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Improving mailings to study members in longitudinal surveys

Evidence from the Millennium Cohort Study

Lisa Calderwood

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Abstract

Typically, longitudinal survey managers send 'keep in touch' mailings to sample members between waves to help minimise non-response through failure to locate individuals at future waves. This paper reports the results from a randomised experiment to improve the effectiveness of the between-wave mailing on the Millennium Cohort Study (MCS), a large-scale birth cohort study in the UK. Our experimental intervention, which involved revising the content of the covering letters used in the 2010 mailing, aimed to increase the proportion of sample members responding to the mailing, particularly among those with higher attrition rates: lower-educated sample members and minority ethnic groups. The re-design involved making the letter easier to read, due to a concern that poor literacy or English language skills may be a barrier to returning the form for some groups. The re-design also changed the style and signatory, motivated by the psychological concepts of reciprocity, linking and helping tendencies. Our main finding, that the design of the covering letter has a minimal impact on the effectiveness of these mailings, will help guide further research in this area and help to inform practice on longitudinal surveys. The results also make an important contribution to the existing evidence on the content of advance letters more generally and thereby have broader applicability for survey research and practice.

Key words: longitudinal; tracking; non-response; attrition; survey methods; between-wave mailing; covering letters; advance letters

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1 Introduction

Attrition is a major concern for longitudinal surveys as it can lead to biased estimates if sample members who drop out over time are systematically different to those who remain in the survey. A particular concern is that if the factors associated with sample loss are themselves associated with the substantive processes that the study is aiming to measure over time, this can lead to biased estimates of change. There are three different sources of attrition in longitudinal studies:

- failure to locate
- failure to make contact having located
- failure to co-operate having contacted (Lepkowski and Couper, 2002).

This paper focuses on the challenge of minimising sample attrition due to failure to locate sample members who move between waves. Although most major longitudinal surveys have developed highly successful tracking procedures for minimising attrition through failure to locate, there is relatively little methodological evidence on the relative success, and cost-effectiveness, of different tracking procedures (Couper and Ofstedal, 2009).

One of the most commonly used tracking procedures on longitudinal surveys is a between-wave mailing to keep in touch with sample members. This is a prospective tracking method designed primarily to prevent loss of contact by keeping contact details up-to-date. Although there is variation between different surveys in the design of these mailings, there is a common requirement for sample members to get in touch with the study to confirm or update their contact information. Previous research has shown that sample members who respond to these mailings are more likely to take part at subsequent waves (Laurie et al., 1999) and that fewer fieldwork resources are required to achieve an interview with them (Couper and Ofstedal, 2009). There has also been some recent experimental research aimed at improving the effectiveness of these between-wave mailings on household panel surveys in the UK and US (Fumagalli, Laurie and Lynn, 2010; McGonagle, Couper and Schoeni, 2011).

This paper reports the results from a randomised experiment to improve the effectiveness of the between-wave mailing for the Millennium Cohort Study (MCS), a large-scale birth cohort study in the UK. In doing so, it extends the existing literature by providing evidence from a different type of longitudinal survey about a different kind of intervention to those explored previously. One of the distinctive features of birth cohort studies is that there tends to be a longer interval between waves of data collection than on household panel surveys. In this context, prospective tracking plays a greater role in minimising attrition and therefore increasing the effectiveness of between-wave mailings is particularly important. Our main finding, that the design of the covering letter has a minimal impact on the effectiveness of these mailings, will help guide further research in this area and help to inform practice on longitudinal surveys. The results also make an important contribution to the existing evidence on the content of advance letters more generally and thereby have broader applicability for survey research and practice.

2 Background

The problem of locating sample members in longitudinal surveys is related to an individual's propensity to move and, for those who do move, to be located. Couper and Ofstedal (2009) offer a theoretical model to help understand the location process. They hypothesise that the main factors affecting the propensity to move are person-level factors such as age, family circumstances, employment and housing situation, and societal-level factors such as the general level of mobility and degree of urbanisation. The propensity to be located, on the other hand, is influenced by survey design factors, such as the interval between waves, the type of tracking procedures, used and structural factors such as the availability of population registers, mail forwarding rules and the portability of phone numbers.

Tracking methods used on longitudinal surveys can be either prospective or retrospective. Retrospective tracking methods involve trying to find sample members who are known to have moved. Commonly used retrospective tracking strategies include attempting to contact the previous address's new occupiers, neighbours and contact persons given by sample members, as well as seeking new addresses in administrative records such as electoral roles. Prospective methods aim to prevent loss of contact with sample members by ensuring that contact information is updated frequently. One such method is to collect future addresses at the interview from sample members who are planning to move. Another method is to make it as easy and cheap as possible for sample members to update their contact information by providing telephone numbers with reverse charging, email addresses and websites. These contact details should appear on all survey materials. Between-wave mailings to keep in touch with sample members are a prospective tracking method used on many longitudinal studies.

The focus of this paper is on the optimal design of between-wave mailings. There are various design considerations that apply to these mailings and variation between surveys in their practice. However, until recently, there has been little or no methodological literature in this area to inform the choice of design. This gap in the evidence has recently been addressed by randomised experiments carried out on between-wave mailings by McGonagle, Couper and Schoeni (2011) using the Panel Study for Income Dynamics (PSID) in the US, and Fumagalli, Laurie and Lynn (2010) using the British Household Panel Survey (BHPS). These studies provided evidence on many important elements of the design of between-wave mailings including:

- the number and spacing of mailings and how this relates to the interval between waves of data collection
- whether an address confirmation card (returned regardless of whether or not the sample members' contact details have changed) is more effective than a change of address card, (returned only if there is new information)
- the use of reminders and incentives to encourage responses
- the inclusion of a newsletter or findings leaflet with the mailing.

