

THE
BEHAVIOURAL
INSIGHTS TEAM ◆

Testing invitation letter messages to increase the uptake of cervical screening

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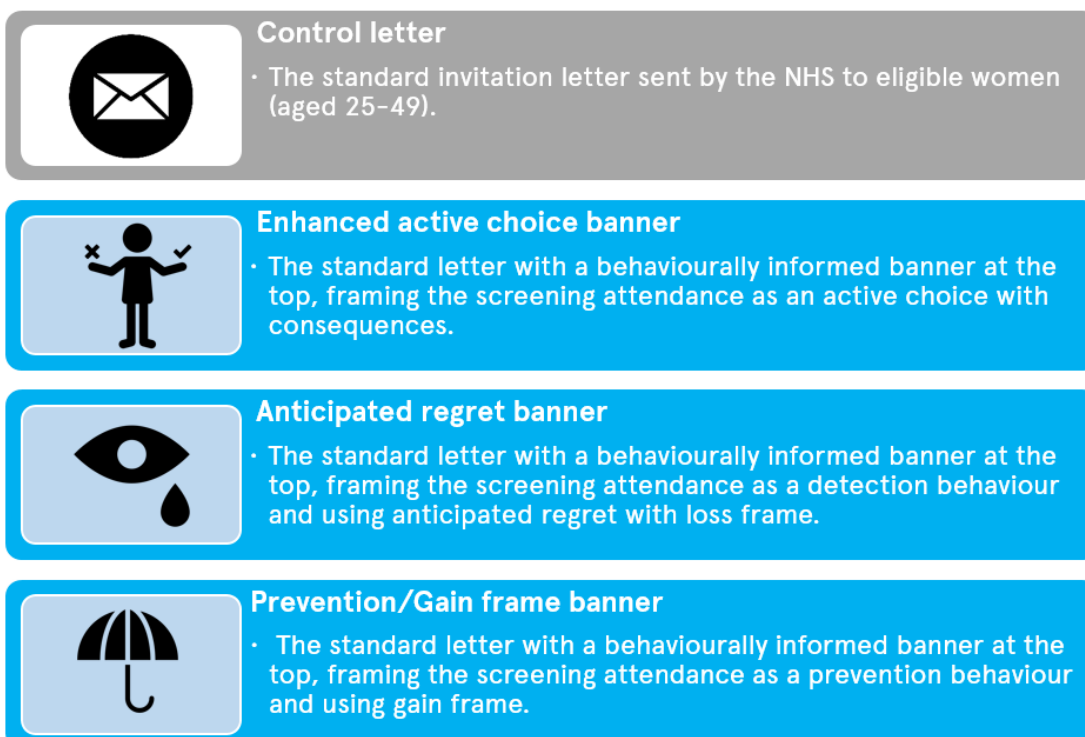
Executive summary

Cervical cancer is one of the few cancers for which mortality rates could be reduced to almost zero. This is possible through a combination of having the human papillomavirus (HPV) vaccination and having regular cervical screening, as the screenings enable prevention through early detection and removal of abnormal cells. However, the uptake of NHS cervical screening is not as high as it could be, especially among the women at highest risk. Only 70.4% of eligible women in Greater Manchester attended their screening in the last 5 years, and while this is comparable to the North West (72%) and England average (73%), it is well below the NHS target of 80%. Moreover, the attendance is currently lower – only 63% – among the youngest eligible age group of women, aged 25–29, who are actually the most likely to be diagnosed with cervical cancer.

The Greater Manchester Health and Social Care Partnership (GMHSCP) commissioned the Behavioural Insights Team (BIT) to explore how behavioural insights could be used to improve the uptake of cervical screening. We ran a four-armed randomised controlled online experiment on 1,802 participants using the Predictiv platform. The experiment specifically targeted young women aged 24–30, given the particularly low attendance and high incidence rates in the 24–29 year old age group.

The trial

Based on the insights from our literature review on cancer screening uptake, we designed behaviourally informed banners featured on the top of the standard screening invitation letters. Participants in our Predictiv experiment were randomly assigned to one of the four conditions shown on the next page:



We looked at the impact of the invitation letters with these different banners on participants' intention to attend their next scheduled screening, and on participants' support for the cervical screening programme. As exploratory analyses, we looked at participants' engagement with additional information on cervical screening, and which misconceptions had potentially been corrected by our interventions. Finally, we conducted a rapid qualitative analysis of short-form text responses provided by participants, allowing us to understand from them the barriers they faced in getting screened.

Results

In the online Predictiv environment, invitation letters with behaviourally informed banners do not seem to be more effective than existing letters in increasing the proportion of women likely state they would attend their next cervical screening. This lack of difference between the interventions and the control condition may be due to the fact that the invitation letter itself contains sufficient information to enable young women to feel informed enough to indicate that they would attend their next screening. Given that all participants, including those in the control condition, read the invitation letter, it may be the case that the behaviourally informed banners did not add anything above and beyond this. However, this may be different in a real-world context, where different banners have the potential to

draw a person's attention to an invitation letter which might otherwise be disregarded.

However, it is important to note participants' tendency to overstate their intentions to attend their next screening, relative to the number that we know actually do attend based on NHS data. Across all of our conditions, around 90% of participants said they would attend their next screening. One possible explanation for this is an intention-behaviour gap, where a person may genuinely intend to carry out a particular behaviour but ultimately does not. The young women in our sample might have been overly optimistic about their likelihood of booking and attending their next screening. Having such a high stated intention to attend also introduces the possibility of "ceiling effects" - with intentions so high, the potential for further improvement becomes very small, which is perhaps why there were no discernible differences between conditions.

The findings from our qualitative textual analysis, combined with recent research from other organisations, suggest that addressing young women's physical discomfort and embarrassment may be critical to increasing screening uptake. Ways of addressing these barriers include behavioural solutions using of targeted social norms or role models and testimonials to allay feelings of shame, or the clearer and more upfront provision of key pieces of information to reduce fear arising from uncertainty about the screening process. In the longer run, more resource-intensive interventions focused on reducing discomfort and increasing privacy, such as self-sampling kits people can administer themselves, may address some of the current critical barriers to screening uptake.

Introduction

The Greater Manchester Health and Social Care Partnership (GMHSCP) commissioned the Behavioural Insights Team (BIT) to explore how behavioural insights could be used to improve the uptake of cervical screening. This report outlines the background to this particular policy challenge and then details the design and results of an online experiment, using BIT's Predictiv platform, to test the impact of behaviourally informed messaging in screening invitation letters. The experiment investigated the effects of different messages on young women's intention to attend cervical screening, compared to the standard cervical screening invitation.

Background

Across the UK, all women aged 25 to 64 are regularly invited for cervical screening by the NHS cervical screening programme. Women aged 25-49 are invited every 3 years, while it is every 5 years for those aged 50-64. In the invitation letter, they are asked to book an appointment with their GP to have the screening. The cervical cell sample taken during screening enables prevention of cervical cancer by early detection and removal of abnormal cells, or the detection of already developed cancer. This improves the likelihood of successful treatment and recovery.

However, the attendance rates are not as high as they could be, especially among the women at highest risk. Only 70.4% of eligible women in Greater Manchester attended the screening in the last 5 years, and while this is comparable to the North West (72%) and England average (73%)¹, it is well below NHS target of 80%.² Moreover, the attendance is currently lower – only 63% – among the youngest eligible age group of women, aged 25-29³, who are actually the most likely to be diagnosed with cervical cancer.⁴

In March 2016, GMHSCP commissioned BIT to conduct a trial of behaviourally informed letters to increase cervical screening uptake in Greater Manchester. We

¹ Source:

<https://fingertips.phe.org.uk/profile/cancerservices/data#page/0/gid/1938132830/pat/46/par/E39000037/ati/153/are/E38000016>

² Public Health England. (n.d.). Health matters: making cervical screening more accessible. Retrieved January 22, 2018, from: <https://www.gov.uk/government/publications/health-matters-making-cervical-screening-more-accessible/health-matters-making-cervical-screening-more-accessible--2>

³ Aref-Adib, M., & Freeman-Wang, T. (2016). Cervical cancer prevention and screening: the role of human papillomavirus testing. *The Obstetrician & Gynaecologist*, 18(4), 251-263.

⁴ Cancer Research UK. (2017, November 21). Cervical cancer incidence statistics. Retrieved January 22, 2018, from <http://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/cervical-cancer/incidence#heading-One>

designed a trial that involved making changes to the messaging in the standard invitation letters. We submitted a trial proposal to NHS Cervical Cancer Screening Programme Research Advisory Committee, but the committee rejected the trial, mostly due to capacity issues. As a result, BIT could not deliver a fieldwork trial but in order to still gain insights into how to increase screening uptake, suggested running an online experiment using the Predictiv platform. The experiment specifically targeted young women aged 25-29, given their particularly low attendance rates.

Literature review

To inform this project, BIT conducted a literature review to explore behavioural principles that can be applied to encourage women to attend screening appointments across bowel cancer, breast cancer and cervical cancer screening programmes. The full literature review will be provided to GM as part of our partnership's final report. The literature identifies a number of potential barriers that patients face that could affect screening uptake, including:

- Limited knowledge about the test procedure and its purpose or outcomes
- Feeling the test unnecessary or of no benefit
- Feeling at low personal risk of developing cancer
- Forgetting to go to the appointment
- Fear of embarrassment or pain
- Fear of a positive screening result
- Dislike of the test
- Dissatisfaction with previous screening
- Socioeconomic and demographic factors

Behavioural insights for cervical screening

One effective method of reducing the risk of developing cervical cancer is to be vaccinated for the human papillomavirus (HPV), and in light of this, the NHS provides a wide-reaching HPV vaccination programme. Aside from having the HPV vaccination, attending regular cervical screening is the most effective way to prevent cervical cancer. Prevention and early disease detection is crucial for improving cancer outcomes and for limiting the human and financial costs of the treatment, and it is therefore critical to ensure that as many women as possible participate in the cervical screening programme. However, research shows that cervical screening uptake can be lower than desirable due to a number of behavioural barriers that the patient faces, including embarrassment, inertia and

forgetfulness, fear of pain, and fear of a positive result.⁵ In terms of young women, embarrassment remains an often cited barrier.⁶ However, young women can also be strongly influenced by misperceptions about cervical cancer, such as that the HPV vaccination provides full protection from developing cervical cancer⁷, or that cervical cancer affects mostly older women.⁸

Behavioural science literature on cervical screening suggests a number of ways to improve the uptake, namely through use of risk framing^{9,10,11} and planning devices.¹² In the light of this existing research, our aim in this project was to improve understanding of young women's barriers to attending cervical screening and to investigate how behaviourally informed messages can be used to overcome those barriers.

The trial

We designed and ran a randomised, controlled experiment on the Predictiv online experiment platform to test the impact of adapting the existing NHS cervical screening invitation letters. The objective was to evaluate the effectiveness of three behaviourally informed messages, compared to the current standard communication.

Background to treatment conditions

⁵ Waller, J., Bartoszek, M., Marlow, L., & Wardle, J. (2009). Barriers to cervical cancer screening attendance in England: a population-based survey. *Journal of Medical Screening*, 16(4), 199-204.

⁶ Jo' cervical cancer trust. (2017, April 20). Embarrassment preventing young women from attending a test that could save their life. Retrieved January 22, 2018, from <https://www.jostrust.org.uk/node/573478>

⁷ Blomberg, K., Tishelman, C., Ternstedt, B. M., Törnberg, S., Levál, A., & Widmark, C. (2011). How can young women be encouraged to attend cervical cancer screening? Suggestions from face-to-face and internet focus group discussions with 30-year-old women in Stockholm, Sweden. *Acta Oncologica*, 50(1), 112-120.

⁸ Sadler, L., Albrow, R., Shelton, R., Kitchener, H., & Brabin, L. (2012). Development of a pre-notification leaflet to encourage uptake of cervical screening at first invitation: a qualitative study. *Health education research*, 28(5), 793-802.

⁹ Rivers, S. E., Salovey, P., Pizarro, D. A., Pizarro, J., & Schneider, T. R. (2005). Message framing and pap test utilization among women attending a community health clinic. *Journal of Health Psychology*, 10(1), 65-77.

