Offering disinclined people the choice between different screening appointments: a randomised online survey

Abstract

Objectives:

An invitation to cancer screening with a single (fixed) appointment time has been shown to be a more effective way at increasing uptake compared with an invitation with an open (unscheduled) appointment. The present study tested whether offering more than one fixed appointment could further enhance this effect or be detrimental to people's intention.

Design:

Experimental online hypothetical vignette survey.

Methods:

1,908 respondents who stated that they did not intend to participate in Bowel Scope Screening (BSS) were offered either one, two, four or six hypothetical fixed BSS appointments (all of which covered the same time of day to control for individual preferences).

Results:

Participants who were given more than one appointment to choose from were less likely to intend to book an appointment despite multiple appointments being perceived as more convenient.

Conclusions:

These results suggest that when it comes to offering people appointments for cancer screening, less (choice) is more at least if alternatives fail to serve an inherent preference.

Introduction

Since 2013, the National Health Service (NHS) in England has been offering a once-only endoscopic inspection of the lower part of the bowel (Bowel Scope Screening; BSS) to men and women aged 55 years to reduce incidence of colorectal cancer (CRC). However, uptake is notably lower than that of pre-existing, non-preventive methods of bowel screening based on stool testing (43% vs 54%; McGregor et al., 2016; von Wagner et al., 2011).

In order to mitigate practical barriers around booking and attending a screening appointment, the invitation letter for BSS offers a screening appointment with a given date, time, and location that people are asked to confirm if they want to participate. It is suggested that using fixed or specified appointments with a single default option reduces individuals' decisions to a simple binary choice i.e. "yes, I can make that appointment" vs "no, I can't make that appointment". This approach has been found to be more effective in motivating women to attend breast screening than an open invitation that does not feature a specific date and time (Allgood et al. 2017; Hudson, Brazil, The, Duffy & Myles, 2016; Offman et al., 2013). However, single appointments will inevitably propose times that are inconvenient, which means that many invitees will ultimately have to contact the screening centre to schedule a new appointment. Recent data from BSS show that attendance at the exact appointment offered is as low as 18% and re-scheduled appointments with multiple slots account for more than half of those who have subsequently attended screening (McGregor et al., 2016). While those with strong intentions are likely to contact the screening programme to reschedule, those less committed may be discouraged by the inconvenience of the task. A potential way of overcoming the loss of participation at the first suggested appointment is to offer multiple appointment slots when people are invited for screening. However, there is currently no evidence in the screening context about the potential benefits of offering more than one timed appointment.

Based on the Traditional Economic Theory (THE) of rational choice (Simon, 1955) and Self-Determination Theory (SDT; Deci & Ryan, 1980), it is plausible that offering choice is better than a simple allocation: alternative appointments may create a stronger feeling of autonomy which could increase intrinsic motivation to participate (Iyengar & Lepper, 2000; Katz & Assor, 2007; Patall, Cooper & Robinson, 2008; Zuckerman, Porac, Lathin, & Deci, 1978). SDT is focused on the person acquiring motivation by developing a sense of autonomy and competence. SDT based interventions have been tested in the of tobacco dependence, diet, physical activity and dental care (Fortier et al., 2007; Halvari & Halvari, 2006; Ryan & Deci, 2007; Williams et al., 1998; Williams et al., 2006).

Similarly, presenting a service or product as part of two options can increase its perceived value (Szrek & Baron, 2007). However, Shah and Wolford (2007) suggest an inverse U-shaped curve between selection behaviour and choice set size in which choice has a positive or negative effect depending on the number of options. More choice can complicate the decision-making process by causing confusion and inceasing perceived difficulty. According to the Choice Overload Hypothesis (COH), offering additional timed appointments would therfore decrease motivation to engage with the screening invitation and choose an option. Although choice overload has been observed in a range of contexts (Iyengar & Lepper, 2000; Schwartz, 2004), it is likely to be moderated by the intricacies of the decision such as familiarity with the decision-making context and prior preference over the alternatives (Scheibehenne, Greifender & Todd, 2010, Chernev, Boeckenholt & Goodman, 2015). Specifically, choice overload is likely to be amplified where decision makers do not have prior preferences and lack familiarity with the overall context (e.g. the screening test). While many research studies have examined the impact of large choice sets, Tversky and Shafir (1992) have shown that choice overload can occur even with as few as two options. So far, only two studies have discussed offereing choice in the context of CRC screening (Partin et

al., 2012; ,van Dam et al., 2013). While the later study discusses arguments in favour and against offering a choice of screening strategies, the first concludes, that based on evidence from seven randomized trials, the number of CRC screening options offered is unlikely to affect adherence and patient satisfaction either positively or negatively.