Another key feature of between-wave mailings, which was not included in the experiments carried out on PSID and BHPS, is the design and content of the covering letter sent as part of the mailing. Covering letters used in between-wave mailings perform a similar function to

advance letters i.e. they are both designed to promote compliance with a request. The use of advance letters is standard practice on most surveys and there is strong evidence that they are associated with higher response rates (e.g. de Leeuw et al. 2007). There are some general principles regarding the design and content of these letters, which are guided by the theoretical literature on survey participation and are almost universally adopted, for example using headed paper to demonstrate the authority of the request, explaining how sample members were chosen and the purpose of the study. However, the empirical literature on the design and content of these letters is relatively limited. In their meta-analysis exploring the influence of advance letters on response in telephone surveys, de Leeuw et al. (2007) examined the content of advance letters and found that letters that appealed to the psychological concept of reciprocity were most effective at boosting response and co-operation rates.

The applicability of the concept of reciprocity to the decision to take part in a survey was discussed by Groves, Cialdini and Couper (1992) who reviewed a number of concepts from the social psychology of compliance with requests. They argued that the reciprocal nature of relationships between human beings leads individuals to respond positively to requests from other people to do something, including the request to participate in a survey, and that compliance with requests is enhanced if it is viewed as part of a reciprocal exchange. Reciprocity is also likely to be enhanced when the request is given in person by an individual who is known to a sample member, for example an interviewer, and when it is framed in such a way as to emphasise the direct benefit to the person making the request if the other person co-operates. Groves et al. also discuss the importance of authority. Individuals tend to be more likely to comply with requests from authority figures or respected institutions. Their study also looked at the role of 'liking', the idea that people are more likely to do things for other people if they like the person making the request. Whether or not someone likes the person making the request can be related to how similar they see them to themselves. Another of the psychological factors discussed by Groves, Cialdini and Couper (1992) is people's tendency to want to help each other. Individuals will be more willing to respond to the request to participate in a survey if they are told that by doing so they will be helping other people.

A recent paper by Olson, Lepkowski and Garabrant (2011) attempted to address the gap in the empirical literature on advance letters by carrying out an experimental evaluation of the content of different persuasion letters in a follow-up attempt to convert non-responders. They compared the effectiveness of a letter addressing the specific reasons for non-participation at the first stage of the study with a more general letter conveying the benefit to the community as whole that would result from their participation. They found that the type of letter did not make a difference to the response rate in their study. The limited number of empirical studies in this area provides support for an experimental intervention based on the social psychology of compliance, which aims to boost return rates by re-designing covering letters.

There is a positive association between responding to the between-wave mailing and taking part in the next round of the survey. This suggests that another way to increase the effectiveness of between-wave mailings would be to increase return rates from groups that are known to be under-represented in the study due to differential attrition. It is well-established that higher response rates do not necessarily lead to less bias in survey

estimates (see for example Groves and Peytcheva, 2008). In the context of declining response rates and increasing survey costs (see for example de Leeuw and de Heer, 2002), there is increasing debate in the survey methodological research literature about how resources can be targeted most effectively. In this context, one of the key issues for longitudinal surveys is whether targeting interventions on sub-groups with higher attrition rates could be a way of achieving this goal. These concerns provide support for an experimental intervention on between-wave mailings that aim to boost the return rate among groups that are known to have higher attrition rates.

3 Design and implementation of the experiment

3.1 Survey context

The experiment described in this paper was developed for and carried out on the Millennium Cohort Study (MCS). The MCS is following over 19,000 children born in 2000-01 and is one of four national birth cohort studies in the UK. The sample was recruited through records of those in receipt of a universal benefit paid to parents called Child Benefit and is disproportionately stratified and clustered at the level of electoral ward. The stratification was based on UK country and the characteristics of the sampled wards. In Scotland, Wales and Northern Ireland, there were two strata in each country: disadvantaged and advantaged. In England, there were three strata: minority ethnic, disadvantaged and advantaged. The probabilities of selection differed by strata. More details of the MCS sample design can be found in Plewis (2007). The data collection for the study takes place in the home and involves face-to-face interviews with multiple informants in each family. There have been four waves of the study so far: at 9 months (2001-02), age 3 (2003-04), age 5 (2006) and age 7 (2008). The next wave is taking place in 2012 when the children are age 11. Interviews have been sought with up to two co-resident parents at every wave and, from wave two onwards, the child has also been asked to participate directly. The nature and extent of their participation changes at each wave as the children get older.

Unlike on household panel surveys, which tend to have annual or biannual interviews, the interval between waves on birth cohort studies is not fixed, but instead depends on the age of the study members. In the MCS, there were two-year intervals between the first four waves of the study, reflecting the rapid development experienced by children in this age range. The interval between the fourth and fifth wave of the study has increased to four years reflecting the different developmental considerations of this age group. To date, the approach taken on MCS has been to carry out a 'keep in touch' mailing annually between waves. For the first four waves, which were biannual, this meant that there was one mailing between each wave. As the interval between the fourth and fifth wave has increased to four years, there have been three annual mailings between these waves. This is similar to the approach taken on PSID, which has an annual mailing between its biannual waves. As noted earlier, the relatively long gap between waves means that the 'keep in touch' mailings play a particularly important role in tracking sample members compared with household panel surveys with more frequent interviews.

The underlying mobility rate among the study population is also an important determinant of sample loss through failure to locate (Couper and Ofstedal, 2009). Population statistics show that families with young children tend to have high mobility rates (ONS, 2004). Evidence from earlier waves of the MCS has also shown that the study population had high mobility rates when the children were younger but that this is in steady decline as the children get older. Almost four in ten (38 per cent) families had moved between the first two waves (Plewis et al. 2008). This proportion declined to one in four (24 per cent) between waves two and three and one in five (20 per cent) between waves three and four (Ketende and McDonald, 2010). This is consistent with other literature showing that residential mobility decreases after children start school (for example Michielin and Mulder, 2008). Although mobility rates for the study population may be declining, they are still higher than for the

population as a whole. This is another reason why between-wave mailings are particularly important on child cohort studies compared with household panel surveys drawn from the general population. Despite these relatively high levels of mobility, the rates of sample loss due to failure to locate for the MCS have been relatively low due to the success of the tracking procedures used on the study. Plewis et al. (2008) found that at wave two of the study, which was the first follow-up, 'untraced' was the least common reason for non-response, with fewer than one in twenty families in this category. Similarly Calderwood (2010) found that over 90 per cent of families who had moved since wave two were located at wave three.

