

# A controlled trial of envelope colour for increasing response rates in older women

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**ABSTRACT. Background and aims:** Postal questionnaires are widely used in health research to provide measurable outcomes in areas such as quality of life. Participants who fail to return postal questionnaires can introduce non-response bias. Previous studies within populations over the age of 65 years have shown that response rates amongst older people can be 60% or less. The current study sought to investigate whether envelope colour affected response rates in a study about the effectiveness of screening older women for osteoporosis. **Methods:** A total of 2803 eligible female participants aged between 70 and 85 were sent an invitation pack from their GP practice. The invitation was either in a brown or white envelope and contained a matching pre-paid reply envelope. A study questionnaire was also sent out in brown or white envelopes 1 week after consenting to participate in the trial. **Results:** The overall response rate was 78%. There was little evidence of an effect of envelope colour on response to the invitation to participate in the trial (OR 1.04, 95% CI 0.87-1.24). Similarly, there was no influence of envelope colour on the number of participants returning their questionnaires (OR 0.99, 95% CI 0.60-1.63). There was weak evidence of an effect of envelope colour on the response rates of the consent process (OR 0.86, 95% CI 0.74-1.00). When we updated a recent meta-analysis with the results of this study, there was a non-statistically-significant trend for greater response rates with brown envelopes compared with white envelopes (OR 1.19, 95% CI 0.86-1.64,  $I^2=92\%$ ). However, the results were influenced by one study and when this study was excluded the pooled estimate was 0.98 (95% CI 0.89-1.08,  $I^2=0\%$ ). **Conclusion:** This study found no evidence to suggest envelope colour has an effect on response to participate in a trial or ques-

tionnaire returns. There is weak evidence to suggest envelope colour may affect consent into a trial. (Aging Clin Exp Res 2011; 23: 236-240)

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## INTRODUCTION

Postal questionnaires are widely used in health research to provide measurable outcomes in areas such as quality of life. The use of such questionnaires enables researchers to collect data from a larger group of people than is possible where data collection is based on interviews. Additionally, postal questionnaires are easy to use, allow data collection from a large geographical area and are substantially cheaper to initiate than interviews (1, 2).

However, a poor response rate is one of the disadvantages to their use. Participants who fail to return postal questionnaires can introduce non-response bias (2, 3) as the characteristics and outcomes of non-responders may be very different to responders. Furthermore, non-responders reduce statistical power (2, 3). Previous studies within populations over the age of 65 years have reported response rates between 60% and 65% (3-5). Therefore, methods to enhance response rates are crucial to enhancing the quality of health research.

A recent review (1), published under the auspices of the Cochrane Collaboration, identified a number of methods to improve response rates to postal questionnaires. One of the methods explored was the effect of using brown envelopes, as opposed to white envelopes. Five studies were identified (3, 6-9) and there was a non-statistically-significant trend for greater response rates with brown envelopes compared with white envelopes (OR=1.23, 95% CI 0.81-0.87).

Two recent trials of envelope colour and response rates (3, 6) found no overall effect of using brown or white envelopes on response rates. In the study by Taylor et al.

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62.3% of brown and 64.8% of white (OR 0.90, 95% CI 0.76-1.06) envelopes were returned, though there was significant heterogeneity between the general practices included. When this interaction (envelope and general practice) was taken into account, white envelopes were found to increase response rates compared to brown envelopes (OR 1.22, 95% CI 1.09-1.37). McCoy and Hargie evaluated whether envelope colour affected response rates to a public relations questionnaire amongst a business population; envelope colour was not found to significantly affect response rates ( $p=0.973$ ).

Previous studies of response rates have investigated response rates in terms of response rates to a questionnaire; however, other types of response rates can be measured. Trials within health research often recruit participants through the use of postal forms, prior to sending out questionnaires, and response rates may be different for the recruitment process depending on the colour of the envelope used.

The aims of this study were to investigate whether envelope colour affected response rates in three different stages of a study: 1) Invitation process; 2) Consenting process; and 3) Return of first questionnaire.