The aim of this study was to investigate how the size of the choice set influences intention to confim a given hypothetical appointment in an online experiment. Specifically, we compared a standard screening invitation with a single BSS appointment with alternative invitations that featured either two, four or six appointments to choose from. We tested whether offering more than one timed appointment increased or decreased intentions to confirm an appointment.

Methods

Study Design

A randomised online experiment was designed to measure the effect of appointment choice set size on intention to confirm a BSS appointment. A survey company (ResearchNow) invited men and women from their online panel to take part in a survey on BSS if they were aged 35-54 years, living in England, without a previous diagnosis of bowel cancer. This population was assumed to be naïve to BSS with the aim of ensuring that the task was unfamiliar to participants (Stoffel et al, 2019; von Wagner et al., 2019).

Once people agreed to participate in the survey, they were given a brief description about BSS and asked to respond to a question that tested their comprehension. If they answered correctly, they were asked to indicate their intention to take part in BSS: *Would you take up the offer if you were invited to have the bowel scope screening test?*" with responses on a fully-labelled four-point scale (*'definitely not'*, *'probably not'*, *'probably, yes'* and *'definitely, yes'*).

Those who intended to take part were excluded from the survey in order to *i*) test the effects of the manipulation among those who do not intend to take part and *ii*) minimise ceiling and social desirability effects often associated with self-reported intention measures (Michie & Abraham, 2004; Stoffel et al, 2018; Stoffel et al., 2019; von Wagner et al., 2019).

Once eligibility had been established, participants were then allocated at random to one of four experimental conditions in which they were asked to read a hypothetical vignette (See Supplementary Materials). Depending on the condition, the vignette stated that participants should imagine that they had received an invitation letter from their screening centre that contained either one or two, four or six possible appointment dates in eight weeks' time to choose from. Each vignette was followed by a second comprehension question on the main feature of the experimental manipulation. Upon answering correctly, participants were asked to indicate their intention to book an appointment: *"Would you call up your local screening centre to confirm (one of) the offered appointment(s)?"*using a four-point Likert scale ('*definitely not*', '*probably not*', '*probably, yes*' and '*definitely, yes*').

Perceptions of the invitation process was assessed through three questions on the perceived difficulty of deciding whether to confirm the offered appointment(s), the convenience of the offered alternative(s), and complexity of the invitation process. All three questions used the same fully labelled five-point Likert scale ('*not at all*', '*slightly*', '*moderately*', '*very much*' and '*extremely*') and were adapted from a 12-item subjective measurement of mental load and mental effort (Krell & Hui, 2017).

Details of respondents' age, gender, ethnicity, employment status, living arrangement, education, car ownership, home ownership, and self-reported health status were collected at the end of the survey (see S1 Table for details about participants' characteristics). Participants

received a small financial incentive of around 50 pence from the survey company for completing the survey.

The selection of appointment times

Each appointment time offered was drawn from a set of six half-hour slots on Tuesday, Wednesday, and Thursday mornings between 9.30 and 11.30. The six appointments were chosen through three rounds of pilot testing with 464 participants in which BSS non-intenders had to indicate their preferred appointment among a list. Starting with 10 appoinments in the first round, we asked responders which appointment they would prefer. After each round, the two most frequently preferred appointments were removed, resulting in the six appointments that shared the lowest preference rates. This approach was chosen to identify and remove potential dominating appointments to ensure a homogenous choice set.

Statistical analysis

Our main outcome was intention to book the offered appointment using a dichotomised scale ('*probably, yes*' or '*definitely, yes*' vs '*probably not*' or '*definitely not*') after exposure to the experimental manipulation. Sample size of this study was calculated prior to data collection based on the results of a soft launch. We calculated that we needed approximately 450 completes per condition to detect differences of at least 8% in proportion of non-intenders effect size between conditions, with a power of 80% and an alpha value of 0.05 (Cohen, 1988). We report all measures, manipulations, and exclusions in these studies. All statistical analysis was conducted with Stata/SE version 15.1 (StataCorp LP, College Station, TX). The survey, data and Stata codes for the experiment are available via OSF: https://osf.io/exbtk/?view_only=1b2f34b492744df69c11b7ab1a62998e.

We used unadjusted and adjusted ordinal logistic regression to investigate the effect of the number of appointments offered on confirmation intentions and perception of the decision

task and appointments. Covariates that were included in the adjusted analyses included initial intention, age, gender, ethnicity, employment status, living arrangement, education, car ownership, home ownership, and self-reported health status.