However, despite the success of its tracking procedures, the MCS has experienced attrition as families drop out of the study over time, as do all major longitudinal studies. Evidence from prior waves has shown that a range of socioeconomic and demographic characteristics are associated with higher attrition rates. In particular, minority ethnic groups and lower educated parents have among the highest drop-out rates (Plewis et al., 2008; Dex and Rosenberg, 2008). This is a particular concern as the MCS is designed to over-represent families from deprived areas, including those with lower education levels and minority ethnic groups. In addition, as parents' education and ethnic group are also strongly related to important outcome variables, such as children's social and educational development (for example Jones and Schoon, 2010), this differential attrition is likely to lead to bias in key survey estimates.

3.2 Design of the experiment

The standard content of the between-wave mailings for the MCS comprises:

- a covering letter and feedback leaflet for parents
- a feedback leaflet for the cohort child
- a return form
- freepost envelope.

As well as the family's address and home telephone number, the return form also includes additional individual level contact information (mobile and work telephone numbers) for up to two co-resident parents, email addresses and details of contact persons. The form is pre-printed on an A4 sheet of coloured paper.

An address confirmation approach is taken, meaning all study members are asked to return the form either to confirm their details are correct or to provide updated information. Up to two postal reminders are sent at roughly six-week intervals to study members who do not return the form. Unlike most household panel surveys, incentives are not used to encourage the return of the form (or during data collection waves of the study). The covering letter is sent on study headed paper and the signatory is the principal investigator (referred to as 'study director'). The parents' leaflet is a professionally designed, 4-page A4 colour booklet containing findings from the study. Since the 2009 mailing, when the children were aged 8, the mailing has also contained a professionally-designed findings leaflet for the children. The reminder mailings contain a covering letter from the principal investigator, an additional copy of the form and another freepost return envelope.

In common with the PSID and BHPS experiments, the main objective of the randomised experiment carried out on the MCS was to increase the effectiveness of the study's between-wave mailings. As an 'address confirmation' approach is used, in practice this meant that the primary aim of the experiment was to increase the proportion of forms that were returned by sample members. We refer to this proportion as the 'return rate'. A secondary aim of the experiment was to increase the return rate from particular groups of sample members who are known to have higher rates of attrition, as this could be expected to reduce bias at future waves. More specifically, the aim was to boost the return rate among sample members who are less well educated and those from minority ethnic groups.

We were concerned that low literacy and poor English language reading skills may be a barrier to returning the form for parents with lower levels of education and those who spoke languages other than English. As noted earlier, one of the design features of the MCS is the over-sampling of disadvantaged areas and areas with higher minority ethnic populations. For this reason, parents with lower levels of education and who speak languages other than English are over-represented in the study population. In particular, we were concerned that these parents may not return the form because they find the covering letters difficult to read and understand. At each wave, all respondent materials are translated into the minority ethnic languages that are most common in the sample and made available when required. This is an integral part of the process of gaining informed consent to survey participation. However, this is not done for the materials used in between-wave mailings primarily because the main purpose of these mailings is to give feedback to study members rather than to secure consent to survey participation. We also felt that the formality of the language might be disengaging for these groups of sample members. The signatory for the covering letters is the study's principal investigator who, as the MCS is run from an academic institution, is a senior academic at professorial grade. The letters use relatively formal and complex language and are quite long.

Our experimental intervention involved revising the content of the covering letters for both the initial and the reminder mailings. The four components of the re-design of these letters are shown in Table 1. The first two components – simplifying the language and reducing the length of the letter – were intended to make the letter easier to read for sample members with lower levels of education and for those who speak languages other than English at home. The second two components – changing the style of the letter from formal to informal and changing the signatory from the study's principal investigator to the study's Cohort Maintenance Officer – were intended to enhance the likelihood of compliance with the request to return the form. Other elements of the design and content of the covering letters, such as the study branding, the broad content and order, were held constant as far as possible between the control and treatment versions of the letters. It was hypothesised that these changes to the covering letters would lead to a higher return rate overall and in particular, among sample members with lower levels of education and those who speak languages other than English at home.

The complexity of the language used in the letters was measured using the Flesch-Kincaid readability score which is one of several scores easily available online (e.g. www.readable.com). Flesch-Kincaid is one of the most commonly used readability scores and has now been integrated into Microsoft Word. It is designed to measure comprehension difficulty. The

core measures of the score are word length and sentence length. Shorter words (i.e. fewer syllables) and shorter sentences (i.e. fewer words per sentence) generates a higher Flesch-Kincaid readability score. The higher the score, the easier the text is to read. The maximum possible score possible is 120, which is achieved when every sentence has a maximum of two one-syllable words. Age-equivalents of the readability score can also be calculated to indicate the age at which most people would be expected to read and understand the text.

Table 1: Design of experiment

Design of letter	<u>Experimental group</u>	
	Control	Treatment
Simplicity: Flesch-Kincaid score (Reading Ease Age)		
- Initial Mailing	74.5 (13-14 years)	91.9 (9-10 years)
- Reminder 1	74.0 (13-14 years)	93.2 (9-10 years)
- Reminder 2	73.9 (13-14 years)	92.3 (9-10 years)
Length: Number of words (proportion)		
- Initial Mailing	473 (1)	315 (0.67)
- Reminder 1	274 (1)	133 (0.49)
- Reminder 2	191 (1)	104 (0.55)
Style	Formal	Informal
Signatory	Principal Investigator	Cohort Maintenance Officer

Table 1 shows that letters used in the treatment group have a much higher readability score than the letters used in the control group (92-92 compared with 73-74). These scores indicate that the letters in the treatment group should be easily understood by most 9- to 10-year-olds, compared with a reading ease age of 13 to 14 for the letters in the control group. Table 1 also shows that the treatment letters were much shorter than the control versions – between half (0.49) and two-thirds (0.67) the length. Reminder letters were considerably shorter than the initial mailing letter in both treatment and control groups. However, it is

notable that although the treatment letter was easier to read and shorter, the control letter had a relatively low reading ease age (13-14 years) and was not particularly long (equivalent to less than one side of A4). This indicates that, even in the control group, the majority of the parents who received the letter should have been able to read it easily. One possible implication of this is that the re-design may be expected to have only a modest impact on increasing the return rate.