## METHODS

### *Design and participants*

As part of a trial assessing the effectiveness of Screening of Older women for Osteoporotic fracture Prevention (SCOOP; ISRCTN 55814835) (10) in England, we assessed whether envelope colour (brown or white) increased response rates. The trial was a two armed pragmatic randomised controlled trial of screening *vs* usual care. All women aged between 70 and 85 who were sent an invitation to take part in the first phase of recruitment for the SCOOP study from the York study centre were included in this study.

All GP practices taking part in the first phase (March to September 2008) of recruitment for the SCOOP study were provided with patient invitation mailing packs for each eligible patient. These packs were alternately arranged (brown, white, brown, white etc.). In each GP practice, an alphabetical (by surname) list of all eligible patients was produced by the practice. Patients were sent a brown or white envelope depending on the colour in the sequence. This systematic method of allocation is as effective at producing equivalent groups as true randomisation if there is no relationship between sequence and prognostic variables and if the person sending out the envelopes is not aware of the prognostic characteristics of the participants (11). In this instance both of these criteria were fulfilled.

Each pack contained a consent form with an accompanying background information form, a decline form with an accompanying background information form, participant information sheet, pre-paid reply envelope and a let-

ter inviting the patient to take part in the SCOOP study. These documents were either in a brown or white envelope; the mailing envelope and the paid reply envelope were matched for colour. Hence, if the patient received a white envelope invitation pack then they also received a white pre-paid reply envelope.

In the SCOOP study, patients were asked to return either a consent or decline form. The aim of this was to elicit information on the characteristics of the population who decline, as well as those who consent, as everyone was encouraged to complete a background information form. Reminder invitation packs were sent to patients three weeks after the initial mailing if we had received neither a consent nor a decline form. This pack was identical to the original pack posted and the mailing envelope and pre-paid reply envelope colour also matched the envelope colour of the initial mailing.

After patients had consented to participate in the SCOOP study they were sent a questionnaire, this was sent to participants approximately within a week of receiving their consent form. This questionnaire consisted of three health screening questions, York modified SF-12 (12), EQ5-D (13), and the State-Trait Anxiety Inventory (14). Participants were sent a reminder letter and a copy of the questionnaire if we had not received their completed questionnaire 14 days after the original questionnaire was sent. The questionnaire and reminder mailing were either in a brown or white envelope; the mailing envelope and the paid reply envelope were matched for colour. A final telephone reminder was also made 30 days after the original mailing to participants who had not responded (Fig. 1).

### *Statistical methods*

Because this was a 'sub-study' nested in a larger RCT of osteoporosis screening, our sample size was constrained by the number of invitations sent out for the screening study. However, we anticipated sending out approximately 2800 invitations which would give us 77% power to show an absolute difference of 5% ( $2p=0.05$ ) between the two groups, using a baseline of 60%.

The response rate for the invitation process was calculated as the number of patients who returned the invitation to take part (including those who consented and declined to take part) divided by the number of patients who were sent an invitation. The response rate for the consenting process was calculated as the number of patients who consented to take part divided by all other patients (including those who declined to take part in the study and non-responders). Finally, the response rate for the return of first questionnaire was calculated as the number of participants who returned a completed questionnaire divided by the number of participants who, following consent to take part, had been sent a questionnaire.