¹⁰ Cox, D., Sturm, L., & Cox, A. D. (2014). Effectiveness of asking anticipated regret in increasing HPV vaccination intention in mothers. *Health Psychology*, 33(9), 1074.

¹¹ Huf, S., King, D., Honeywell, S., Tseng, F. M., Andresen, I., Vlaev, I., & Darzi, A. (2016). Message framing in invitation letters for cervical screening: a randomised controlled trial. *The Lancet*, 388, S57.

¹² BIT trial 'First Invitations to Breast Screen Victoria' conducted in Australia (trial number: 2015029)

Enhanced Active Choice (Treatment 1)

Behavioural literature recognises the influence of ‘choice architecture’ on people’s decision making: the way a choice is presented can influence the decision taken¹³. Research also shows that inertia and ‘omission bias’¹⁴ (a bias towards seeing inaction that results in harm as preferable to action that results in harm) may make people more likely to prefer inaction. This may be particularly relevant in the case of cervical screening, considering that a survey of women in England on the topic of cervical screening attendance found that 20% of women cited “not getting around to do it” as the main reason for non-attendance.¹⁵

The aim of using an ‘active choice’ approach is that it can counter omission bias by showing that the choice to not act (i.e. to not book and attend a screening) is still an active choice, making omission feel more like commission.¹⁶ A study investigated the effects of presenting people with an active choice in the context of flu vaccinations.¹⁷ In this study, people who were prompted to actively choose were significantly more likely to opt for a reminder to get a flu shot, compared to the group simply offered an opportunity to opt in (72% compared to 45%). This effect was even stronger when people were prompted with an ‘enhanced active choice’ which highlighted the advantages of getting a flu shot, and the disadvantages of not doing so: “I will get a Flu Shot this Fall to reduce my risk of getting the flu and I want to save \$50” (in this context, the saving was because the employer would pay), or “I will not get a Flu Shot this Fall even if it means I may increase my risk of getting the flu and I don't want to save \$50.” Enhanced active choice is therefore a promising behavioural approach to use when prompting women regarding cervical screening.

It is important to emphasise that employing an active choice message does not change the options available or the nature of choice itself. It only clearly states the choices and their respective consequences. An active choice approach does not interfere with the decision-maker’s free choice, and it also aims to make decision-making easier.

¹³ Thaler Richard, H., & Sunstein Cass, R. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. Yale University Press.

¹⁴ Schweitzer, M. (1994). Disentangling status quo and omission effects: An experimental analysis. *Organizational Behavior and Human Decision Processes*, 58(3), 457-476.

¹⁵ Waller, J., Bartoszek, M., Marlow, L., & Wardle, J. (2009). Barriers to cervical cancer screening attendance in England: a population-based survey. *Journal of Medical Screening*, 16(4), 199-204.

¹⁶ Carroll, G. D., Choi, J. J., Laibson, D., Madrian, B. C., & Metrick, A. (2009). Optimal defaults and active decisions. *The quarterly journal of economics*, 124(4), 1639-1674.

¹⁷ Keller, P. A., Harlam, B., Loewenstein, G., & Volpp, K. G. (2011). Enhanced active choice: A new method to motivate behavior change. *Journal of Consumer psychology*, 21(4), 376-383.

Detection/loss frame with anticipated regret (Treatment 2) and prevention/gain frame (Treatment 3)

The way a risk is framed can influence uptake of health-promoting behaviours.¹⁸ When faced with a risky situation, such as having a test that will tell a person whether they have an illness or not (i.e. a test for illness *detection*), that person might be more sensitive to a message stressing the potential losses associated with not carrying out the test for detection. In the context of cancer screening, research by Okuhara and colleagues¹⁹ breaks loss-framing down into the costs of not having the screening (e.g. "Failing to detect cancer early can cost you your life") and the benefits missed from not having the screening (e.g. "When you don't have a screening, you are failing to take advantage of the best method for detecting cancer early").

On the other hand, when faced with a lower risk situation in which a behaviour is preventative (i.e. something that increases likelihood of illness *prevention*), such as sunscreen use or physical exercise, a message emphasising the potential benefits of a behaviour may be more effective.²⁰ Okuhara and colleagues characterise gain-framing in the context of cancer screenings as either highlighting the benefits (e.g. "When you have a cancer screening, you are taking advantage of the best method for detecting cancer early") or highlighting the costs that are avoided ("If a cancer is detected early, it is less likely to be fatal").

Table 1. Framing of health behaviours

Type of behaviour	Level of risk	Framing
Prevention	Low	Gain frame
Detection	Medium to High	Loss frame

Implications for our trial

Regarding how to best use different framing, research indicates that emphasising potential losses should work better with high-risk detection behaviours, while emphasising potential gains should work better in low-risk prevention behaviours. Indeed, previous research has shown that loss-framed messages are in general

¹⁸ Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, 211(4481), 453–458.

¹⁹ Okuhara, T., Ishikawa, H., Okada, H. & Kiuchi, T. (2014). Identification of gain- and loss-framed cancer screening messages that appeared in municipal newsletters in Japan. *BMC Research Notes*, 7, 896.

²⁰ Rothman, A. J., & Salovey, P. (1997). Shaping perceptions to motivate healthy behavior: the role of message framing. *Psychological Bulletin*, 121(1), 3.

effective for encouraging screening attendance. This could be especially the case when the concern about risk of detecting illness is strengthened by eliciting anticipated regret. The aim of this approach is to encourage people to think about the regret they might feel about having lost the opportunity to avoid a negative outcome.²¹ Prompting people in ways that elicit anticipated regret has been shown to be effective in increasing attendance at cervical screening (i.e. 'If I did not attend for a cervical smear in next few weeks, I would later wished I had.').²² so the combination of loss-framing and anticipated regret is potentially powerful.

However, critically in the case of cervical cancer, cervical screening can arguably be framed as both a detective and a preventative behaviour.²³ In a small study (n=441), Rivers and colleagues²⁴ showed that while the loss-framed message works when cervical screening is presented as detective, the gain-framed message works as well when cervical screening is presented as preventative. Moreover, research suggests that gain-framed messages resonate more with people who are not very engaged with a particular health issue²⁵ and the younger population.²⁶

Therefore, our experiment examined which framing – loss/detection vs. gain/prevention – is more effective for younger women, who are less likely to attend cervical screening.²⁷ A recent study from 2016²⁸ examined the impact of loss framing and gain framing on cervical screening uptake for women who were due for their screening, but unfortunately the intervention material did not specifically pair the loss frame *plus* detection or gain frame *plus* prevention in its messaging, so the relative impact of those specific pairings is still unknown. That study found no effect of the messaging on uptake at 15 weeks post-intervention, followed by a modest but significant positive effect on uptake at 32 weeks post-intervention,

²¹ Brewer, N. T., DeFrank, J. T., & Gilkey, M. B. (2016). Anticipated regret and health behavior: A meta-analysis. *Health Psychology, 35*(11), 1264.

²² Sandberg, T. & Conner, M. (2009). A mere measurement effect for anticipated regret: Impacts on cervical screening attendance. *British Journal of Social Psychology, 48*(2), 221-236.

²³ Rothman, A. J., Bartels, R. D., Wlaschin, J., & Salovey, P. (2006). The strategic use of gain-and loss-framed messages to promote healthy behavior: How theory can inform practice. *Journal of Communication, 56*(s1).

²⁴ Rivers, S. E., Salovey, P., Pizarro, D. A., Pizarro, J., & Schneider, T. R. (2005). Message framing and pap test utilization among women attending a community health clinic. *Journal of Health Psychology, 10*(1), 65-77.

²⁵ Huf, S., King, D., Honeywell, S., Tseng, F. M., Andresen, I., Vlaev, I., & Darzi, A. (2016). Message framing in invitation letters for cervical screening: a randomised controlled trial. *The Lancet, 388*, S57.

²⁶ Ibid.

²⁷ For evidence on the fall off in screening among younger women, see Lancucki, L., Fender, M., Koukari, A., Lyng, E., Mai, V., Mancini, E., ... & Patnick, J. (2010). A fall-off in cervical screening coverage of younger women in developed countries. *Journal of Medical Screening, 17*(2), 91-96.

²⁸ Huf, S., King, D., Honeywell, S., Tseng, F. M., Andresen, I., Vlaev, I., & Darzi, A. (2016). Message framing in invitation letters for cervical screening: a randomised controlled trial. *The Lancet, 388*, S57.

with a 1.4 percentage point (or 4%) increase at that time-point. This suggests that loss framing and gain framing are still promising ways of increasing cervical screening uptake, and that impact could perhaps be enhanced by our use of the most specific loss/detection and gain/prevention framing.

Our experiment also used a more personalised version of the framing: instead of using general information about the number of lives saved or lost, as is often used in the health sector, we aimed to make the messages more salient and personal by phrasing them in a way that directly addresses the participant, for example “Getting screened hugely reduces your chance of getting cervical cancer” (as opposed to “Getting screened hugely reduces the risk of getting cervical cancer”). Full behavioural messages are presented in the next section.

Experimental conditions

We summarise the experimental conditions below, including the number of participants in each condition. The full experimental material can be found in Appendix 2.

Table 2: Overview of the different conditions in the experiment

Condition name	Description	N
Control	This is the standard invitation letter sent by the NHS to eligible women (aged 25-49).	485
Enhanced active choice	<p>This is the standard letter with a behaviourally informed banner at the top, framing the screening attendance as an active choice with consequences.</p> <div> <p>What will you choose to do?</p> <div> <input type="checkbox"/> I will book my appointment today by calling my GP practice. Getting screened will reduce my chance of developing cervical cancer by up to 75%. <input type="checkbox"/> I will not get screened and will miss out on the chance to reduce my risk of developing cervical cancer. </div> </div>	406
Anticipated regret (Loss/detection frame)	This is the standard letter with a behaviourally informed banner at the top, framing the screening attendance as a detection behaviour and using anticipated regret with loss frame.	446

	<p>If you were diagnosed with cervical cancer, would you regret not getting screened earlier?</p> <p>Cervical screening can help detect and remove cells which could develop into cancer. If you don't get screened, you will be in the group of women who are much more likely to die from cervical cancer.</p>	
Prevention/ gain frame	<p>This is the standard letter with a behaviourally informed banner at the top, framing the screening attendance as a prevention behaviour and using gain frame.</p> <p>Do you want to give yourself the best chance of preventing cervical cancer?</p> <p>Cervical screening can detect cancer, but it can also <u>prevent it</u> by identifying early changes in cells. Getting screened hugely reduces your risk of getting cervical cancer.</p>	465
TOTAL		1,802

Experimental design

The experiment was conducted online using the Predictiv platform which enables BIT to test different behaviourally informed communication approaches side-by-side and to evaluate their impact. While the experiments cannot always test the main behaviour of interest (such as the actual attendance of a screening), they are designed to capture and measure intermediate behaviours, beliefs or actions that are key drivers that are most likely to affect behavioural outcomes.

Sample

Potential participants could select to participate in this experiment through the panel survey website on which they are registered. We recruited 1,802 female participants aged 24–30 years. We chose to expand the age range one year either side of 25–29. We included 24-year-old women as they begin receiving communications about cervical screening 6 months in advance of their 25th birthday, so their responses to communications about screening are of interest. We included 30-year-old women as they were believed to be similar enough for the purposes of this experiment (for example, women aged 30–34 have the second highest rate of cervical cancer diagnosis, after the 25–29 age group) and they allowed us to add necessary numbers to our sample size.

Process

The process that participants followed in this experiment is outlined below, and depicted in Figure 1.