The other components to the re-design, such as changes of signatory and style, were motivated by the psychological concepts of reciprocity, liking and helping tendencies. Both the treatment and control letters contain a request from the signatory to send the form back. However the change of signatory meant that on treatment letter this request came from the person who will actually receive and process the forms when they are returned. This is explained in the letter. The intention of this change was to enhance the reciprocal nature of the request to return the form and to strengthen the appeal to the recipients' helping tendencies by emphasising that the signatory would directly benefit from them returning the forms. The change to a more informal style and conversational tone was intended to make the recipient feel that they liked the signatory and, for most recipients, to feel that the signatory was similar to them, which, as discussed earlier, has been shown to be related to individuals willingness to help other people. In addition, it was felt that this change of signatory and style would be particularly appealing to sample members with lower education levels and poorer English-language skills who may feel put off by the formal style of the standard letter and intimidated by the standard signatory. Table 2 below contains an extract from the covering letter that accompanied the initial mailing for both treatment and control groups. Full text of all six letters is included in Appendix A.

Table 2: Extracts from the covering letter for the initial mailing by experimental group

Control	Treatment
We have enclosed a yellow form containing your family's contact details. I would be very grateful if you could take a moment to check (and if necessary correct) your existing details, add any additional information and return the form in the Freepost envelope provided even if all the information is correct and complete.	Please will you check your details on the yellow form and send it back to me? Just write on any changes or additions you want to make. I will type them into our database when I get the form back. Even if all of your details are correct, please send the form back anyway so we know that you've checked them.

It should be noted that changing the signatory in this way is counter to the standard recommendation that advance letters should be signed by an authority figure. However we felt that in the context of an ongoing longitudinal study, this change of signatory would not undermine the authority of the request. Sample members are familiar with the study and will likely perceive requests on behalf of the study as having legitimate authority even if from a different signatory. Furthermore, as the letters were sent on headed paper it was clear that they were 'official' letters from the study.

In order to retain the internal consistency of the treatment letter and to maximise its potential impact, we decided to integrate all four components into a single treatment letter, rather than have a number of different treatment letters each with different re-design components. We felt that the different components of the re-design would be more likely to lead to an increase in return rates in combination than in isolation. We also felt that the different re-design components worked well together. For example it made sense to shorten the letter in combination with simplifying the language. Changing the style was a logical consequence of making it shorter and simpler. Finally the revised letter was more convincing in the ‘voice’ of the Cohort Maintenance Officer than the study’s Principal Investigator. However, as a consequence of this decision, it is not possible to evaluate the impact of these different components independently of each other.

3.3 Implementation of the experiment

The experiment was implemented on the between-wave mailing carried out in 2010. Over 15,500 families were included across three phases of mailing out. Table 3 below gives an overview of the mailing.

Table 3: Overview of the 2010 between-wave mailing

	Phase 1 (n=5052)	Phase 2 (n=8640)	Phase 3 (n=1961)
Initial Mailing	February	July	September
Reminder 1	April	August	November
Reminder 2	June	October	-

As explained earlier, the 2010 mailing was the second annual mailing since the last wave of data collection in 2008. In total, 15,653 families were included. The criteria for inclusion in the mailing were families where the study child had not died, emigrated or permanently refused and who were not permanently untraced or known to have moved away from the most recent address we have for them. In order to equalise the spacing between contacts, these mailings usually take place about 12 months after the previous contact, which may have been an interview or the previous mailing. As interviewing on the study takes place over a 12-month period, the mailings are typically carried out in three phases spread across the year. In common with other longitudinal studies, some families re-join the MCS after missing one or more waves of data collection. For this reason the mailing included some families who had not taken part in the most recent wave of data collection but who were expected to be issued for subsequent data collection waves. The first two phases of the mailing contained only families who took part in the 2008 data collection wave and the third phase contained only families who did not take part in the last survey. This was primarily for operational reasons. The families who took part last time were processed more quickly following the 2008 survey, which influenced the timing of the subsequent mailings. Up to two reminder mailings were sent to families who had not returned their form at approximately six week intervals within each phase. As Table 3 shows, the families in Phase 3 only received

one reminder mailing, compared to the two reminders sent in Phases 1 and 2. It was felt that sending further requests to families who had not taken part last time may jeopardise further their participation in future waves of the study.

Study families were randomly assigned to an experimental group at the start of each phase of the mailing with half of the cases allocated to the treatment and control groups respectively. The randomisation was carried out in SPSS and involved the generation of a random value between 0 and 1 for each case and the assignment of cases to one of two groups depending on the random value. The experimental treatment was applied to all cases, regardless of their prior participation history, and to the reminder mailings as well as the initial mailing. Appendix B shows the characteristics of families by experimental group to demonstrate that the randomisation was implemented robustly. Overall, there were almost 8,000 cases in each of the groups, giving the experiment a high level of statistical power to detect significant differences in return rates between the treatment and control groups.