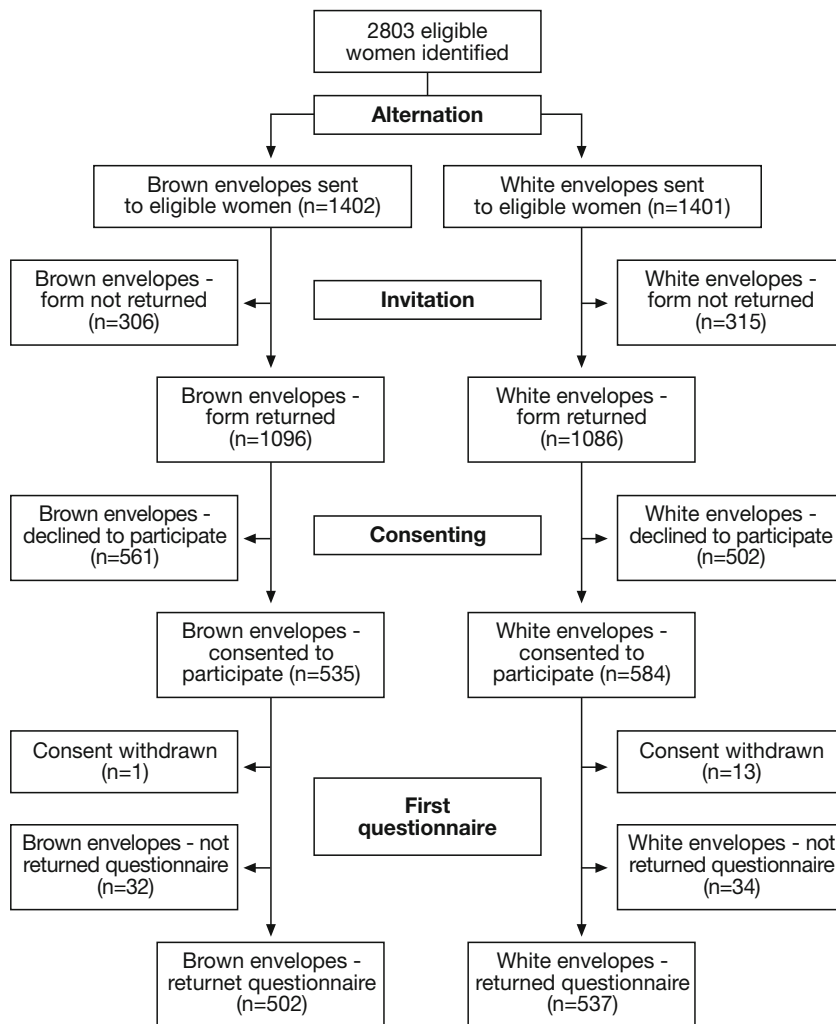


Fig. 1 - Flow diagram of study methods.

Univariate odds ratios (OR) were calculated (SPSS version 15; SPSS, Inc, Chicago, IL) for envelope colour. The results of the questionnaire response rates for the present study were added to the existing Cochrane Review and updated Forest plots were produced (Review Manager 5). Odds ratios greater than one indicate that higher response rates were achieved using brown envelopes.

## RESULTS

### *Increasing response to the invitation process*

A total of 2803 eligible patients were sent an invitation pack from their GP practice and 2182 responded to the invitation (78%); 621 patients did not return the invitation. Univariate analysis showed that the response rate for brown envelopes (1096 out of 1402, 78%) was not

statistically significantly different from white envelopes (1086 out of 1401, 78%; OR 1.04, 95% CI 0.87-1.24).

### *Increasing response to consent process*

The total number of participants consenting to take part in the SCOOP study was 1119 out of 2803 (40%). Univariate analysis showed that there was weak evidence of a relationship between envelope colour (brown 535 out of 1096, 49% and white 584 out of 1086, 54%) and response rates to the consenting process (OR 0.86, 95% CI 0.74-1.00).

### *Increasing questionnaire response rates*

The overall response rate to the questionnaire was 94% (1039 out of 1105). Univariate analysis showed that the response rate for brown envelopes (502 out of 534,