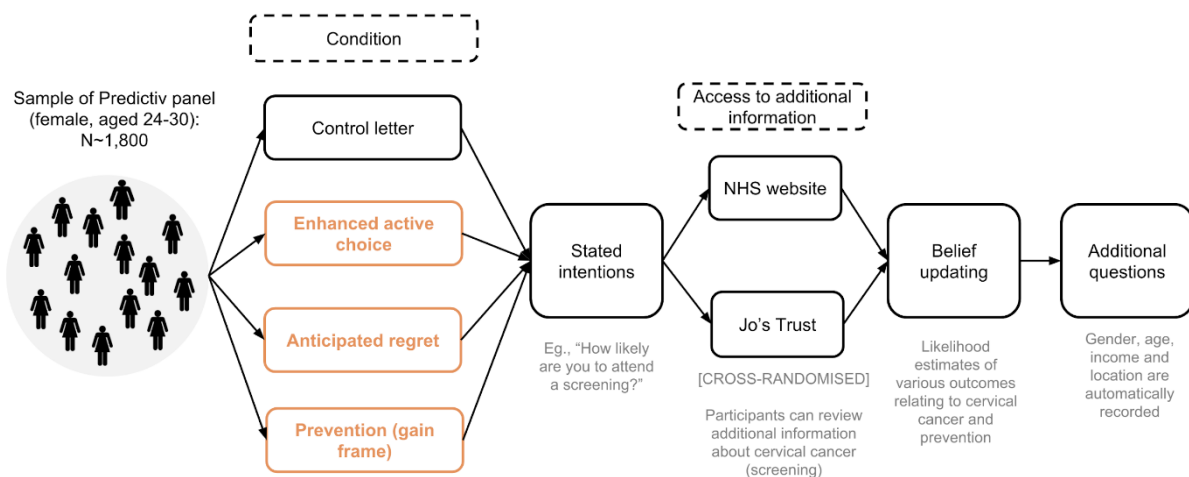
- **Material stage:** Participants were randomly allocated into one of four arms: 3 intervention arms (the business-as-usual invitation letter plus a different banner for each of the 3 conditions: enhanced active choice, anticipated regret, prevention/gain frame) and a control arm (a business-as-usual invitation letter with no banner). Participants could spend as much time as they wanted viewing the material.
- **Stated intentions:** Participants will be asked a series of questions that captured their intentions to attend their next scheduled screening. These self-reported measures were:
 - **Primary outcome measure: stated intention to attend** (binary measure) – the proportion of participants answering ‘yes’ vs. ‘no’ to the question of whether they would attend their next screening.
 - **Secondary outcome measures: stated intention to attend** (scale) – likelihood of attending their next scheduled screening, on a scale of 1 (extremely unlikely) to 9 (extremely likely).
- **Stated support for the programme (another secondary outcome)** – support for the screening programme on a scale of 1 (not at all supportive) to 5 (extremely supportive).
- **Access to additional information:** Participants were given the option to access additional information about cervical screening and cervical cancer. They were cross-randomised into two different conditions, where they were presented with the opportunity to access one of two different information sources: the NHS’s cervical screening booklet (in PDF format) or a webpage by Jo’s Trust, a cervical cancer charity.
- **Beliefs about cervical screening and cervical cancer:** To help us understand the effects of the different treatment conditions on common misconceptions about cervical screening and cancer, participants were asked to indicate the probability of various outcomes related to cervical cancer and prevention, such as the effectiveness of the HPV vaccine and the likelihood by which getting screened reduces the incidence rate of cervical cancer. The elicitation procedure was based the work of Armantier and colleagues.²⁹ These belief measurements were compared against a baseline

²⁹ Armantier, O., & Treich, N. (2013). Eliciting beliefs: Proper scoring rules, incentives, stakes and hedging. *European Economic Review*, 62, 17-40.

measurement conducted in a different cohort of demographically matched participants who did not see the experimental material.

- **Additional demographic questions (self-reported):** Finally, participants were given several additional demographic questions that capture characteristics that could influence the participant's stated intentions as well as their response to the intervention material. These include education level and whether the participant has previously attended a cervical cancer screening. The participant's age, gender, income and location were already recorded via their participant profile.

Figure 1: Experiment overview



Limitations

One key thing to note is that this experiment examined stated intentions rather than measuring actual behaviour, as is frequently the case in Predictiv experiments where the target behaviour cannot be captured in an online environment. Research shows that there is often a gap between what people say they would do and what they actually do.³⁰ Therefore, the results expressed via stated intentions should be interpreted with this in mind, and we will discuss this gap between intentions and behaviour in further detail below.

³⁰ Webb, T. L., & Sheeran, P. (2006). Does changing behavioral intentions engender behavior change? A meta-analysis of the experimental evidence. *Psychological bulletin*, 132(2), 249. According to this meta-analysis of 47 studies, a medium-to-large change in intention leads to a small-to-medium change in behavior.

Results

Sample representativeness

Once the trial was complete, we examined the demographics of our sample to determine how representative it was of the general population. Across the demographic characteristics we had data on, we believe our sample is acceptably representative of the 24- to 30-year-old female population of the UK. Our sample may have slightly higher incomes and a slightly higher education level than average, but they have a similar proportion of people who have previously attended a screening. It is difficult to estimate the extent to which the differences in income and education level might have had an impact on the results of this trial, and these differences, although small, should be kept in mind when interpreting the results. We go into more detail about representativeness across different demographic characteristics later in this report in Table 2.

Stated intentions and support

Our key outcome measures were stated intentions, measured in two ways: (1) participants stated 'yes' vs. 'no' to the question of whether they would attend their next screening and (2) participants stated how likely they would be to attend the screening, on a 9-point response scale from extremely unlikely to extremely likely.

We found no statistically significant difference in stated intentions or support for cervical cancer screening attendance between young women who received the standard invitation letter and those who received one of the letters containing behaviourally informed banners.

An important note on interpreting the results

Below are the full results presented using two different approaches. Firstly, we show the responses given by participants exposed to different conditions. These are averaged raw results, and we refer to these as the "unadjusted results". This tells us how the sample of young women in each condition on average responded to our messages.

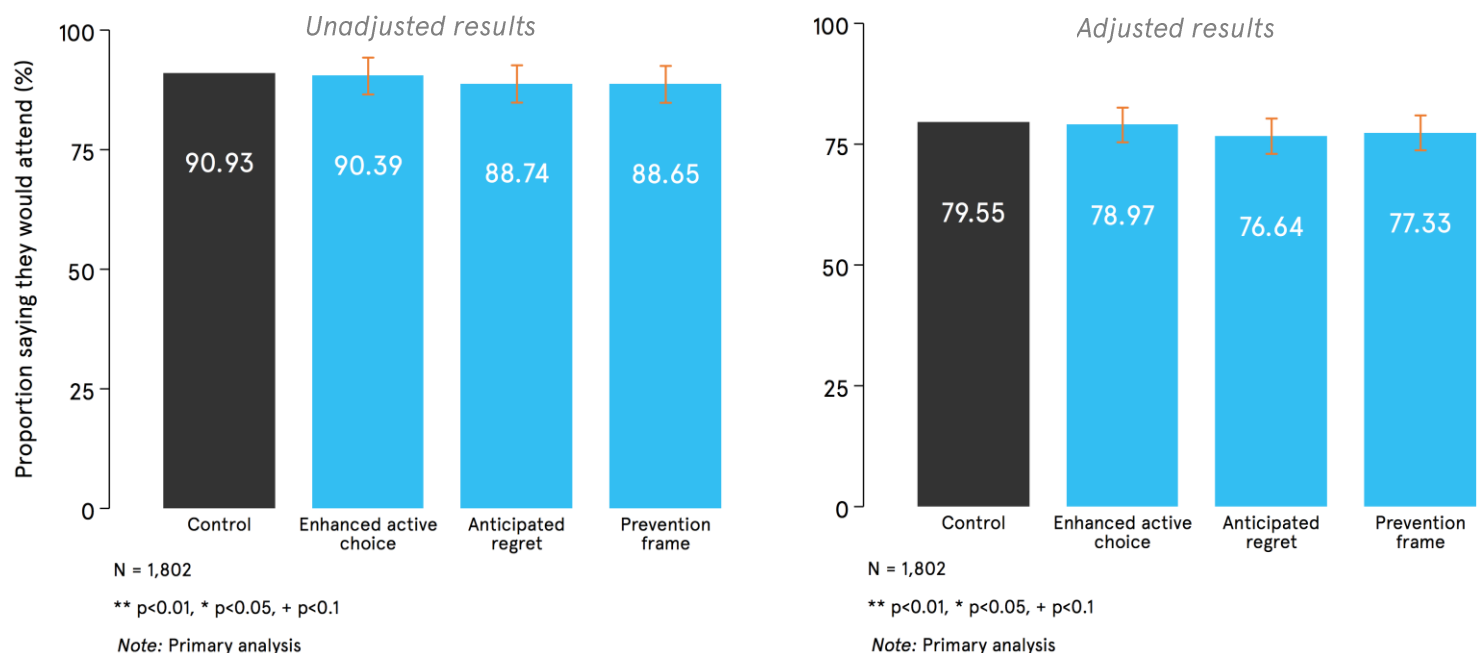
However, the typical statistical approach would be to look at the effect of messages, controlling for the key demographic characteristics (such as age, income or education). We refer to these as the "adjusted results". The aim of this approach is to isolate the pure effect of the treatments, separating out the impact of other factors correlated with the outcome. The adjusted approach means that the effect of the treatments is expressed for the median participant.³¹ This

³¹ We set the baseline category for demographic characteristics that were most common in our sample (i.e., most participants in our test fell into this group) and, given the relatively young age of participants, those who had not previously been screened. Statistically, this increases the precision with which we can estimate the

benchmark of the median participant causes the level of stated intentions to be slightly lower across treatments.

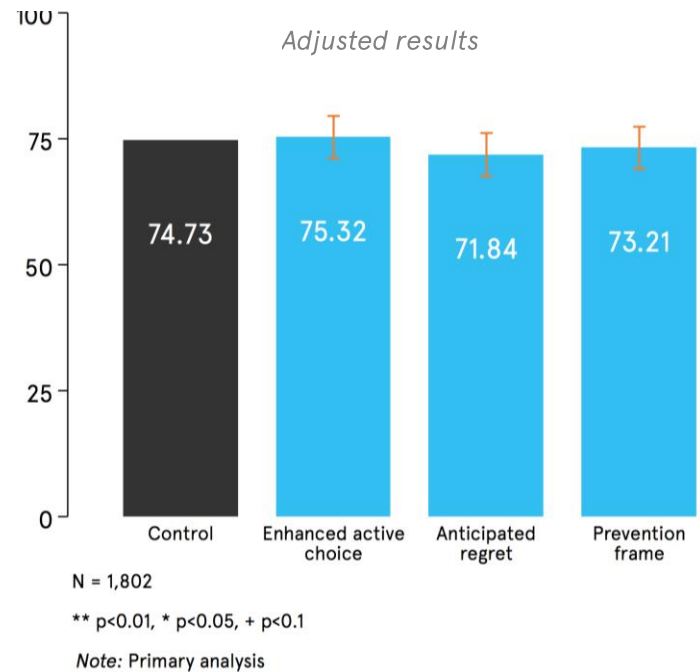
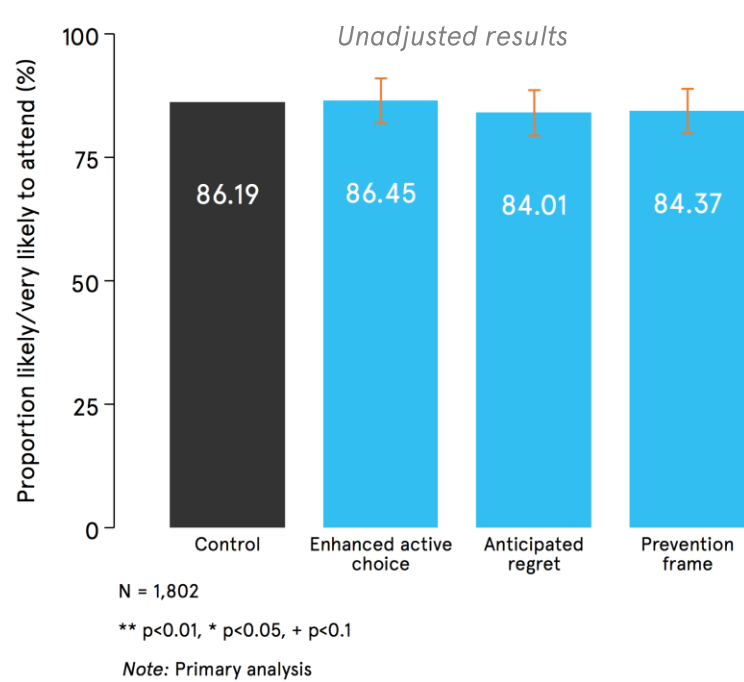
We show the unadjusted and adjusted results side by side, with the unadjusted results on the left and the adjusted results on the right. The unadjusted results should only be used to understand how common particular responses were. The adjusted results should be used to understand the relative differences between the effects of different messages (i.e. which messages were more effective than others). For example, in Figure 2 you can see that a very percentage of participants said they would attend their next screening (circa 89–91%). However, this figure should not be used to try to understand the relative differences between the conditions, as it is the adjusted results that give a more accurate estimate by properly controlling for the influence of other factors. To understand the relative differences between conditions, Figure 3 should be used, and you can see from that figure that there were no statistically significant differences between conditions (i.e. directionally, the behaviourally informed messages performed slightly worse than the control condition, but these differences are not significant, so we can say that there were no differences between the behaviourally informed messages and the control condition).