4 Results

This section firstly examines whether there are significant differences by experimental group on the overall return rate to evaluate whether the primary aim of the experiment – to increase the return rate – was achieved. It then explores variations in the return rate by education level and languages spoken at home and by experimental group in order to evaluate whether the secondary aim of the experiment – to increase the return rates from lower educated sampled members and those who speak languages other than English at home – was achieved. Finally, it examines the composition of those who returned their forms, in relation to education and languages spoken, to evaluate the impact of the experiment on reducing bias. Cases from the different phases of the mailing were pooled during the analysis. Education and languages spoken at home are taken from the most recent wave of data collection in 2008 and for this reason the analysis of these characteristics is restricted to the sub-sample who took part in that survey. As almost nine in ten of those included in the mailing had taken part in the most recent wave, this restriction does not result in a big reduction in the analytical sample sizes in the experimental groups. As noted earlier, the MCS involves interviews with up to two co-resident parents. We use the educational level of the ‘main respondent’ who is almost always the natural mother of the cohort member. Education is measured using a derived variable that maps the respondent’s highest academic or vocational qualifications (reported across all prior waves) to an equivalent level on the standard scale used in the UK for National Vocational Qualifications (NVQs). The highest level, Level 5, is equivalent to a postgraduate degree and the lowest level, Level 1, is equivalent to the minimum high school leaving qualification (i.e. at least one General Certificate of Secondary Education [GCSE] awarded at grade D-G). Language spoken at home is a self-reported household-level measure usually given by the main respondent on behalf of the family.

4.1 How did the return rate vary by experimental group?

Table 4 shows that there was no statistically significant difference between the experimental groups in the proportion returning their forms (55 per cent for the control group and 56 per cent for the treatment group, p -value >0.3). The primary aim of the experiment, to increase the return rate, was not achieved as the treatment did not succeed in increasing the proportion of sample members returning their form. However, there was a statistically significant difference in the proportion returning their forms early. By early, we mean that they returned the form after receiving the initial mailing only (without the need for any reminders). A higher proportion of those in the treatment group returned their forms early compared with the control group (34 per cent compared with 31 per cent, p -value <0.005). This was an unexpected finding as we did not hypothesise that the re-design of the letter would have an impact on the early return rate.

Table 4: Return rates by experimental group

	Control	Treatment	p-value
	%	%	
Returned	54.8	55.5	>0.3
Returned early	31.2	33.7	<0.005
Sample size	7826	7827	

Note: Design-based F tests were used to test the null hypothesis of no relationship between experimental group and each of the return rates. The analysis was carried out using the `svy` commands in STATA to adjust for the sample design.

4.2 What was the relationship between the return rate and prior wave participation? Did this vary by experimental group?

Table 5 shows that, as expected, in both treatment and control groups sample members who took part in the most recent wave were much more likely to return their forms than those who did not. This relationship was observed for the early return rate as well as the overall return rate. However, there was no statistically significant difference between experimental groups in the overall return rate for either participants or non-participants at the most recent wave. In relation to the early return rate, the difference between experimental groups observed for the total sample was also observed for those who had taken part in the most recent wave, that is higher early return rate in the treatment group (38 per cent compared with 35 per cent, p-value <0.001). For those who had not taken part in the most recent wave, there was also no statistically significant difference between experimental groups in the proportion of early returners. In fact, Table 5 indicates a relationship in the opposite direction. There was a higher early return rate in the control group, but this is not statistically significant. Overall, these results are as expected as it was not hypothesised that the treatment would have a differential impact related to prior participation.

Table 5: Return rates by prior participation and experimental group

	Took part in most recent wave			Did not take part in most recent wave		
	Control	Treatment	p-value	Control	Treatment	p-value
	%	%		%	%	
Returned	61.2	61.1	>0.2	10.4	9.1	>0.7
Returned early	34.8	37.8	<0.001	6.2	4.7	>0.1
Sample size	6848	6848		978	979	

Note: Design-based F tests were used to test the null hypothesis of no relationship between experimental group and each of the return rates. The analysis was carried out using the `svy` commands in STATA to adjust for the sample design.

We now turn our attention to the secondary aim of the experiment: to increase the return rate among lower-educated groups and families who do not speak English at home.

4.3 What was the relationship between the return rate and education and languages spoken at home? Did this vary by experimental group?

Table 6 shows the return rate, both overall and for early returners, by experimental group and by education and language. The analysis sample is restricted to families who took part in the most recent wave, at which education and language are measured.

Table 6: Return rates by experimental group and education and language

	Control	Treatment	Sample size	p-value
	%	%		
Returned				
Main respondent's educational qualifications				
No qualifications	34.1	42.4	291	<0.001
Overseas qualifications only	45.2	46.7	385	>0.7
Level 1 (lowest)	46.6	48.2	951	>0.6
Level 2	59.2	57.2	3,622	>0.2
Level 3	63.2	61.1	2,082	>0.2
Level 4	73.1	75.9	4,162	<0.05
Level 5 (highest)	75.7	77.0	930	>0.6
Languages spoken at home				
English only	62.8	63.1	11,280	>0.6
Other languages	50.8	55.4	1,876	<0.01
Returned early				
Main respondent's educational qualifications				
No qualifications	15.3	22.0	291	<0.001
Overseas qualifications only	22.9	22.3	385	>0.9
Level 1 (lowest)	25.5	26.0	951	>0.8
Level 2	32.7	33.3	3,622	>0.6
Level 3	36.5	36.5	2,082	>0.9
Level 4	43.6	50.1	4,162	<0.001
Level 5 (highest)	46.0	49.6	930	>0.2
Languages spoken at home				
English only	36.5	39.9	11,280	<0.01
Other languages	24.4	29.2	1,876	<0.05

Note: Design-based F tests were used to test the null hypothesis of no relationship between experimental group and each of the return rates within education level and language groups. The analysis was carried out using the svy commands in STATA to adjust for the sample design.