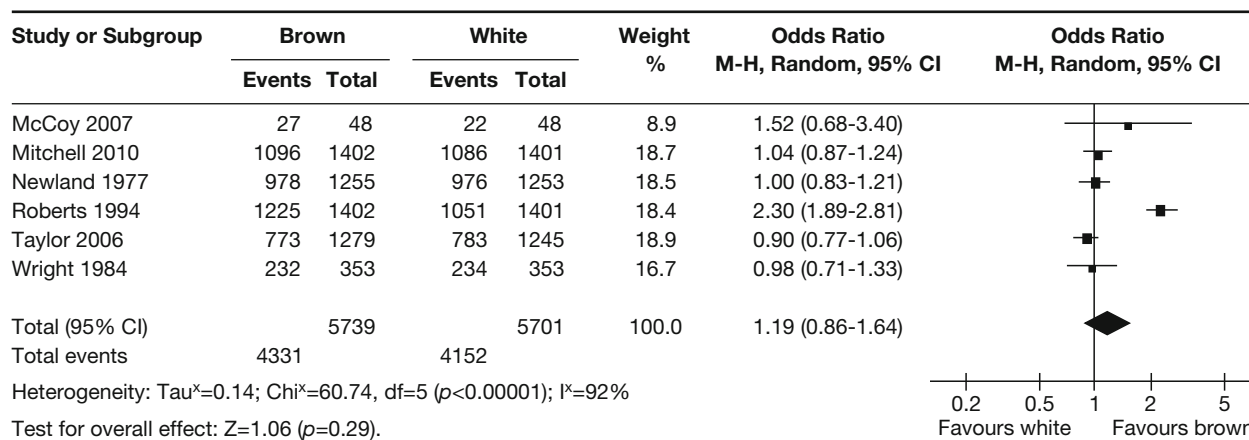


Fig. 2 - Comparison of Brown vs White envelope to increase response rates.

94%) was not statistically significantly different from white envelopes (537 out of 571, 94%; OR 0.99, 95% CI 0.60-1.63).

The results from this analysis were added to the results of the Cochrane Review (1) (Fig. 2). There was a non-statistically-significant trend for greater response rates with brown envelopes compared with white envelopes (random effects OR 1.19, 95% CI 0.86-1.64, six trials with 11,440 participants in total). There were still extremely high levels of heterogeneity ( $I^2=92\%$ ), which indicates that the percentage of total variation across studies is likely to be due to heterogeneity rather than chance. Interestingly, when we excluded the Roberts (1994) (8) trial from the meta-analysis, the  $I^2$  statistic reduced to 0% and the pooled estimate became 0.98 (95% CI 0.89-1.08).

## DISCUSSION

### Main findings

This study assessed whether envelope colour increased response rates. Three types of response rates were assessed in this trial: firstly, response to an invitation to participate in the trial; secondly, consenting to participate in the trial; and finally, response rate to a questionnaire once a participant had consented to participate in the trial.

We found the colour of the envelope did not affect whether a patient responded to the invitation to participate in the trial or whether a participant returned questionnaires. However, weak evidence of a relationship between envelope colour and the consenting process was found ( $p=0.06$ ), suggesting that white envelopes rather than brown envelopes resulted in more favourable recruitment rates. However, recruitment was not the primary outcome of this study: overall questionnaire response rates were. Consequently the effect of envelope colour must be treated with caution and needs to be confirmed in a separate randomised trial.

The results of the meta-analysis in this study reflect those found by Taylor et al. (3), whereby there was a significant amount of heterogeneity. However, this was primarily due to one study included in the analysis, and when this study was excluded from the analysis the  $I^2$  statistic reduced to 0% (8).

### Limitations of this study

The main limitation of this study was that it was carried out as a sub-study to the screening trial, therefore, the power calculations were based on the screening study and not the response rates. However, we had 77% power to show an absolute difference in response rates of 5%. Another limitation of this study is the participant population that was used. Participants in this study were all female and between the age of 70 and 85. Hence, the results may not be generalisable to other populations, settings or trial procedures. For example, it may be that for this population the individuals felt more compelled to return either a consent or decline form because the letter had been sent from their GP. Compared to previous studies in an elderly population, the current study has very good overall response rates (4, 5).

### What is already known on this topic and what this study adds

Postal questionnaires are widely used in health research but poor response rates are one of the main disadvantages (1, 4, 5). A number of methods are available to increase response rates to questionnaires (1, 15). This study found weak evidence that envelope colour may have an effect on the consenting process into a trial, suggesting that white envelopes should be considered when patients are sent an invitation to participate in a study. Further studies are needed to assess the impact of envelope colour on the consenting process in different

healthcare settings and patient populations. With regards to returning questionnaires this study supports previous research in this area, which found that envelope colour has no effect on response rates. When the results of this study were added to the current Cochrane Review, the findings of the review were maintained.

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**Competing interests.** None.

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