion between the ages of 65 and 70. These findings show that there is not a linear association with increased age and screening rejection. However, as this study was based on a very small sample of rejectors, further research is required to explain why this would be the case.

Further research is also required to examine the effects of language on screening participation. The higher prevalence of respondents who spoke a language other than English at home among the precontemplators suggests that it is important for public education campaigns to consider the needs of Culturally and Linguistically Diverse (CALD) groups. This consideration is likely to extend beyond mere translation of screening material into targeted and novel modes of communication delivery.

The contemplation and rejection stages had the highest numbers of Australian-born respondents. This suggests that although those born in Australia have thought about screening, they are not progressing to the point where they are preparing to act. This result conflicts with research conducted in Australia and overseas that has found cancer screening participation to be generally lower among minority groups.^{23,24} It is possible that our findings reflect an attitude toward screening that is unique to Australian culture. However, further research, particularly in the area of cultural belief systems, is required to explain this finding.

Our results showed that those in the precontemplation and colonoscopy intention stages generally were less likely to have private health insurance than those at other stages. The finding

that those not considering screening (precontemplation) were associated with lower levels of private health insurance is not surprising; past research has noted the tendency for those without private health insurance to be less likely to participate in elective health procedures.^{10,25,26} This is likely due to the perceived costs involved for not only the testing procedure but also for any follow-up testing should any problems be detected. Further research is required to determine the significance of this finding within the current Australian context. While those who access a screening kit from a doctor or pharmacy are required to pay a small amount for the kit, bowel cancer screening as part of the NBCSP incurs no cost to the participant. The majority of the population included in this study were unlikely to have had any previous experience of screening as part of the NBCSP, which could explain this finding.

The finding that lower levels of private health insurance were also associated with colonoscopy intention is surprising, particularly as there is no Medicare rebate in Australia to cover the cost of a screening colonoscopy.²⁷ Respondents were not asked to provide a reason for their choice of screening test because the study was primarily concerned with FOBT screening behaviour. Nonetheless, given this puzzling result, it is important for future research to investigate the two screening behaviours separately and consider factors that might contribute to a preference for a more costly and invasive approach to screening. One possible factor could be a GP preference for the different tests.

The generalisability of the results is limited by the sample and sub group sizes. The rejection stage was particularly small, with only 4% of the sample rejecting the idea of screening for bowel cancer. Data were collected via a mailed survey and it is possible that the number of true rejectors was underestimated due to their failure to participate. Further research using different methods of data collection is required to verify the proportion of rejectors among the wider population. As a result of sampling from within the catchment areas of two associated hospitals, participants were generally well-educated and from urban areas. Past research has highlighted the potential role that access to health care services can have on uptake of preventive health behaviours,^{8,28} therefore sampling from predominantly urban areas with easy access to healthcare services may limit the generalisability of the study to the wider Australian population. Similarly, education has been found to be associated with awareness of preventive health services²⁹ and with CRC screening uptake,¹³ therefore future studies should consider sampling from a more diverse population in order to examine the effects of education on readiness to screen. Nonetheless, the study is a useful exploratory investigation of the population's readiness to screen for CRC and of the subgroups that are likely to require special interventions to encourage participation in CRC screening.

Conclusion

The majority of the population had not progressed beyond contemplation indicating that strategies to address these issues need to be introduced. Some demographic variables were found to be more strongly associated with those in the early stages of readiness to screen for CRC than those who are preparing to screen, or have screened. These variables include being female, younger, lacking private health insurance and speaking a language other than English at home. Examining ways of communicating the benefits of screening to this segment of the population may move the distribution of people from the thinking stages (precontemplation and contemplation) to the action stage.

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