In relation to education, Table 6 shows a clear gradient in return rates by education level for both the treatment and control group. Those in the lower-educated groups were much less likely to return the form than those with higher levels of education. This pattern is apparent in both the treatment and control groups and for both overall and early return rates. However, the experimental intervention did have had a positive impact on the return rates among the lower-educated groups. Among those with no qualifications, the overall return rate is much higher in the treatment group than the control group: 42 per cent compared with 34 per cent, a difference of eight per cent higher. This difference emerges among the early returners where the early return rate in the treatment group (22 per cent) is seven per cent higher than in the control group (15 per cent). Both of these differences are statistically significant (p-values <0.001). This shows that the impact of the treatment was strongest at the initial mailing with the reminder mailings having relatively less impact. The impact they do have is in the same direction, that is a higher return rate in the treatment group leading to the gap between the treatment and control group increasing by one per cent after the reminders. A similar pattern is also observed among those with overseas qualifications and Level 1 qualifications, though the differences between treatment and control groups are not statistically significant.

Table 6 also shows that the experimental intervention had the unintended effect of boosting return rates among the higher educated groups. Specifically, those with Level 4 qualifications, which is a degree or an equivalent vocational qualification, have higher overall and early return rates in the treatment group than in the control group. However, unlike for those with no qualifications, the gap that emerges between treatment and control groups in the early return rate narrows after the reminder mailings. For those with Level 4 qualifications, the early return rate is six per cent higher in the treatment group than the control group (50 per cent compared with 44 per cent, p-value <0.001). This is almost as large as the equivalent gap (7 per cent) among those with no qualifications. However, after the reminder mailings this gap between the experimental groups narrows to three per cent (76 per cent in the treatment group compared with 73 per cent in the control group, p-value <0.05) but remains statistically significant. The same pattern is observed for the highest educated group, Level 5 (a post-graduate degree or equivalent), though it is not statistically significant.

In summary, there is clear evidence that the treatment has had a positive and statistically significant impact on the overall and early return rate for those with no qualifications and, unexpectedly, for those with degree-level qualifications. The difference that emerges between experimental groups in the early return rate is largely driven by those with degree-level qualifications as they are the largest group. The reason that the difference in the return rate disappears after the reminder mailings is because those with degree-level qualifications respond more favourably to the reminders in the control group than in the treatment group. Although the overall return rate remains higher in the treatment group compared with the control group, this gap is no longer big enough to have a statistically significant impact on the overall return rate. Among the no qualifications group, there remains a large and statistically significant gap in the return rate after the reminders, but as this group is very small this has a negligible impact on the overall return rate.

In relation to languages spoken at home, Table 6 shows that sample members who speak languages other than English at home were more likely to return the form in the treatment group than the control group. This was true of both after the initial mailing only (29 per cent compared with 24 per cent, p-value <0.05) and after the reminder mailings (55 per cent compared with 51 per cent, p-value <0.01). These differences are significant and in the direction predicted by the experiment, that is they show that the treatment letter has led to higher return rates among those who speak a language other than English at home. Among those who speak English only at home, the early return rate is significantly higher in the treatment group compared with the control group (39 per cent compared with 37 per cent, p-value <0.01) but this difference disappears after the reminder mailings (63 per cent for both treatment and control groups). This mirrors the pattern observed for the overall sample. This difference has a negligible impact on the overall return rate, as with education, although there is a significant difference in the overall return rate for those who speak languages other than English at home because this group make up only a small proportion of the sample.

Overall, these findings show that the secondary aim of the experiment, to increase the return rate in the treatment group among those with lower levels of education and those who do not speak English at home, was achieved. There was also an unexpected increase in the return rate in the treatment group among those with higher level of education. Despite these statistically significant increases in the return rate among these particular groups of sample members, overall there is no difference in the return rate by experimental group.

4.4 What impact do these different rates have on the composition of returners? How does this vary by experimental group?

Table 7 shows the impact of the different return rates on the composition of returners in relation to education and language spoken at home. It compares the distribution of education and language among returners to the distribution for everyone who was included in the mailing, what the distribution of education and language among returners would look like if everyone returned their forms or if there was no difference in return rates by education and language. The intention is to show the extent to which those with lower education and who speak a language other than English at home are under-represented among returners and to evaluate whether the experimental treatment succeeded in improving the representation of these groups.

Table 7: Education and language for returners by experimental group compared with the overall sample

	Returners		Overall sample
	<u>Control</u>	<u>Treatment</u>	
	%	%	%
<i>Main respondent's educational qualifications</i>			
No qualifications	6.2	7.9	11.4
Overseas qualifications only	2.0	2.2	2.8
Level 1 (lowest)	5.2	5.5	7.0
Level 2	25.8	24.2	26.5
Level 3	15.7	15.0	15.2
Level 4	36.5	37.0	30.4
Level 5 (highest)	8.6	8.3	6.8
<i>Sample size</i>	<i>4188</i>	<i>4248</i>	<i>13,690</i>
<i>Languages spoken at home</i>			
English only	88.7	87.7	86.3
Other languages	11.3	12.3	13.7
<i>Sample size</i>	<i>4188</i>	<i>4250</i>	<i>13,696</i>

In relation to education, Table 7 shows that higher-educated groups (Level 4 and 5) are over-represented and the lowest educated group (no qualifications) is under-represented among returners in both the treatment and control groups. For the lowest educated, this difference is smaller in the treatment group compared with the control group, indicating that the treatment has improved the representation of the lowest-educated group among the returners. For example, those with no qualifications comprise six per cent of returners in the

control group, eight per cent of returners in the treatment group and around 11 per cent overall.

In relation to languages spoken at home, in both the treatment and control groups those who speak English only at home are over-represented among returners and those who speak other languages at home are under-represented. The proportion of returners who speak languages other than English at home is slightly higher among the treatment group (12 per cent) than the control group (11 per cent) and thereby closer to the overall proportion in the sample (14 per cent).

Although these differences are not statistically significant, they provide evidence that the treatment had led to an improvement in the representation of those with lower educational qualifications and those who speak languages other than English among the returners. Given the positive association between responding to between-wave mailings and taking part in subsequent waves of data collection, these findings indicate that the treatment may help to reduce bias at future waves.