Figures 2. and 3. Stated likelihood of attending the screening (yes/no)



effect of the control message and, arguably, provides a more sensible reference category when interpreting the results. For example, setting the baseline category to women with no formal education, would produce less precise estimates and be less meaningful given that most women in the population have completed at least formal education. The baseline category chosen in our test someone with an income between £20,000–£39,999, living in North England, with a professional qualification, and who has not been previously screened.

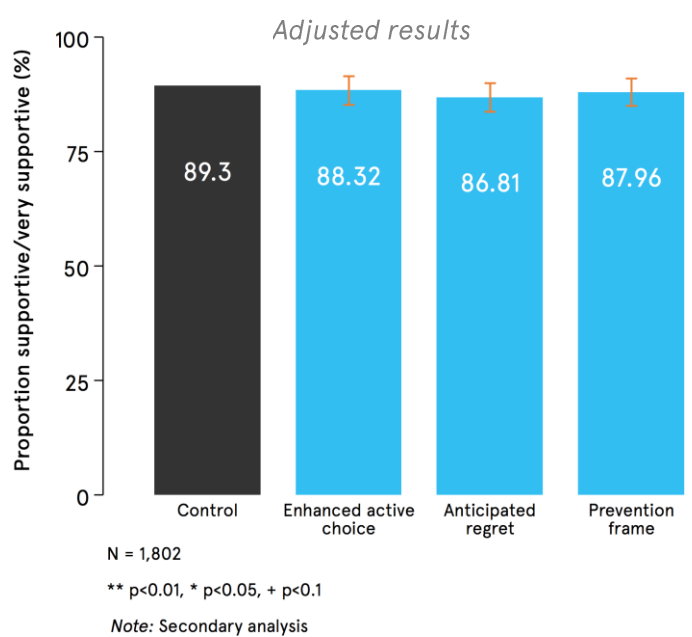
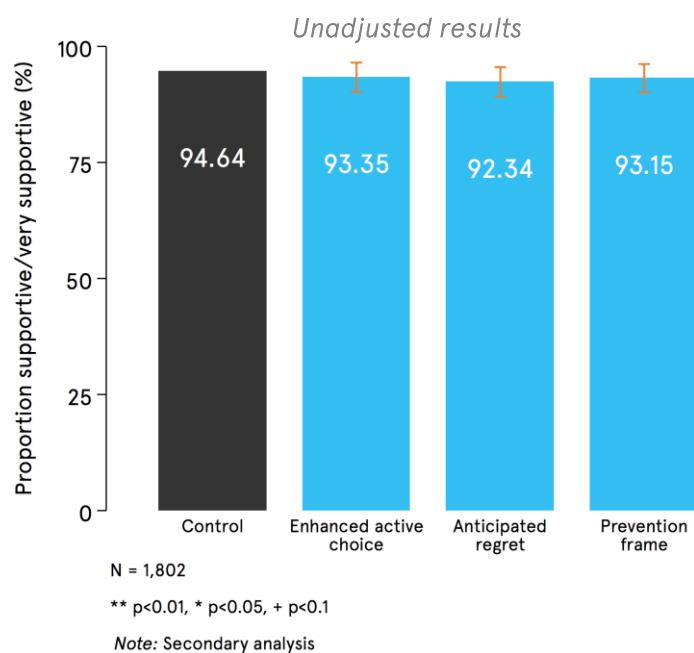
Figures 4. and 5. Stated likelihood of attending the screening (participants saying that would "likely" or "very likely" attend on a 9-point scale)



Unadjusted results

Adjusted results

Figures 6. and 7. Stated support for the screening programme (percentage of 'supportive' responses)



Accessing additional information about cervical screening

As a part of our exploratory analysis, we looked at the proportion of young women who choose to access additional information via either the NHS booklet or Jo's Trust website. If they wished to see more information, they clicked on the thumbnails (as seen in Figures 8 and 9) to access the information, which they could read later.

Figures 8. Thumbnail image used to offer additional information located at the Jo's Trust website

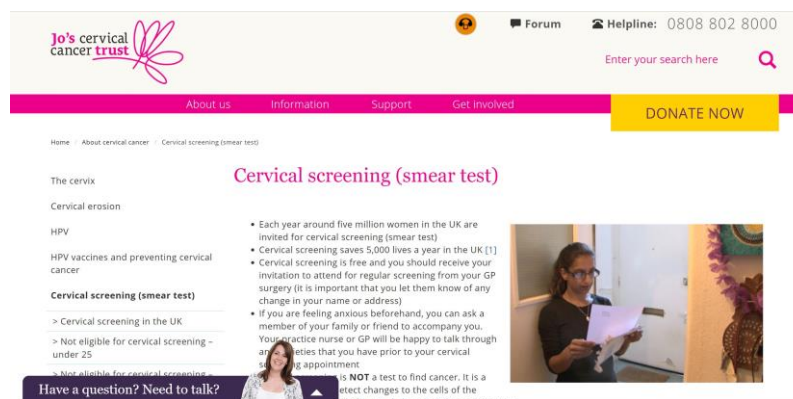


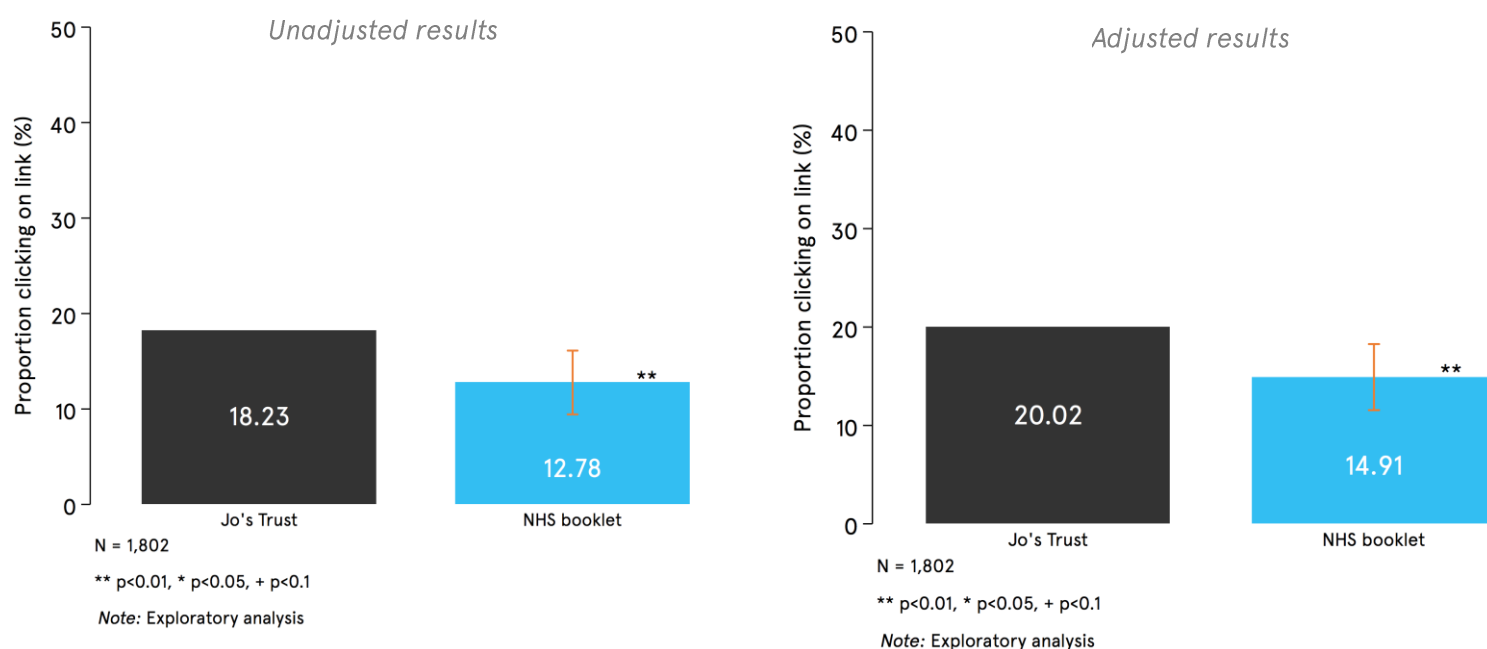
Figure 9. Thumbnail image used to offer additional information located in an online PDF version of the NHS cervical screening information booklet



We found that the proportion of participants who were offered the NHS booklet information were 5.1 percentage points less likely to click through than those

offered the Jo's Trust. Relative to a baseline of 20%, this represents a decrease in click-throughs of 25%. This suggests that participants considered the Jo's Trust website a more attractive resource compared to the NHS booklet. However, it may also be the case that participants who were offered the NHS booklet may have recognised the resource as something they had already received in the post, and that is why they chose not to access it again, whereas the offer of the Jo's Trust information might have been perceived as more novel and therefore more worthwhile engaging with.

Figures 10. and 11. Click-through rates by information source (Jo's Trust vs. NHS booklet)



Belief updating

Our trial focused on young women, because whilst they have the highest incidence of cervical cancer,³² they are the least likely to attend.³³ Research has identified some influential misperceptions about cervical cancer that might act as barriers to

³² Cancer Research UK. Cervical cancer incidence by age. Accessible at <http://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/cervical-cancer/incidence#heading-One>

³³ NHS Digital (2017). Cervical Screening Programme, England – 2016-17.

uptake,³⁴ such as the belief that the HPV vaccination provides full protection from developing cervical cancer³⁵ or that cervical cancer affects mostly older women.³⁶

One of our aims was to measure young women's beliefs regarding three aspects of cervical cancer and screening where misbeliefs might hinder screening uptake: cervical cancer incidence by age, the effectiveness of the HPV vaccine, and the effectiveness of screening in reduction of cancer risk. We then wanted to find out whether these beliefs influence women's likelihood of getting screened.

Results for this secondary analysis are presented in Figures 12–14, with the orange dotted line indicating the correct answers. We found a small but significant difference in beliefs between the treatment groups and the control group about which age groups have the highest incidence of cervical cancer and how much screening reduces the risk of developing cervical cancer (for further details, see Appendix 3).

Regarding incidence, our behaviourally informed banners helped the participants to become more accurate in their understanding of which age groups have the highest incidence of cervical cancer. In Figure 12 you can see a spike at the orange dotted line, indicating that participants who had seen our banners were much more accurate in identifying the correct age group compared to participants who had not seen our banners. Regarding risk reduction due to screening, the banners also helped participants correct their beliefs about how effective screening is, as seen in Figure 13: seeing our banners was associated with a belief in greater effectiveness, which was also closer to the true effectiveness of 75%. However, it seems that participants in the control condition and those who saw our banners were equal in their beliefs about HPV vaccine effectiveness: Figure 14 shows not much difference between groups.

Looking at women in the control condition (i.e. not exposed to any new information), we found that the more they believed they are at risk of cancer and that the screening can reduce this risk, the more likely they were to say they would attend. However, whilst these beliefs can play a role in motivating attendance, we did not find that a change in beliefs elicited by the extra information included in

³⁴ Albrow, R., Blomberg, K., Kitchener, H., Brabin, L., Patnick, J., Tishelman, C., ... & Widmark, C. (2014). Interventions to improve cervical cancer screening uptake amongst young women: a systematic review. *Acta Oncologica*, 53(4), 445–451.

³⁵ Blomberg, K., Tishelman, C., Ternstedt, B. M., Törnberg, S., Levál, A., & Widmark, C. (2011). How can young women be encouraged to attend cervical cancer screening? Suggestions from face-to-face and internet focus group discussions with 30-year-old women in Stockholm, Sweden. *Acta Oncologica*, 50(1), 112–120.

