ORIGINAL ARTICLE

Marriage and cancer prevention: does marital status and inviting both spouses together influence colorectal cancer screening participation?

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Objectives This study examined the influence of marital status and inviting both partners together on participation in colorectal cancer screening.

Setting Data were from a subset of participants from the UK Flexible Sigmoidoscopy Trial (1996–1999).

Methods Marital status was self-reported, and co-invitation of partner was obtained from the trial database. Screening intentions were assessed in 16,527 adults aged 55–64 years. Attendance was recorded in the 4130 respondents who were subsequently invited.

Results Multivariate analyses, controlling for age and educational level, indicate that married (or cohabiting) people have more positive intentions (odds ratio [OR] = 1.26; 95% confidence interval [CI] 1.14–1.38) and higher attendance rates at screening (OR = 1.23; 95% CI 1.04–1.45) than non-married people. After adjusting for the marriage effect, inviting partners together (co-invitation) significantly increased screening intentions among women (OR = 1.17; 95% CI 1.04–1.31) but not men (OR = 0.97; 95% CI 0.85–1.10). Co-invitation significantly increased attendance at screening in both genders (OR = 1.34; 95% CI 1.14–1.58).

Conclusions In this age group, married adults are more likely to participate in colorectal cancer screening than the non-married, and inviting both members of a couple together further increases screening uptake. The positive effect of marriage was as strong for women as men.

INTRODUCTION

Married people tend to be healthier than non-married people.[1–7] This may be partly a consequence of healthier individuals getting married (selection effect), but could also be an effect of the married state itself (causation effect). Married people tend to be more compliant with healthier behaviour advice,[7] but study designs make it difficult to distinguish behavioural differences that pre-dated the marriage from differences that were a consequence of it. To attempt to resolve this, we studied a health behaviour that was new to the British health-care system (flexible sigmoidoscopy screening for colorectal cancer), to see if marital status and inviting both spouses together influenced participation rates.

One mechanism that has been put forward for the 'healthy marriage' effect is that spouses monitor and control each other's behaviour.[8,9] It has been argued that women, as part of their role as 'family health gatekeepers', are more likely to attempt to change their spouse's behaviour than men.[10,11] We had already noted higher attendance rates in men in the UK Flexible Sigmoidoscopy (FS) Trial, which we hypothesized might be because married men were encouraged by their wives to attend screening.[12] However, Coyne and Bolger's[13] model of the effect of marriage identifies it as a form of mutual social control resulting from recognition of one's value to others, which may limit maladaptive (and promote adaptive) behaviour. Married people may also view the well-being of the family as dependent on their health and therefore lead healthier lives and support healthier lifestyles in their spouse.[14,15] On this basis, we could expect that married people of either sex would show higher attendance rates than single people.

In 1995, a multicentre randomized controlled trial (the UK FS Trial) was set up in the UK to evaluate the efficacy of flexible sigmoidoscopy in reducing colorectal cancer mortality and incidence.[16] Participation in colorectal cancer screening is a novel health behaviour in the UK context because it is not part of the national screening programme. The present study examined the influence of marital status on both intentions to participate in colorectal cancer screening and actual attendance. We examined participation rates in relation to marital status for the group as a whole, and in men and women separately. We also studied the effect of inviting both members of a couple (which happened when both were in the screening age range and attended the same general practice) versus inviting only one. Inviting both members of a couple might increase communication about screening and spouses could therefore motivate each other to participate. Of course spouses might also stimulate each other not to attend, but there is evidence that motivation for healthier lifestyles is more common than stimulation of unhealthy behaviours among couples.[17] We hypothesized that both marriage and co-invitation would increase screening uptake, but that the effects would be stronger for men.