Ethical approval

The study was approved by the university's research ethics committee (approval number 13113/002).

Results

Study Population

Figure 1 demonstrates the flow of participants through the study. In total, 9,129 men and women aged 35-54 years were invited to participate. Out of the 8,386 (91.9%) who correctly identified BSS as a test which involves inserting a flexible tube into the back passage, 2,125 (23.3%) indicated that they would either *'probably not'* (n=1,717) or *'definitely not'* (n=408) do the test. 6,261 who intended to do the test by either saying that they would probably (n=3,947) or definitely (n=2,314) do the test were excluded. 217 participants (10.2%) did not finish the survey. The final sample consisted of 1,908 respondents of whom 57.8% were female, 82.1% White-British, 65.5% married or cohabiting, 76.3% in paid employment, and 63.6% in good or excellent self-reported health (63.6%). Drop-outs post-randomisation did not create imbalances (Appendix 1).

[Insert Figure 1 here]

Intention to book BSS appointment

The unadjusted and adjusted logistic regression in Table 1 shows the negative effect of offering a choice on intention (Odds Ratios, ORs) varied between 0.69 and 0.75, indicating

that presenting individuals with more than one appointment option reduced the intention to book an appointment (Table 1 and 2).

[Insert Table 1 here]

There were no statistically significant differences between conditions whose choice sets contained more than one appointment.

Perception of screening invitation

Most participants (89.1%) did not perceive the decision task to be very or extremely difficult, irrespective of experimental group (Table 2).

[Insert Table 2 here]

Approximately half of the sample perceived the invitation process to be very or extremely complex (52.2%). However, the adjusted logistic regression did not reveal a statistically significant effect of offering choices among appointments on these two perception items (Table 3).

Conversely, individuals who were presented with more than one appointment option were more likely to perceive their choice sets to be convenient. Specifically, those who were offered four or six options perceived them to be more convenient than those who only got one option (OR: 1.57; 95% CI: 1.25-1.97, $p<0.001$ and OR: 1.53; 95% CI: 1.1-1.93, $p<0.001$). Conversely, offering two appointments to choose from was not associated with greater perceived convenience (OR: 1.15; 95% CI: 0.91-1.45).

[Insert Table 3 here]

Discussion

This study investigated whether the size of the appointment choice set affects BSS confirmation intentions among disinclined men and women. The study was tested on two

opposing concepts: Self-Determination Theory and Traditional Economic Theory, which both advocate choice, versus the Choice Overload Hypothesis, which stipulates that 'less is more' when it comes to offering alternative screening appointments. Consistent with literature on choice overload (Scheibehenne et al., 2010, Chernev et al. 2015), our experiment suggests that offering choice has a negative effect on intentions to confirm an appointment. Furthermore, similar to Tversky and Shafir (1992), we found that offering as few as two options decreases confirmation intentions.

A strength of our experiment was the use of a series of comprehension checks to ensure that all participants in the final sample correctly understood the decision task, providing a high level of internal validity. However, this study also has some limitations. Firstly, we used an online experiment with hypothetical scenarios and participants aged 35 to 54 who were not yet eligible for screening, potentially reducing the relevance of their responses and limiting external validity of our findings.

The next step would be to test external validity through a randomised controlled trial within the screening programme, in which eligible individuals are invited for screening with one or more appointment times.

Secondly, our experiment does not explain why offering choice between different screening appointments had a negative effect on screening intentions as our results suggest that offering choice did not increase the difficulty of the participation decision or the complexity of the screening invitation. Furthermore, the positive effect of offering choice among four or more alternatives on perceived convenience of the appointments suggests that choice is not unambiguously bad. Future research could look at other subjective and behavioural outcomes such as choice satisfaction, decision reget, decision confidence, and choice deferral (Chernev et al. 2015). In addition, we deliberately chose to remove potentially dominating choice

options by offering appointmet times within relatively short time slots. Future research would need to determine the extent to which there are strong preferences for appointment slots, including day of the week, time of the day and whether these could still be used to optimise invitation strategies.

Finally, the role of familiarity with the decision task should be addressed before extrapolating our findings to other health services such as dental checks, immunization and breast and cervical cancer screening where individuals are invited regularly. In these situations, individuals who have participated previously may already be familiar with the invitation process and have specific preferences and expectations.

Conclusions

The results from this online experimental survey support the current practice of the NHS Bowel Scope Screening Programme to send a single fixed appointment by showing that offering choice without addressing pre-determined preferences for specific times and days is likely to reduce rather than increase motivation to book an appointment.