³⁶ Sadler, L., Albrow, R., Shelton, R., Kitchener, H., & Brabin, L. (2012). Development of a pre-notification leaflet to encourage uptake of cervical screening at first invitation: a qualitative study. *Health education research*, 28(5), 793–802.

the treatment messages would increase intentions to get screened, compared to the control group.

To an extent, this could be due to the fact that young women in our sample were already fairly knowledgeable about the key cervical cancer facts. Taken together, this suggests that other barriers, rather than the ones we focused on in this trial, may be playing a bigger role in holding young women back from having a screening.

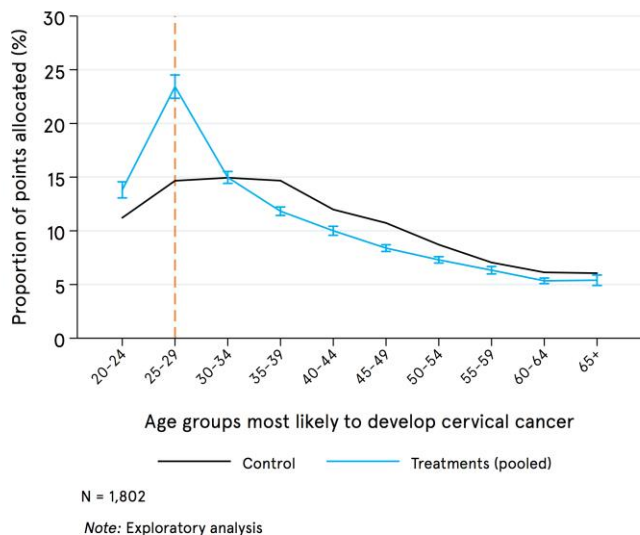


Figure 12: Belief about the incidence of cervical cancer in particular age groups

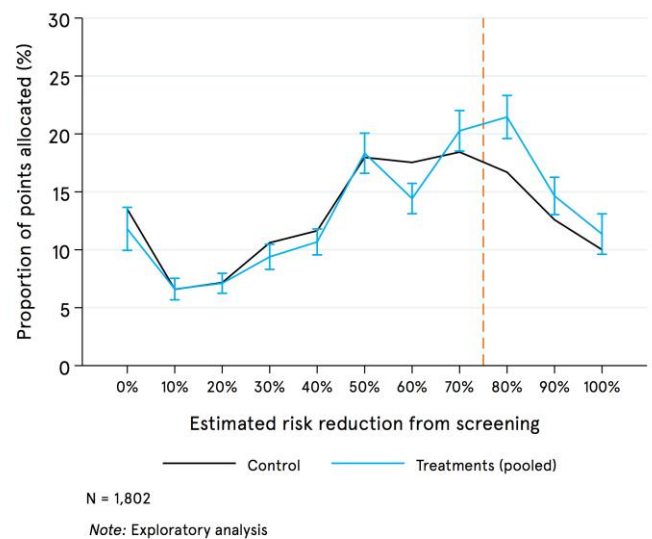


Figure 13: Belief about how much screening reduces the risk of cervical cancer

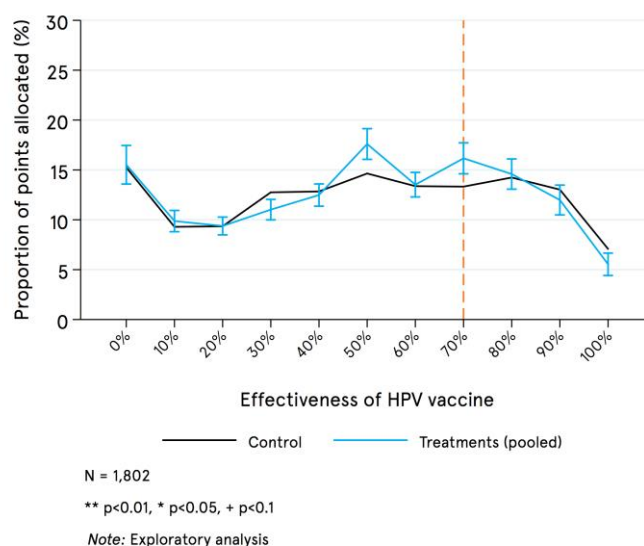


Figure 14: Belief about the effectiveness of HPV vaccination

Possible explanations for null effects in this trial

Screening behaviour is not easy to change, and the results from this trial further demonstrate the difficulties in identifying and changing the drivers of this particular behaviour. In this trial, we found no differences between the effects of our behaviourally informed messages and the business-as-usual control condition. Below, we discuss some of the possible reasons that these messages were not effective, despite the background research that suggested they were promising candidates.

Representativeness of the sample

Small differences between our sample and the general UK population of women aged 24–30 could lead to a bias the results. As previously mentioned, based on the demographic data we had, we do not believe that our sample was substantial different from the general population, but it remains a possibility that any differences could have influenced participant's stated intentions to attend their next screening. In Table 3 below, we attempt to approximately quantify the potential differences between our sample and the population we wish it to represent.

Table 3: Representativeness of our sample relative to the general population

Factor	Comparison	Interpretation
Income	Population: Median annual income for women aged 22–29 is £23,000 ³⁷	Our sample could have slightly higher incomes on average.
	Our sample: Average annual income would be circa £28,000; Median income is between £20,000–£39,999	
Education	Population (men & women): 7% have no education, 43% have undergraduate/postgraduate (Level 4+) education ³⁸	The level of highest qualification could be slightly higher in our sample. The exact magnitude depends on the gender effect.
	Our sample: 1% with no education, 51% have undergraduate/postgraduate (Level 4+) education	

³⁷ Calculated based on data from the Annual Survey of Hours and Earnings: 2016 provisional results, Available at <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/bulletins/annualsurveyofhoursandearnings/2016provisionalresults>

³⁸ ONS (2017). Annual report on levels of highest qualification held by working age adults. Table 3: Level of highest qualification held by adults of working age in the United Kingdom, 2016 (a) Available at <http://gov.wales/statistics-and-research/levels-highest-qualification-held-working-age-adults/?lang=en>

Overstating intentions	Population: 65% of women aged 25–29 attend cervical screening ³⁹ .	The number of participants saying they would attend is very high relative to the number of people who do attend, which strongly suggests a substantial gap between intended behaviour and actual behaviour.
	Our sample: 90% of participants said they would attend.	
Previous attendance of screening	Population: 65.2% within the past 5 years ⁴⁰	Our sample has slightly better attendance.
	Our sample: 67% overall	

Based on this rapid assessment of the sample representativeness, our sample could slightly over-represent views of more affluent and highly educated young women who are slightly more likely to have previously experienced a screening. However, these differences are relatively small, so we do not believe they are driving the results we have seen. The potential influence of overstatement, or the gap between intended behaviour and actual behaviour, is explored further below.

The effectiveness of the unaltered invitation letter

It is possible that the mere act of having to read the full invitation letter resulted in this very high percentage of our sample, including those in the control group, saying they would attend their next screening – perhaps many women do not read their invitation letter when they receive it in the real world, and ensuring they read it carefully in the online Predictiv environment (and being financially incentivised to do so in the context of participating in an experiment) may indeed increase likelihood of screening attendance, and behavioural messaging might not add anything above and beyond this impact. It could be the case that the invitation letter is effective as long as it is actually read, and behavioural insights approaches could be applied in the field to increase the likelihood of the invitation letters being actively read and not disregarded. The results of experiment do not provide us with

³⁹ NHS Digital (2017).

⁴⁰ NHS Digital (2017). Table 1a. NHS Cervical Screening Programme: Coverage by screening interval and age band, England, 2007 to 2017.

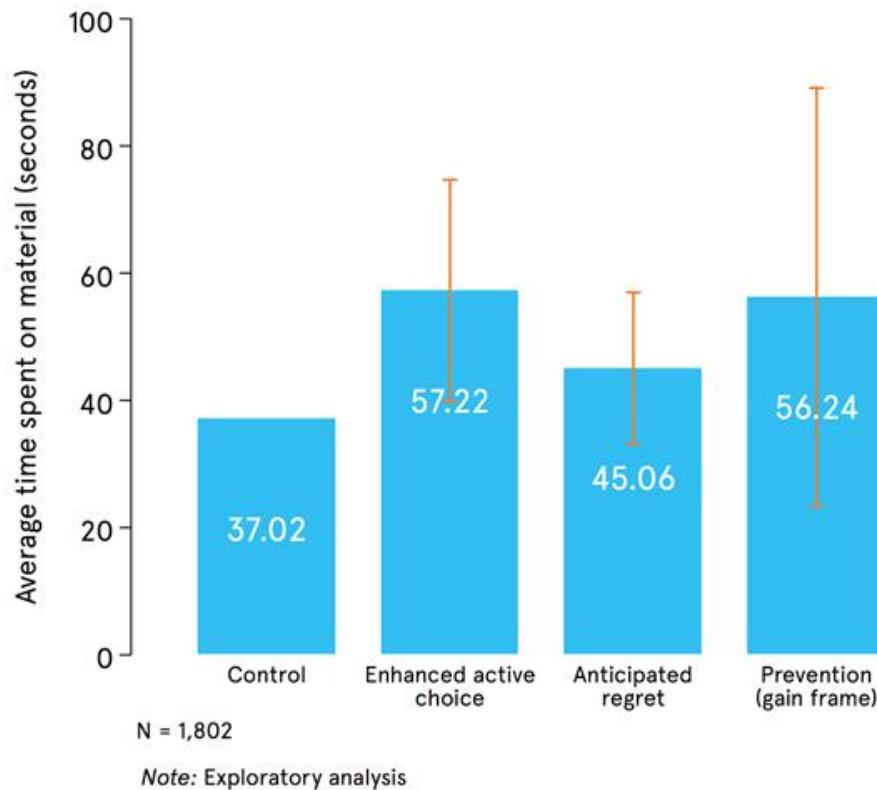
evidence of whether any of the behaviourally informed messages we tested might be effective in the field, however.

Overstating intentions

Our results could have been biased by participants overstating their intentions to attend their next screening. According to real-world data, 65% of women aged 24-29 attend their screening, and approximately 90% of participants in all our conditions (including the control condition) said they would attend their next screening. If that many did actually attend their next screening, that would be an enormous increase.

In the interests of understanding more about how the participants engaged with the material, we explored the amount of time participants spent looking at the different conditions, shown below in Figure 15. Although there was considerable variability in the treatment conditions, on average participants spent about 20 seconds longer looking at the enhanced active choice and prevention/gain frame materials, and 8 seconds longer on the anticipated regret materials, relative to the control condition. Although this is only an exploratory analysis and results are only indicative, these are interesting findings, as the length of the material is highly similar across treatment conditions, so it seems that the enhanced active choice and prevention/gain frame banners in particular caused participants to spend more time reviewing the material. However, despite more time spent reviewing the material, this did not translate into changes in stated intentions to attend a screening.

Figure 15. Time spent looking at the invitation letter, by condition



However, it is more likely that a greater portion of this jump is due to participants overstating their likelihood to attend, and behavioural science has much to say about the gap between someone's intentions and their actual behaviour.⁴¹ People may genuinely want to carry out a particular behaviour, and may genuinely believe that they will, and yet ultimately they do not. Some research suggests that this intention-behaviour gap could differ according to age and may be more pronounced among younger people.^{42,43} A wide range of factors can influence one's intentions, with some explanations attributing key roles to a person's attitude, their self-perceived ability to carry out the behaviour, and the prevalence of the behaviour around them.⁴⁴ However, one potentially powerful influence on reported intentions is social desirability bias, which emerges due to people feeling the need to respond in a way which will be perceived favourably. It may be the case that the young women in our sample felt the need to say that they would attend

⁴¹ Sheeran, P., & Webb, T. L. (2016). The intention-behavior gap. *Social and personality psychology compass*, 10(9), 503-518.

⁴² Reuter, T., Ziegelmann, J. P., Wiedemann, A. U., Lippke, S., Schüz, B., & Aiken, L. S. (2010). Planning bridges the intention-behaviour gap: Age makes a difference and strategy use explains why. *Psychology and Health*, 25(7), 873-887.