METHODS

Participants and procedures

Data were collected in six centres of the FS Trial: Glasgow, Harrow, Birmingham, Leeds, Leicester and Welwyn Garden City (UK). The sampling frame was a population sample of British adults aged 55–64 years who were taking part in the UK FS Trial.[16,18] Background questionnaires were sent to

31,252 people, of whom 20,052 responded (64%). Those with missing data on items used in these analyses ($n = 3338$) were excluded, leaving 16,714 respondents for the final analyses (83% of responders and 54% of total sample). We know from previous analyses that return rates were lower in men and from addresses in more socioeconomically disadvantaged neighbourhoods.[19,20] Respondents included in the present analyses ($n = 16,714$) did not differ from those excluded ($n = 3338$) on age, gender or educational qualifications. Data were collected in two stages: first, a self-report questionnaire was sent to all respondents (sample A) and next a sub-sample of people, who responded positively to the question on intentions to attend, was invited to screening (sample B). The invitation procedure has been described in detail elsewhere.[18]

Measures

Screening participation was assessed at two levels: intention to attend screening in sample A and attendance at screening in sample B.

Screening intention was assessed in the self-report questionnaire with a single question 'If you were invited to have a bowel cancer screening test, would you take up the offer?' with responses 'yes definitely', 'yes probably', 'probably not', or 'definitely not'. For these analyses, answers were dichotomized into yes and no.

Attendance at screening was assessed in the sub-sample of people who were invited for screening. Respondents who responded 'yes' to the screening intention question in the self-report questionnaire were randomized to screening or usual care (no screening) in the ratio 1:2. Those randomized to screening were sent an invitation for screening with a specified appointment about five weeks in advance (sample B). FS screening is not part of the present UK national screening programme, and therefore is not otherwise available.

Marital status was self-reported and dichotomized to married or living as married (termed married in these analyses for simplicity of presentation) versus not married (divorced, separated, widowed or single).

Co-invitation of another adult of opposite sex in the same household was assessed at both stages (i.e. the time of sending out self-report questionnaires to assess screening intentions and the time of sending out appointments). Co-invitation occurred automatically when there were two adults from opposite sex within the age range of 55–64 years in the household, living at the same address, and registered at general practitioner (GP) practices participating in the trial. People living at the same address were always randomized to the same arm of the trial. When married people were living with someone from the opposite sex at the same address, they were assumed to be partners. When married people were invited alone, it indicates that their partner was either not within the age range (55–64), lived at a different address, or was registered with a different GP who was not participating in the study. Although rare, some people who identified themselves as not married (nor living as married) lived with an adult aged 55–64 years of the opposite sex, which might be a sibling or a friend. This occurred in 187 cases (1.1% of 16,714). These cases were excluded from the analyses, because the nature of the relationship was unclear and numbers were too small to analyse this group separately.

Age and *gender* were known from the Health Board records. The age range was 55–64 years and was dichotomized at age 60 years.

Educational qualifications, based on whether respondents had passed public examinations within schools (yes, no), were used as the indicator of socioeconomic status (SES).

Statistical analyses

Multiple logistic regression analyses were used to assess the associations of marital status and co-invitation with screening intentions and attendance at screening, adjusting for age, gender and educational level. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated for positive screening intensions and attendance at screening. Two-way interactions between gender and marital status or co-invitation were analysed for significance, and results are presented for men and women separately when interactions with gender are found to be significant. Analyses were carried out with SPSS 13 for windows, and a $P < 0.05$ was considered significant.

RESULTS

Screening intentions

Data on intentions to attend screening were available on 16,527 people (sample A). Characteristics of this sample are presented in Table 1. In total, 74% of them described themselves as married or living as married ($n = 12,201$). Half

Table 1 Characteristics of study sample A: intentions to attend screening

	n	(%)	% Intended to attend screening	χ^2	*P* value
Sample A	16,527	(100)	80.5		
Marital status and co-invitation					
Married and invited with partner	6233	(37.7)	82.5		
Married and invited alone	5968	(36.1)	81.3		
Non-married and invited alone	4326	(26.2)	76.4	64.9	<0.001
Age (years)					
55–59	8076	(48.9)	82.5		
60–65	8451	(51.1)	78.6	39.2	<0.001
Gender					
Male	7511	(45.4)	83.7		
Female	9016	(54.6)	77.8	89.6	<0.001
Educational qualifications					
Yes	6566	(39.7)	85.4		
No	9961	(60.3)	77.2	168.5	<0.001

of the married people (51%) were contacted together with their partner ($n = 6233$) and the other half were contacted alone ($n = 5968$). All of the non-married people were invited alone ($n = 4326$).