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320

Table 1 Ordinal logistic regressions on intentions to confirm appointment (N=1,908)

	Unadjusted model		Adjusted model†	
	Odds ratio	95% CI	Odds ratio	95% CI
Appointment(s) offered				
1 option	Ref.		Ref.	
2 options	0.753	0.585 - 0.948*	0.685	0.529 - 0.888**
4 options	0.689	0.535 - 0.886**	0.691	0.533 - 0.896**
6 options	0.749	0.581 - 0.966*	0.710	0.546 - 0.923*

†Adjusted for initial intentions, gender, age, marital status, ethnicity, education, employment, car and house ownership and self-reported health status. Full model is reported in S2 Table in the supplementary file.

(* $p<0.05$; ** $p<0.01$)

Table 2 Effect of offering choice on confirmation intentions and perception of the decision task and appointments

	1 option (N=438)		2 options (N=488)		4 options (N=506)		6 options (N=476)		Overall (N=1,908)		p-value†
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	
Intention to confirm appointment											
Definitely not	68	(15.5%)	67	(13.7%)	85	(16.8%)	64	(13.4%)	284	(14.9%)	
Probably not	219	(50.0%)	295	(60.5%)	293	(57.9%)	294	(61.8%)	1101	(57.7%)	0.001
Probably yes	104	(23.8%)	105	(21.5%)	100	(19.8%)	89	(18.7%)	398	(20.9%)	
Definitely yes	47	(10.7%)	21	(4.3%)	28	(5.5%)	29	(6.1%)	125	(6.5%)	
Difficulty of decision task											
Not at all	190	(43.4%)	233	(47.8%)	235	(46.4%)	219	(46.0%)	877	(46.0%)	
Slightly	104	(23.7%)	109	(22.3%)	127	(25.1%)	129	(27.1%)	469	(24.6%)	
Moderately	95	(21.7%)	94	(19.3%)	88	(17.4%)	76	(16.0%)	353	(18.5%)	0.550
Very much	33	(7.5%)	32	(6.6%)	41	(8.1%)	39	(8.2%)	145	(7.6%)	
Extremely	16	(3.7%)	20	(4.1%)	15	(3.0%)	13	(2.7%)	64	(3.3%)	
Complexity of invitation process											
Not at all	32	(7.3%)	26	(5.3%)	35	(6.9%)	30	(6.3%)	123	(6.5%)	
Slightly	59	(13.5%)	72	(14.8%)	85	(16.8%)	70	(14.7%)	286	(15.0%)	
Moderately	125	(28.5%)	130	(26.6%)	131	(25.9%)	117	(24.6%)	503	(26.4%)	0.778
Very much	159	(36.3%)	193	(39.6%)	197	(38.9%)	189	(39.7%)	738	(38.7%)	
Extremely	63	(14.4%)	67	(13.7%)	58	(11.5%)	70	(14.7%)	258	(13.5%)	
Convenience of appointment(s)											
Not at all	122	(27.9%)	130	(26.7%)	102	(20.2%)	107	(22.5%)	461	(24.2%)	
Slightly	97	(22.1%)	108	(22.1%)	110	(21.7%)	98	(20.6%)	413	(21.6%)	
Moderately	142	(32.4%)	140	(28.7%)	145	(28.7%)	131	(27.5%)	558	(29.3%)	0.003
Very much	57	(13.0%)	86	(17.6%)	120	(23.7%)	106	(22.3%)	369	(19.3%)	
Extremely	20	(4.6%)	24	(4.9%)	129	(5.7%)	34	(7.1%)	107	(5.6%)	

† Chi-Square test

Table 3 Adjusted ordinal logistic regressions on perception items (N=1,908)

	Difficulty making decision†		Complexity of invitation process†		Convenience of appointment(s) †	
	OR	95% CI	OR	95% CI	OR	95% CI
Appointment(s) offered						
1 option	Ref.		Ref.		Ref.	
2 options	0.854	0.670 - 1.088	1.100	0.870 - 1.391	1.148	0.912 - 1.446
4 options	0.903	0.710 - 1.147	0.919	0.729 - 1.159	1.571	1.250 - 1.974**
6 options	0.856	0.672 - 1.091	1.111	0.876 - 1.408	1.530	1.211 - 1.934**

† Adjusted for initial intentions, gender, age, marital status, ethnicity, education, employment, car and house ownership and self-reported health status. Full model is reported in S2 Table in the supplementary file. (* $p<0.05$; ** $p<0.01$)

Figure 1 Flow through the study