⁴³ Amireault, S., Godin, G., Vohl, M. C., & Pérusse, L. (2008). Moderators of the intention-behaviour and perceived behavioural control-behaviour relationships for leisure-time physical activity. *International Journal of Behavioral Nutrition and Physical Activity*, 5(1), 7.

⁴⁴ Armitage, C.J. & Conner, M. (2010). Efficacy of the Theory of Planned Behaviour: A meta-analytic review. *British Journal of Social Psychology*, 40(4), 471-499.

their next screening simply because they felt that was the appropriate response, particularly if the prominent NHS branding on the experimental materials made them feel that they should show their engagement with and support for a screening programme that is provided to them for free.

Another issue we need to consider in relation to overstatement of intentions is how this higher-than-anticipated baseline affects our ability to detect effects. Given that in our control group around 90% of participants said they would attend their next screening, there is potentially very little room for us to improve this with behaviourally informed messages, so we might be at risk of encountering “ceiling effects”. This could be especially the case knowing that a previous UK field trial using behavioural messages to increase cervical screening uptake achieved only a statistically significant increase of 1.4 percentage points.⁴⁵

Nevertheless, at 90% stated intention of attendance we were still adequately powered to detect an effect (above 3 percentage points) on the 9-point Likert scale outcome measure of stated intention to attend, as showed by subsequent power calculations.

Not addressing other key influential barriers to uptake

Whilst our treatments were based on well-evidenced behavioural interventions, it may be that the messaging did not adequately address other important barriers that strongly influence young women’s cervical screening uptake. Our additional qualitative analysis (see below) suggests that physical discomfort, embarrassment and fear are other major barriers, especially among women who have not previously had a screening.

These findings are in line with the broader literature which shows that discomfort and embarrassment, rather than a lack of knowledge about risks involved, may prevent women from getting screened.⁴⁶ However, evidence on ways to counter these barriers is limited. Less invasive self-sampling kits are the most promising

⁴⁵ Huf, S., King, D., Honeywell, S., Tseng, F. M., Andresen, I., Vlaev, I., & Darzi, A. (2016). Message framing in invitation letters for cervical screening: a randomised controlled trial. *The Lancet*, 388, S57.

⁴⁶ Waller, J., Bartoszek, M., Marlow, L., & Wardle, J. (2009). Barriers to cervical cancer screening attendance in England: a population-based survey. *Journal of medical screening*, 16(4), 199-204; Jo's Trust (2018). Body shame responsible for young women not attending smear tests. Retrieved March 15, 2018, from <https://www.jostrust.org.uk/node/1073042>

solution⁴⁷⁴⁸ but these are only a future possibility and are not widely available yet. Approaches using social norms and testimonials may also be effective in addressing these particular barriers, as suggested by studies focusing on shame and embarrassment of screening in some ethnic minority communities.⁴⁹

Exploratory textual analysis: Top reasons for (non) attendance among young women

We conducted a rapid analysis of participants' free text responses to explore the drivers of women's intentions regarding screening. From the total of 1,739 free text responses, we analysed a sample of 500 women's answers to the following question: *'It's helpful for us to better understand why you would (not) get a screening. Please tell us why you chose the way you did.'* This was accomplished by doing a rapid thematic analysis, which involved coding the text with labels that corresponded to themes and behavioural dynamics that had been either identified during the literature review (such as 'embarrassment', or 'difficulty with booking/attending'), or that emerged from data (such as 'not (yet) sexually active' or 'previous screening result').

As shown in Figure 16., physical discomfort was the top cited reason for non-attendance among young women who said they would not attend (29% of responses). Many women were very candid about how inconvenient or painful the screening can be (e.g. *'I am worried that it is painful and I not a nice experience.'* or *'The tool used to open to get the swab in was incredibly uncomfortable.'*). Fear about the screening proceedings (18%) and embarrassment about one's body being exposed to healthcare professionals (15%) were other major reasons for non-attendance. However, coming a close second as driver of screening avoidance was simply a lack of interest (21%) (expressed as a lack of need or want to attend).

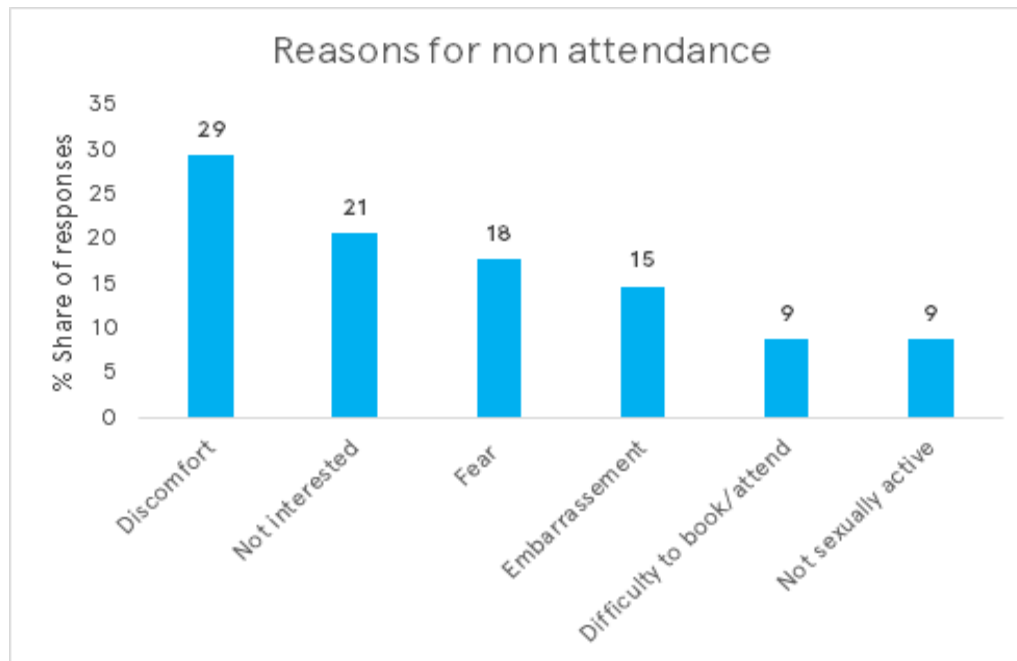
⁴⁷ Verdoodt, F., Jentschke, M., Hillemanns, P., Racey, C. S., Snijders, P. J. F., & Arbyn, M. (2015). Reaching women who do not participate in the regular cervical cancer screening programme by offering self-sampling kits: a systematic review and meta-analysis of randomised trials. *European journal of cancer*, 51(16), 2375-2385.

⁴⁸ Kitchener, H., Gittins, M., Cruickshank, M., Moseley, C., Fletcher, S., Albrow, R., ... & Sargent, A. (2017). A cluster randomized trial of strategies to increase uptake amongst young women invited for their first cervical screen: The STRATEGIC trial. *Journal of medical screening*, 0969141317696518.

⁴⁹ Waller, J., Robb, K., Stubbings, S., Ramirez, A., Macleod, U., Austoker, J., ... & Wardle, J. (2009). Awareness of cancer symptoms and anticipated help seeking among ethnic minority groups in England. *British Journal of Cancer*, 101, S24-S30.; Robb, K. A., Solarin, I., Power, E., Atkin, W., & Wardle, J. (2008). Attitudes to colorectal cancer screening among ethnic minority groups in the UK. *BMC Public Health*, 8(1), 34.; Chang, S. C. H., Woo, J. S., Yau, V., Gorzalka, B. B., & Brotto, L. A. (2013). Cervical cancer screening and Chinese women: insights from focus groups. *Frontiers in psychology*, 4, 48.

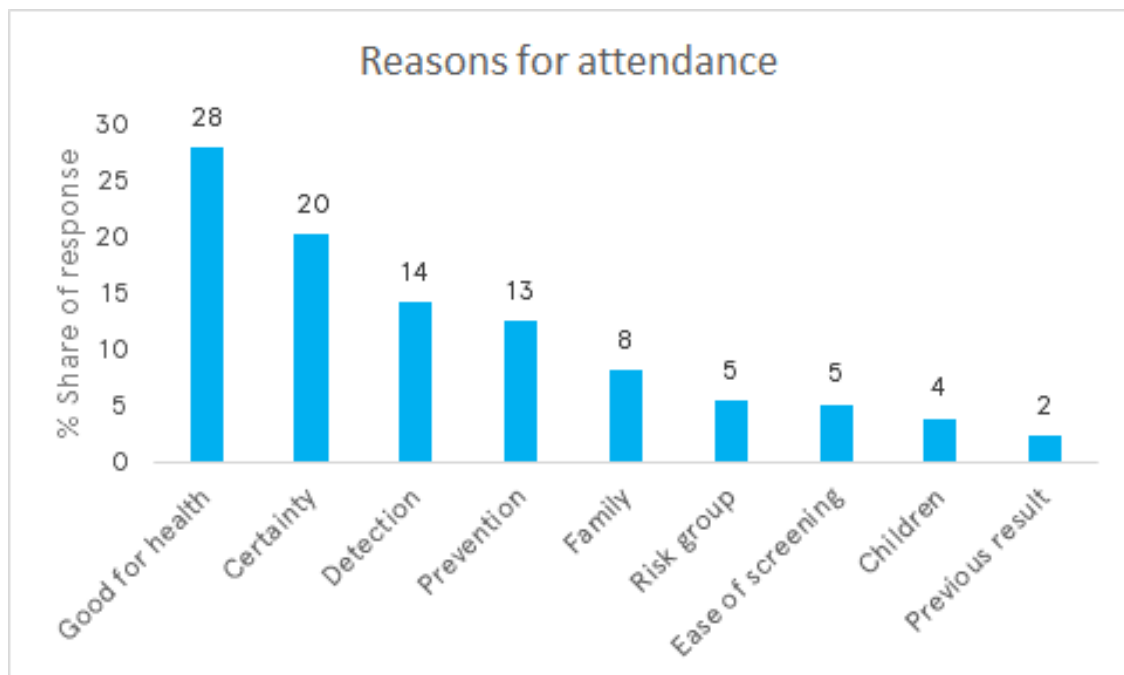
Similarly, young women who were not yet sexually active said that screening was not relevant to them (9%).

Figure 16: Stated reasons for not attending the screening (N=37)



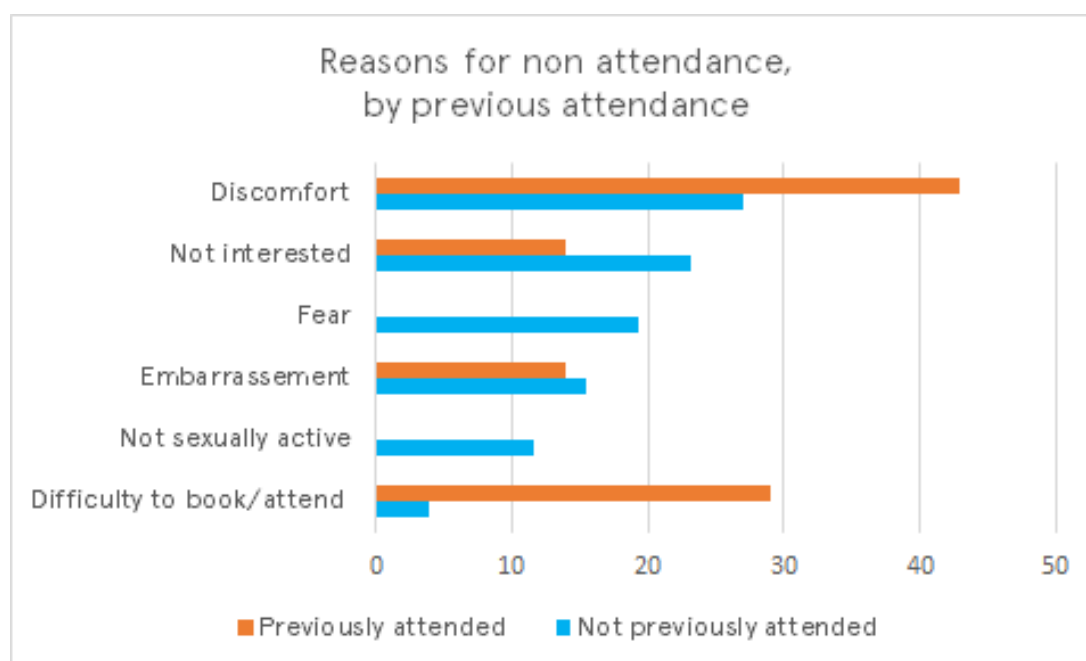
In terms of the reasons to attend (Figure 17.), the majority of young women who said they would attend the screening simply referred to its importance for one's health (28% of responses) (e.g. *'Because it's beneficial for health', 'We should get checked.'*). The second most cited reason to get screened was just to be on the safe side, to have the certainty that they are healthy (20%). Both the preventative and detective effect of screening came close third as the major reason to get screened (14% and 13%, respectively). Among other reasons were: having cancer in family or witnessing it among one's close friends (8%), being in the high risk age group (5%) (e.g. *'I'm 29 so I am at higher risk now of developing something bad'* or *'More young girls [like me] are contracting cervical cancer'*), the need to be healthy to care for one's children (and associated lower embarrassment about screening) (4%), as well as a previously abnormal result (2%).