Table 1 shows the percentages of people expressing a positive intention to attend screening in each sub-group. Intention to attend screening was lowest among the 'non-married and invited alone' (76.4% intended to attend screening), intermediate among the 'married and invited alone' (81.3%), and highest among the 'married and invited with partner' (82.5%) ($P < 0.001$). Intention to attend screening was also significantly related to younger age, male gender and better education (Table 1). The marital status and co-invitation groups differed significantly on these demographics (data not shown), so further analyses were adjusted for these demographic variables.

Logistic regression models predicting intention to attend screening are presented in Table 2. Multivariate analyses showed significant independent effects of marital status and co-invitation on intention to attend screening. Married people were more likely to intend to attend screening than non-married people (OR = 1.26, 95% CI 1.14–1.38). The interaction between gender and co-invitation was significant ($P = 0.029$), so results of co-invitation are presented separately for men and women. The effect of co-invitation on intentions was significant among women (OR = 1.17, 95% CI 1.04–1.31), but not men (OR = 0.97, 95% CI 0.85–1.10).

Attendance at screening

Attendance was assessed in the sub-sample of 4130 persons who responded 'Yes' to the screening intention question and were randomized to screening (Sample B). Characteristics of the sample are shown in Table 3. Two-thirds were married (or living as married) of whom around half were invited for screening with their partner. Attendance was highest among the 'married and co-invited' group (74.8%), intermediate among the 'married and invited alone' (68.8%) and lowest among the 'non-married and invited alone' group (63.4%) ($P < 0.001$, see Table 3). Attendance was also higher among men and those with educational qualifications.

Multivariate logistic regression models predicting attendance at screening are shown in Table 4. Interaction terms with gender were not significant, so results are presented for men and women together. Multivariate analyses show significant independent effects of marital status and

Table 2 Logistic regression models predicting intentions to attend screening ($n = 16,527$)

	Univariate			Multivariate*,†		
	OR	95% CI	*P* value	OR	95% CI	*P* value
Non-married	1			1		
Married or living as married	1.40	1.29–1.52	<0.001	1.26	1.14–1.38	<0.001
Invited alone	1			1		
Invited with partner	1.24	1.14–1.34	<0.001	♂0.97	0.85–1.10	0.613
				♀1.17	1.04–1.31	0.011

*Multivariate odds ratios (ORs) adjusted for gender, age and educational qualifications. Nagelkerke $R^2 = 0.031$

†Interaction between gender and marital status is non-significant ($P = 0.672$). Interaction between gender and co-invitation is significant ($P = 0.029$), and gender-specific ORs are, therefore, presented for this variable

Table 3 Characteristics of study sample B: attendance at screening

	n	(%)	% Attended at screening	χ^2	*P* value
Sample B	4130	(100)	69.4		
Marital status and co-invitation					
Married and invited with partner	1264	(30.6)	74.8		
Married and invited alone	1879	(45.5)	68.8		
Non-married and invited alone	987	(23.9)	63.4	34.5	<0.001
Age (years)					
55–59	2021	(48.9)	69.1		
60–65	2109	(51.1)	69.6	0.1	<0.737
Gender					
Male	1978	(47.9)	71.7		
Female	2152	(52.1)	67.2	9.6	<0.002
Educational qualifications					
Yes	1727	(41.8)	76.4		
No	2403	(58.2)	64.3	69.7	<0.001

Table 4 Logistic regression models predicting attendance at screening ($N = 4,130$)

	Univariate			Multivariate*,†		
	OR	95% CI	*P* value	OR	95% CI	*P* value
Non-married	1			1		
Married or living as married	1.43	1.23–1.66	<0.001	1.23	1.04–1.45	0.014
Invited alone	1			1		
Invited with partner	1.47	1.27–1.70	<0.001	1.34	1.14-1.58	<0.001