5 Discussion and conclusions

This paper set out to explore whether the effectiveness of between-wave mailings on longitudinal surveys can be improved using evidence from a randomised experiment carried out on the Millennium Cohort Study (MCS), a large-scale birth cohort study in the UK. The aim of the experiment was to increase the overall proportion of returns to the mailing and, in particular, from groups with higher levels of attrition: those with lower levels of education and minority ethnic groups. As sample members who respond to these mailings are more likely to take part at subsequent waves, increasing the effectiveness of these mailings can reasonably be expected to lead to lower rates of attrition and a reduction in bias at future waves. The experimental intervention involved the re-design of the covering letters used in the mailing. As this is a different type of intervention from those explored in the research literature to date, the results make an important contribution to knowledge on this topic. Given that these covering letters perform a similar function to advance letters, the results also contribute to evidence in this area and thereby have broader applicability for survey research and practice.

The results show that the experimental treatment did not succeed in boosting the return rate overall. However, it did succeed in increasing the return rate among the lowest-educated sample members and those who speak languages other than English at home. The treatment also led to unexpected increases in the proportion of sample members returning their form early and in the return rate among one of the more highly-educated groups.

Our main finding, that the design of the covering letters had a minimal impact on the effectiveness of the between-wave mailing, provides reassuring evidence to longitudinal survey managers. It implies that return rates on these mailings are unlikely to be strongly influenced by the design of the covering letter included in the mailing. It also provides indicative evidence that the willingness of sample members to take part in surveys more generally may not be strongly influenced by the design of advance letters. This is consistent with other recent experimental literature on the design of letters (Olsen et al., 2011). However, the context of this particular experiment is also important to bear in mind when considering the implications of these findings. Crucially the control letter used in the experiment was well-designed and followed best practice guidelines. It is possible that if the control letter was poorly designed, the re-design treatment may have led to an increase in return rates. Additionally, although significant revisions were made to the treatment letter, the recipients were sample members in an established longitudinal survey who were used to receiving such letters annually. This may have meant that they were less susceptible to the influence of these changes. Moreover, almost 9 in 10 of the recipients had taken part in the most recent survey wave, implying that many of them were likely to co-operate with the mailing request regardless of the design of the letter. For these reasons, it is perhaps unsurprising that the re-designed treatment letter had no impact on the overall return rate.

This finding does not, however, imply that the design of covering letters and advance letters is unimportant. Indeed, the evidence from our experiment clearly showed that the treatment letter led to an increase in the return rate from the lowest-educated groups and those who speak languages other than English at home. Although it is not possible to attribute this increase to a particular component of the re-design, this finding implies that letters that are

easier to read and understand may lead to enhanced rates of compliance with the request contained in them from these particular groups of sample members, who are often under-represented in surveys. We recommend that survey managers incorporate readability testing into the design and development of advance letters (and other survey materials) in order to ensure, as far as possible, that those with literacy and language problems are able to read and understand the information provided to them. As well as potentially having a beneficial impact on response rates among these groups, which could in turn lead to a reduction in bias in survey estimates, it is also clearly important from an ethical perspective to ensure that all sample members are able to understand information about the survey.

One possible concern with this recommendation is that simplifying the language in advance letters may make some sample members, perhaps those who are more highly educated, less willing to comply with the request because they feel they are being 'patronised' by the language of the letter being 'dumbed-down'. If this is a valid concern, it may imply that simplified letters should be tailored to specific groups likely to have difficulty reading rather than sent to all sample members. However, the evidence from our experiment does not provide any empirical support for this concern as return rates in the treatment group were not lower among sample members with higher educational qualifications. Indeed, among those with degree-level qualifications, the second highest level, the return rate was higher in treatment group.

Another interesting finding from our experiment was the increase in the early return rate in the treatment group. Although this was not anticipated, it can be explained by, and is not inconsistent with, our experimental hypotheses. It is plausible to argue that the informal and reciprocal nature of the request to return the form would have greater impact on early returns, (as was observed) and that a more formal approach from a more authoritative signatory would have greater impact on reminder mailings (as was observed). This is also consistent with experimental evidence from the research literature showing that, in the context of a postal survey, sending a pre-notification letter led to an increased rate of early returns but no overall increase in response rates (Taylor and Lynn, 1998). Furthermore, the increase in the proportion of forms returned early has other benefits for survey practice. It enables contact details to be updated more quickly and leads to a reduction in the cost of the reminder mailings. In the context of a large-scale study such as the MCS, these cost and time-savings are relatively trivial. However, these results may have useful practical implications for surveys wishing to maximise return rates in a limited time period or with limited resources for reminder mailings.

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Appendix A: Full text of covering letters

Initial mailing: Control

Dear Parent or Guardian,

Your child is one of the 19,000 special children born in the UK in 2000/2001 whose lives are being followed by the Child of the New Century Study. The study is continuing to build up a unique picture of modern childhood.

Keeping your contact details up-to-date

We want to keep the contact details we have for your family up-to-date and complete so that we can get in touch with you about future surveys and send you findings from previous surveys. We have enclosed a yellow form containing your family's contact details. I would be very grateful if you could take a moment to check (and if necessary correct) your existing details, add any additional information and return the form in the Freepost envelope provided **even if all the information is correct and complete**. If you don't send back the form, we will write to you again as we won't know whether or not you've received it.

Findings from the Age 5 and Age 7 Surveys

The enclosed leaflets contain some findings from the recent surveys. The leaflet for parents looks at how children's lives have changed over the past 30 years and the leaflet for children covers some of the things they told us about themselves when they were aged 7. I hope that you and your child find them interesting. Additional copies can be downloaded from the study website (www.childnc.net).

Children of the 21st Century: the first 5 years

The second book documenting the lives of the children of the 21st century has now been published. Covering the first five years of life, it examines children's home and family backgrounds and stages of development as they start school. The authors also consider the implications of their findings for family policy and health and social services. A summary of each of the 14 chapters in the book is available on the study website.