Figure 17: Stated reasons for not attending the screening (N= 430)



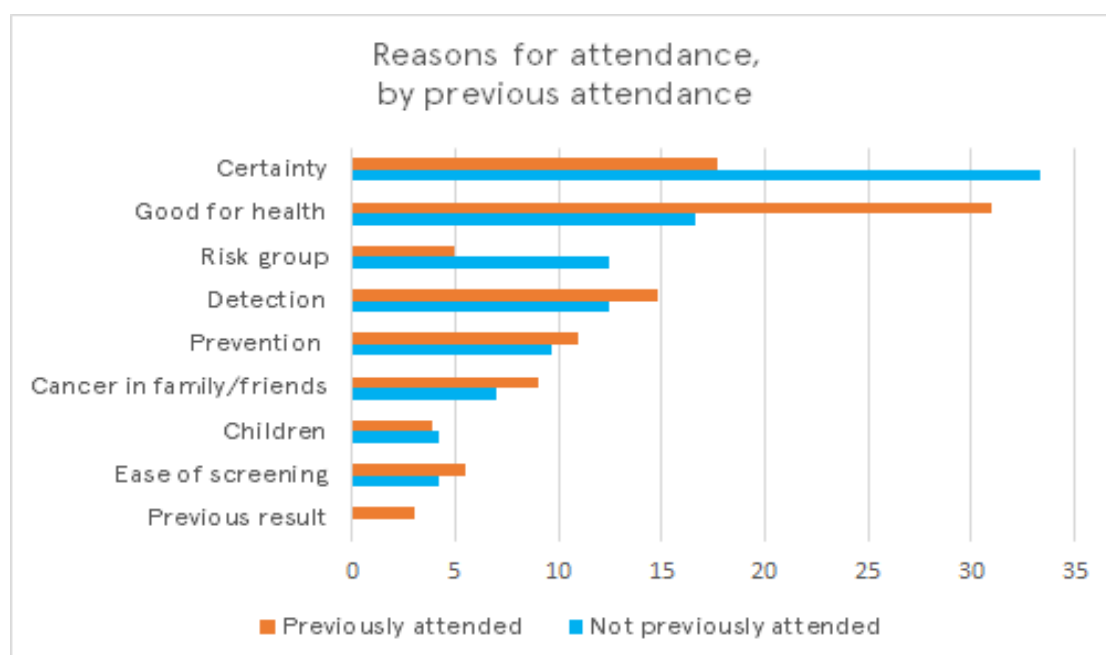
To further explore why some young women may be more likely to attend cervical screening than others, we broke down our data by previous attendance (the only statistically significant factor in our analysis). As shown in Figure 18., we see that women who did not previously attend a screening are more likely to refer to a lack of sexual activity and a lack of general interest (e.g. *'I was informed by the doctor that it was not necessary (yet) since I have not been sexually active yet'*; or *'just don't want to'*, *'seems like a waste of time'*). However, they are also more likely to be fearful about how the screening will go. Women who previously attended and stated they are unlikely to do so in the future are probably discouraged by their initial uncomfortable and embarrassing experience. This group also finds it more difficult to get around to booking/attending their appointment.

Figure 18. Stated reasons for not attending the screening (reported as percentages)



As for the cited reasons to attend screening (Figure 19.), young women who did not previously attend were more likely to mention the need for certainty about being healthy, especially given they are in the high-risk group. Those who had already attended were more motivated by screening being important for their health. A few women in this group also referred to their previous abnormal screening result.

Figure 19. Stated reasons for attending the screening (reported as percentages)



In terms of limitations, this rapid qualitative analysis was conducted on a limited sample, but provides relevant contextual detail for understanding the barriers that

young women cite when it comes to cervical screening. Our findings complement those that Jo's Trust has recently publicised, which found body shame to be a powerful influence on young women's decision to attend screening.⁵⁰ Our findings suggest that physical discomfort during the screening is an additional influence, and that this deters not only young women who have never been screened but also young women who have had a screening. This suggests that an uncomfortable or painful first experience could have a worrying effect on women's subsequent willingness to have a screening.

A further interesting finding in the current research is that some proportion of young women are simply not interested in getting screened. It would be interesting to understand the nature of this disinterest or indifference, particularly given the clear communication to women regarding cervical cancer and the benefits of screening.

These qualitative results need to be considered in the context that they are from a relatively small sample size, and that they are prone to selection bias in terms of the type of person who is willing to participate in an online experiment about cervical cancer and in terms of the type of person who is willing to share their sentiments via a free-text response. However, given that the panel that Predictiv recruits from aims to be representative of the broader UK population, and given that a large proportion of the participants offered a free-text response, we believe that the qualitative analysis has identified some previously unexpected factors that influence young women's willingness to be screened and that would be worthwhile investigating in the future.

Conclusion

The overall conclusion from this trial is that, in the online Predictiv context, invitation letters with behaviourally informed banners do not seem to be more effective than existing letters in increasing the proportion of women likely state they would attend their next cervical screening.

We discussed potential reasons for this null effect. One reason was participants' tendency to overstate their intentions to attend screening. The young women in our sample might have been overly optimistic about their likelihood to book and attend their next screening. At 90% stated intention to attend, the stated intentions to attend were so high that a potential for further improvement became very small.

⁵⁰ Jo's Trust. (2018, January 22). Body shame responsible for young women not attending smear tests. Retrieved March 15, 2018, from <https://www.jostrust.org.uk/node/1073042>

Another explanation for the null effect is that the invitation letter on its own is effective, and adding these particular behaviourally informed message banners does not increase stated intentions above and beyond what the invitation letter could already achieve. However, this finding would likely be specific to the online Predictiv environment, where all participants fully read the invitation letter. However, it is still possible that these banners could have a different effect in the real world if they attract attention to an invitation letter that women would otherwise disregard or ignore. If the issue in the real world is that young women do not read their invitation letters, then a banner could attract their attention, and the cursory evidence about the time spent viewing the treatment material suggests that participants did spend more time looking at the invitation letters that had banners. In the real world, a banner could make a difference by acting as a way to get people to engage with the invitation letter and to read it fully. However, based on the evidence from this Predictiv trial, we are unable to say how effective this approach would be.

Our qualitative work, combined with recent research from other organisations, suggests that addressing young women's physical discomfort and embarrassment may be critical to increasing screening uptake. It would be helpful to synthesise the existing research and literature regarding the barriers of shame and embarrassment in the context of health behaviours, and to understand the types of interventions that are most effective in overcoming these. While more resource-intensive interventions (such as self-sampling kits people can administer themselves) may offer viable solutions in the future, there are still behavioural insights approaches, such as the use of targeted social norms, that may be effective (as well as easier and less resource-intensive) to implement in the more immediate future.

Appendix 1.

Control letter

ADDRESS

XXXXXXX

XXXXXXX



Dear XXXX,

I am writing to invite you to come for a cervical screening test. Cervical screening is a free and confidential service offered by the NHS to all women aged 25-64.

Screening takes place every three years for women aged 25-49, and every five years for women aged 50-64. Some women are invited more often if they have had an inadequate or abnormal result, or if they need follow up after treatment for abnormal cells.

To make your appointment please call your GP practice (on XXXXXXXX) or a local clinic (listed overleaf) who will offer you a date and time.

Information about cervical screening and the recall process is included in the enclosed leaflet 'NHS cervical screening' which you are advised to read before coming for the test. The leaflet also explains about another test that may be carried out on your screening sample if your screening result is mildly abnormal.

Your result will be sent to your home and to your GP. The person taking your test will be able to tell you when you can expect to get your result letter.


Cervical screening, like other medical tests, is not perfect. It may not find every abnormality of the cervix. If you have any unusual symptoms like discharge or irregular bleeding, don't wait for your next test, but talk to your GP or the person who did your last test.

Yours sincerely,

Director of Cervical Cancer Screening Programme


Enhanced active choice

Some things you might not know about cervical cancer screening...



Young women are the most likely to get cervical cancer.
Cervical cancer diagnosis rates are highest in women aged 25-29.

The HPV vaccine doesn't completely protect you from getting cervical cancer.
You still need to have a regular screening.



What will you choose to do?

☐ I will book my appointment today by calling my GP practice. Getting screened will reduce my chance of developing cervical cancer by up to 75%.

☐ I will not get screened and will miss out on the chance to reduce my risk of developing cervical cancer.

ADDRESS

XXXXXXX

XXXXXXX



Dear _____,

I am writing to invite you to come for a cervical screening test. Cervical screening is a free and confidential service offered by the NHS to all women aged 25-64.

Screening takes place every three years for women aged 25-49, and every five years for women aged 50-64. Some women are invited more often if they have had an inadequate or abnormal result, or if they need follow up after treatment for abnormal cells.

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Yours sincerely,

Director of Cervical Cancer Screening Programme

Anticipated regret

Some things you might not know about cervical cancer screening...



Young women are the most likely to get cervical cancer.
Cervical cancer diagnosis rates are highest in women aged 25-29.

The HPV vaccine doesn't completely protect you from getting cervical cancer.
You still need to have a regular screening.



If you were diagnosed with cervical cancer, would you regret not getting screened earlier?

Cervical screening can help detect and remove cells which could develop into cancer. If you don't get screened, you will be in the group of women who are much more likely to die from cervical cancer.

ADDRESS

XXXXXXX

XXXXXXX



Dear _____,

I am writing to invite you to come for a cervical screening test. Cervical screening is a free and confidential service offered by the NHS to all women aged 25-64.

Screening takes place every three years for women aged 25-49, and every five years for women aged 50-64. Some women are invited more often if they have had an inadequate or abnormal result, or if they need follow up after treatment for abnormal cells.

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Yours sincerely,

Director of Cervical Cancer Screening Programme


Prevention/gain frame

Some things you might not know about cervical cancer screening...



Young women are the most likely to get cervical cancer.
Cervical cancer diagnosis rates are highest in women aged 25-29.

The HPV vaccine doesn't completely protect you from getting cervical cancer.
You still need to have a regular screening.



Do you want to give yourself the best chance of preventing cervical cancer?

Cervical screening prevents cancer by identifying early changes in cells. Getting screened hugely reduces your risk of getting cervical cancer.

ADDRESS

XXXXXXX

XXXXXXX



Dear _____,

I am writing to invite you to come for a cervical screening test. Cervical screening is a free and confidential service offered by the NHS to all women aged 25-64.

Screening takes place every three years for women aged 25-49, and every five years for women aged 50-64. Some women are invited more often if they have had an inadequate or abnormal result, or if they need follow up after treatment for abnormal cells.

To make your appointment please call your GP practice (on XXXXXXXX) or a local clinic (listed overleaf) who will offer you a date and time.

Information about cervical screening and the recall process is included in the enclosed leaflet 'NHS cervical screening' which you are advised to read before coming for the test. The leaflet also explains about another test that may be carried out on your screening sample if your screening result is mildly abnormal.

Your result will be sent to your home and to your GP. The person taking your test will be able to tell you when you can expect to get your result letter.

Cervical screening, like other medical tests, is not perfect. It may not find every abnormality of the cervix. If you have any unusual symptoms like discharge or irregular bleeding, don't wait for your next test, but talk to your GP or the person who did your last test.