*Multivariate odds ratios (ORs) adjusted for gender, age and educational qualifications. Nagelkerke $R^2 = 0.037$

†Interactions between gender and marital status ($P = 0.603$), and between gender and co-invitation ($P = 0.308$) are non-significant

co-invitation (adjusted for age, gender and educational level). Married people had higher attendance rates than the non-married (OR = 1.23, 95% CI 1.04–1.45), and those who were invited with their partner had higher attendance rates than those invited alone for screening (OR = 1.34, 95% CI 1.14–1.58).

DISCUSSION

This large prospective study shows that married people express greater interest in screening for bowel cancer and have higher attendance rates at screening than those who are not married. Beneficial effects of marriage in terms of overall health, longevity and healthy life styles have been widely documented.[1–7] The present study adds to this literature, because it analyses a large data-set including men and women and addresses a health behaviour that was not previously carried out. The finding that married people were more likely to take up the offer of screening is consistent with the idea that married state induces a healthier lifestyle (causation effect), although it is not possible to rule out the possibility that health-conscious people are both more likely to marry and more likely to participate in screening programmes (selection effect).

One of the mechanisms linking marriage to health-promoting behaviours is social control,[8,17] which in this context refers to regulatory attempts by others and feelings of obligation and responsibility to others, that facilitate engagement in healthy behaviours. Social networks were reported to be an important motive to attend screening for prostate cancer by 11% of the attending men.[21] However, there is evidence that women have a stronger influence on men's decisions to seek health care, than men do on women's health decisions.[22] In addition, women's traditional role as a family 'gatekeeper' of health, might encourage married men to participate in screening.[10,11] On this basis, we had predicted an interaction between marital status and gender in relation to screening participation, but no such gender differences were observed in the present study. Both married women and married men had more positive intentions to attend screening and their attendance rates were higher compared with those who were not married. This suggests dyadic equality in responsibility for health, at least in this age group, and in relation to a hospital-based screening examination.

Possible explanations why screening attendance is increased among married and co-invited people could be related to a passive (indirect) or active (direct) process of social control.[17] The 'passive' influence of marriage on health behaviour (including screening participation) is related to the observation that married people may have more organized and planned lives, which is beneficial to health and health-enhancing behaviours.[23] Marriage is a commitment with a long-term orientation, and thus shifts the focus from immediate self-interested gains to longer-term gains. 'Active' communication about the screening programme among spouses is also likely to lead to positive opinions about health-enhancing behaviours.[17] Although in the present study we have no information on whether partners discussed the screening programme, it seems reasonable to assume that communication was enhanced when spouses are invited together, and consistent with this, we found that invitation of the two partners together increased screening intentions among women and increased attendance rates in men and women.

It has been suggested that programmes designed to improve lifestyles might be targeted at non-married people, because unhealthy lifestyles are more frequent in this group.[5] Our results showed that married people are about 25% more likely to attend screening (OR = 1.23). Even though the crude difference between the 'non-married and invited alone' and 'co-invited married' group was only 11.4% (74.8–63.4), these differences may be relevant in public health terms when colorectal screening is to be introduced among the general population.

There are limitations to this study. Firstly, the effect of co-invitation was not studied in a randomized design. Co-invitation of both partners occurred in about 50% of married couples. The other 50% of married people were invited alone, which can be assumed to be because their partner was not within the age range of the study (i.e. 55–64 years), not living at the same address, or was registered at a different GP practice that did not participate in the trial. In the case of attendance, one of the partners may not have expressed interest in screening. It is unknown what effect the age difference between partners has on interest or attendance at screening. We had no information on the actual communication between partners or within social networks and future research might benefit from addressing this.

CONCLUSION

In this age group where health concerns are likely to be prominent, and with this particular test, married and co-invited adults were more compliant than non-married adults in attending screening. The positive effect of marriage was as strong for women as men.

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