The publishers, Policy Press, have kindly agreed to offer a 30% discount on the price of this book for study families, which means that you can buy it for £17.99 instead of £24.99. If you wish to buy a copy, please use the enclosed order form to get this special price. Alternatively, you may wish to ask your local library to purchase a copy of the book. We are sorry that we are not able to provide you with a free copy but due to the large number of families in the study we cannot afford to do this.

Thank you for the help you have given us so far with this important study. We very much hope that you will be willing to help us again in the future. The next survey will take place in 2012. We'll write to you again next year.

With kind regards,



Professor Heather Joshi OBE
Study Director

Initial mailing: Treatment

Hello again from the Child of the New Century!

My name's Peter Deane. I'm the cohort maintenance officer for the study. It's my job to try to find you if you move house and to keep our records of your name and address up-to-date. I hope that you and your family are keeping well.

Please will you check your details on the **yellow form** and send it back to me? Just write on any changes or additions you want to make. I will type them into our database when I get the form back. Even if all of your details are correct, please send the form back anyway so we know that you've checked them. If you don't send the form back, we'll send you another letter as we won't know whether or not you've got this one.

Kate Smith and Lisa Calderwood are the survey managers who work on the study. They've written the **leaflets** that we've sent to you. We hope you and your child like them! You can print off extra copies from the study website (www.childnc.net).

Professor Heather Joshi is the director of the study. Along with some other academics, she's been busy writing a **book all about your children**. It's called 'Children of the 21st Century: the first 5 years'. We can't send you a copy for free I'm afraid. We can offer a 30% discount so it costs £17.99 instead of £24.99. If you want to buy a copy, there is an order form enclosed. You can also ask your local library to order a copy. A summary of each of the 14 chapters in the book is available on the study website for you to read and print off if you want.

That's all from me for now. The next survey will be 2012 but we'll write to you again next year.

Take care!



Peter Deane

Reminder 1: Control

Dear Parent or Guardian,

A short while ago we sent you and your child a leaflet containing some of the latest findings from Child of the New Century study. I hope that you found them interesting.

Keeping your contact details up-to-date

With the leaflet, we also sent you a yellow form containing your family's contact details. We asked you to check the details on the form and return it to us even if they were correct and complete. **Our records show that we have not yet received this form back from your family.**

I am enclosing another copy of the yellow form. I would be very grateful if you could take a moment to check your existing details, correct them if necessary and add any additional information. Please return the form **even if all the information is correct and complete** in order to confirm that the contact details we have for you are up-to-date. If you don't send back the form, we will write to you again as we won't know whether or not you've received it.

It is important that we keep your contact details up-to-date and complete so that we can get in touch with you about future surveys and send you findings from previous surveys.

If you have recently returned the form, I am sorry for troubling you again.

Thank you very much for your continuing help with this important study. The next survey will take place in 2012 and we very much hope that you will be willing to take part again. We'll write to you again next year.

With kind regards,



Professor Heather Joshi, OBE
Study Director

Reminder 1: Treatment

Hello from the Child of the New Century!

I am writing to you again because I haven't yet had a **yellow form** back from your family. If you've sent it recently, feel free to ignore this letter. I've sent you another copy of the form in case you've misplaced it. Please will you check your details and send it back to me? Just write on any changes or additions you want to make. Even if all of your details are correct, please send the form back anyway so we know that you've checked them. If you don't send it back, I'll write to you again as I won't know whether or not you've got this one.

Thanks very much. We'll be in touch with another update next year.

Take care!

A handwritten signature in cursive script that reads "Peter Deane".

Peter Deane

Reminder 2: Control

Dear Parent or Guardian,

Keeping your contact details up-to-date

I have enclosed a **yellow form** with your family's contact details. Please check (and if necessary correct) the details on this form, add any additional information and return the form to us **even if all the information is correct and complete**.

We've sent you this form twice in the last few months. I am sending it again as our records show that we have not yet received it back. If you have recently returned it, I am sorry for troubling you again.

It is important that we keep your contact details up-to-date and complete so that we can get in touch with you about future surveys and send you findings from previous surveys. We hope that you and your child enjoyed reading the leaflets we sent you earlier this year.

The next survey will take place in 2012 and we very much hope that you will be willing to take part again. We'll write to you again next year.

Thank you very much for your continuing help with this important study.

With kind regards,



Professor Heather Joshi, OBE
Study Director

Reminder 2: Treatment

Hello from the Child of the New Century!

Please will you check your details on the **yellow form** and send it back to me? Just write on any changes or additions you want to make. Even if all of your details are correct, please send the form back anyway.

We've sent you this form twice in the last few months. I am sending it again as we haven't yet had it back from your family. If you've sent it recently, I'm sorry for bothering you again.

Thanks very much. We'll be in touch with another update next year.

Take care!

A handwritten signature in cursive script that reads "Peter Deane".

Peter Deane

Appendix B: Randomisation

Table B1: Key variables by experimental group

	Control	Treatment
<i>Experimental group</i>¹	7,826 (50.0%)	7,827 (50.0%)
<i>Participated at most recent wave</i>²	6,848 (87.5%)	6,848 (87.5%)
<i>Main respondent's educational qualifications</i>³		
No qualifications	766 (11.2%)	792 (11.6%)
Overseas qualifications only	188 (2.8%)	197 (2.9%)
Level 1 (lowest)	463 (6.8%)	488 (7.1%)
Level 2	1,825 (26.7%)	1,797 (26.3%)
Level 3	1,039 (15.2%)	1,043 (15.2%)
Level 4	2,092 (30.6%)	2,070 (30.3%)
Level 5 (highest)	474 (6.9%)	456 (6.7%)
<i>Sample size</i>	6,847	6,843
<i>Languages spoken at home</i>³		
English only	5,918 (86.4%)	5,902 (86.2%)
Other languages	930 (13.6%)	946 (13.8%)
<i>Sample size</i>	6,848	6,848

¹ Percentage of all cases.

² Percentage of all cases within experimental group.

³ Percentage of cases which took part at most recent wave within experimental group.

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