Yours sincerely,

Director of Cervical Cancer Screening Programme

Appendix 2. Factors related to the stated likelihood of completing cervical cancer screening

We also examined the relationship between some demographic variables and the stated intentions to complete the cervical cancer screening, to explore whether the messages had different impacts for young women depending on factors such as the the region they live in, their income, education or previous screening attendance. In order to isolate the effect of a given demographic variable at the time, we control for all the other factors.

In terms of geography, we found no statistically significant differences relevant to Greater Manchester. Only the participants from the Midlands seemed to be marginally more interested in screening (Figure 20.).

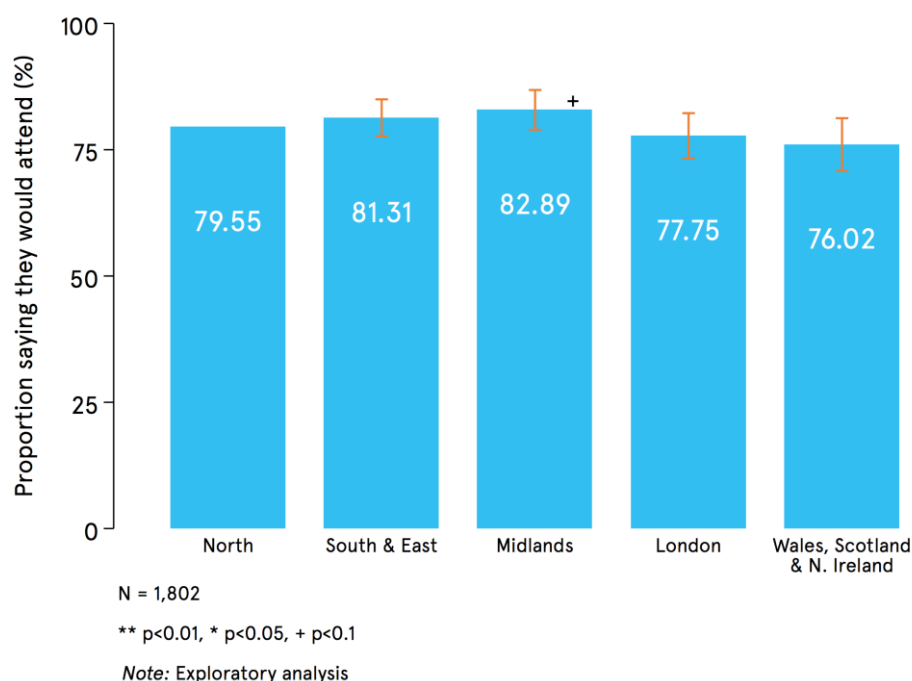


Figure 20: The difference in proportion saying that they will attend the screening, by region

In line with the existing literature, we saw significant effects of previous attendance on stated intentions and some directional effects of income and education levels on stated intentions to complete the screening. However, our sample size is too small to run subgroup analyses by each demographic in a robust way, so these patterns should be only taken as indicative.

As Figure 21. shows, all women who had previously attended the screening said they intended to get screened, compared to only 80% among those who had not been previously screened.

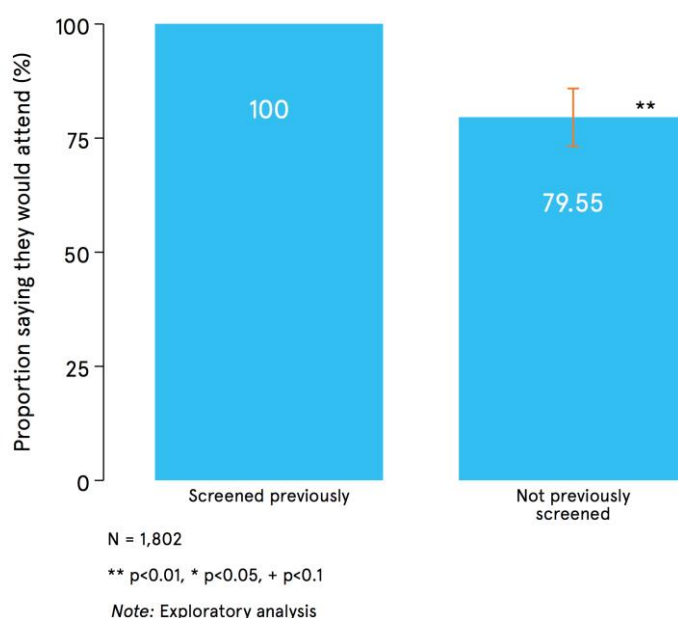


Figure 21: The difference in proportion saying that they will attend the screening between those who have been previously screened and those who have not.

Income and education played a role only to a limited extent in our sample. Those who reported earning more than £40,000 per year were statistically significantly more likely to say they would attend the screening. However, stated intentions to attend the screening were reasonably constant across the different education levels. The only exception were women who reported having no education and

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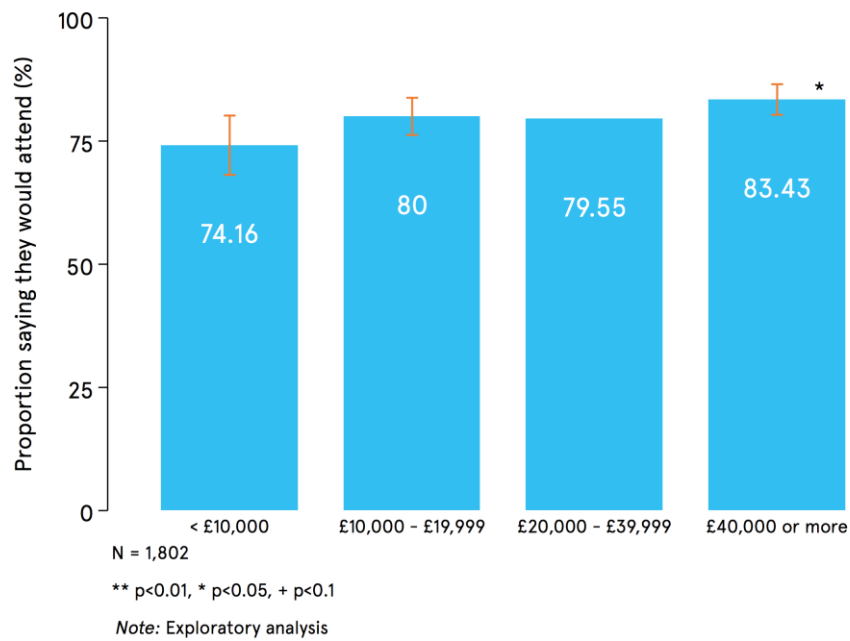


Figure 22: The difference in stated intention to attend across income levels

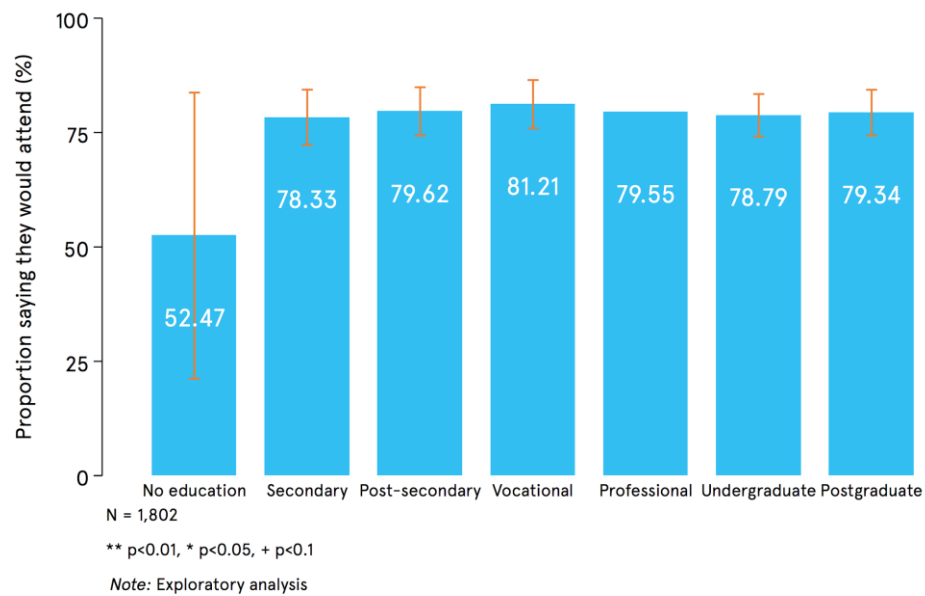


Figure 23: The difference in stated intention to attend across education levels.

Appendix 3. Treatment effect on belief updating

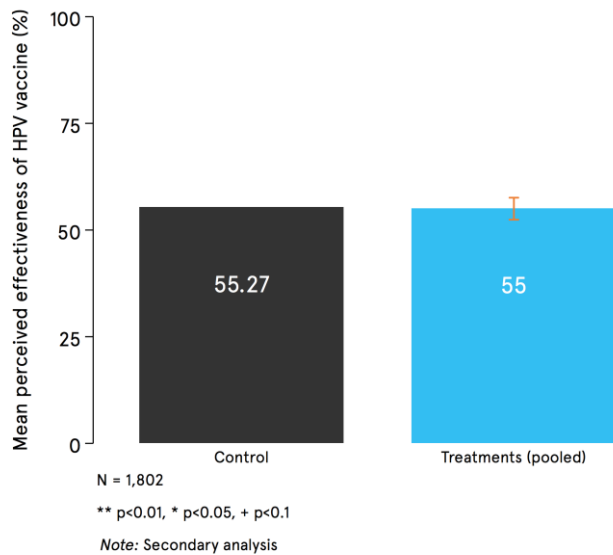


Figure 24: Belief about the effectiveness of HPV vaccination

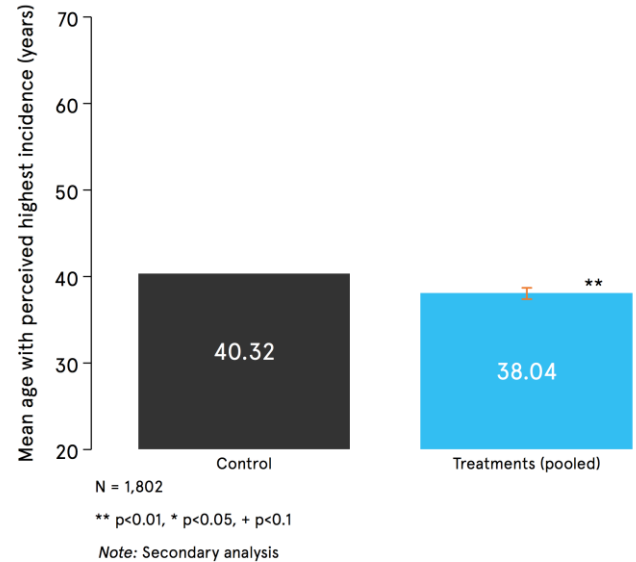


Figure 25: Belief about age groups with highest cervical cancer incidence

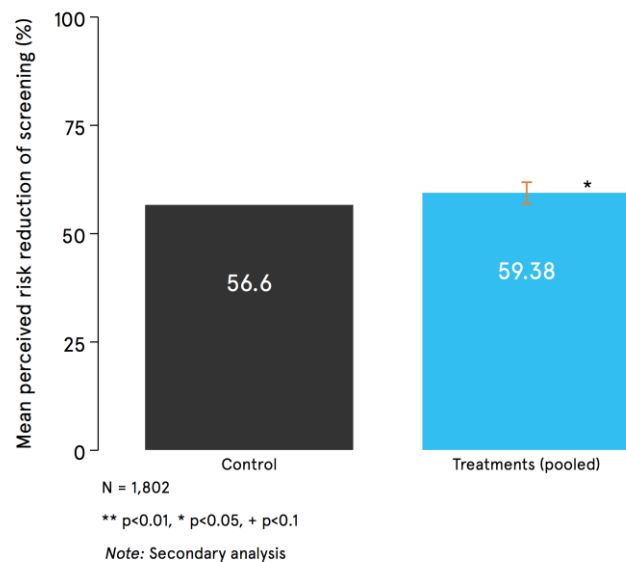


Figure 26: Belief about the preventative effect of cancer screening