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Text messages and reminder calls in student and alumni web surveys

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Abstract

The impact of text messages (SMS) and reminder calls on response to web surveys was experimentally tested using a crossed design on two surveys in the Quality Indicators for Learning and Teaching suite of studies for the Australian Government Department of Education: the May 2018 Graduate Outcomes Survey and the 2018 Student Experience Survey. SMS and telephone reminders were associated with increased probability of response for both surveys. Telephone reminders were more effective than SMS on a per-contact basis. However, taking into account the higher cost of a reminder call than a reminder SMS, sending an SMS reminder was more cost-effective. This research adds to the limited literature on the effectiveness of reminder calls and SMS for surveys.

Acknowledgments

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We gratefully acknowledge the universities and non-university higher education institutions that participated in the May 2018 Graduate Outcomes Survey and the 2018 Student Experience Survey, and the respondents to these surveys from participating institutions.

This paper presents independent analysis and interpretation by the authors, and may not represent the views of the Department of Education or participating institutions.

Acronyms

ANU	Australian National University
CSRM	Centre for Social Research & Methods
GOS	Graduate Outcomes Survey
NUHEI	non-university higher education institution
QILT	Quality Indicators for Learning and Teaching
SES	Student Experience Survey
SMS	short message service (i.e. text message)
SRC	Social Research Centre

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Tables and figures

1   Introduction

The Social Research Centre (SRC) administers the Quality Indicators for Learning and Teaching (QILT) suite of surveys on behalf of the Australian Government Department of Education.[1] As part of response maximisation efforts for two of the QILT surveys – the Student Experience Survey (SES) and the Graduate Outcomes Survey (GOS) – reminder calls are made, and reminder text messages (SMS) are sent to cases with the lowest response propensities, with the goal of minimising nonresponse bias in a total survey error framework (see, for example, Groves et al. 2009 on total survey error). Nonresponse bias refers to differences between respondents and nonrespondents on variables of interest from a survey. Minimising nonresponse bias is important to ensure that survey estimates are as accurate as possible.

This paper describes two experiments conducted on SES and GOS to establish the effectiveness or otherwise of these efforts. Although reminder calls and SMS had been used in previous rounds of GOS and SES, their effects had not been quantified. The experiments were conducted to ensure that there was good evidence of the effectiveness of methods used in these QILT surveys.

1.1   Previous research

1.1.1   SMS as a medium for communications in surveys

In this section, we review previous research on the use of SMS as an adjunct to surveys conducted in other modes. We do not address the use of SMS as a survey mode in its own right.

Web

There has been limited research on SMS for web survey pre-notification, invitations and reminders. Bosnjak et al. (2008) found that SMS pre-notification with email invitations outperformed other combinations in a study of students enrolled at a German university; reminders were not tested.

Mavletova and Couper (2014) found no differences in participation rates between SMS and email invitations in a survey on a Russian access panel, although break-offs were significantly higher for SMS invitations. A mode-switching design was used by Mavletova and Couper (2014:507), with the email invitation–SMS reminder condition having the highest participation rate (60.9%) and the email invitation–email reminder having the lowest participation rate (44.1%). In combination, these results suggest that mode switching – as SES and GOS do for low-propensity cases – is more effective than a single-mode approach.

Mail

Similarly, there has been very limited research on the use of SMS in mail surveys. Virtanen et al. (2007) tested SMS reminders against postcard reminders in Finnish mail surveys, finding significantly higher response rates for the SMS condition (62.8%) than the postcard condition (56.3%) in a survey of the Finnish working-age population living in rural areas. The other two experiments reported on by Virtanen et al. (2007) address an SMS reminder compared with no additional reminder: unsurprisingly, the SMS reminder performed significantly better than no additional reminder.

Telephone surveys

The track record of SMS pre-notification in telephone surveys is mixed. Effects on response rates are not consistent. Cooperation rates appear to be more consistently improved by pre-notification messages than do response rates. Our discussion is divided between Australian studies and the rest of the world.

We first address Australian studies. Dal Grande et al. (2016) reported significantly higher response rates for the SMS group (12.4%) than the no SMS group (7.7%). In contrast, Pennay et al. (2016) found marginally significant ($P \leq 0.1$) increases in response rate for SMS pre-notification (33.3%) compared with no pre-notification (30.2%) in one survey,

but no significant difference in a second test (the response rate of the SMS pre-notification group was 15.9%, compared with 17.2% for the no pre-notification group). Significantly higher cooperation rates were found by both Dal Grande et al. (2016) and Pennay et al. (2016): Dal Grande et al. achieved a cooperation rate of 28.6% for the SMS group and 16.0% for the no SMS group, while Pennay et al. reported cooperation rates of 70.7% for the SMS group and 60.3% for the no SMS group in one survey, and 52.0% for the SMS group and 39.3% for the no SMS group in the other survey.

A similarly mixed pattern applies outside Australia. Kunz and Fuchs (2012) achieved higher response rates when using SMS for screening (23%) than for no screening (13%) in Germany. The United States record is less successful. Brick et al. (2007) found no difference in response rates between the SMS pre-notification group (26.2%) and the no SMS group (26.5%). Steeh et al. (2007) found no difference in response rates between the SMS pre-notification group (24.2%) and the no SMS group (23.2%), but marginally higher ($P \leq 0.1$) cooperation rates at 49.7% for the SMS pre-notification condition compared with 41.5% for the no SMS condition.

1.1.2   SMS and telephone reminders in other contexts

In contrast to the rather scant literature on the use of SMS in surveys, there is a robust literature on the use of SMS reminders in health care that suggests that both SMS and telephone reminders are effective, and that SMS reminders are more cost-effective. Text reminders increased the rate of health care appointments: the relative risk ratio stated in terms of appointment attendance was estimated to be 1.14 in a systematic review by Gurol-Urganci et al. (2013:38), and calculated at the same level based on median baseline and intervention rates reported in a systematic review by Hasvold and Wootton (2011:361). Similarly, a systematic review by Schwebel and Larimer (2018:99) found that 86% of appointment reminder experiments were successful. Gurol-Urganci et al. (2013:38) reported no difference between the effectiveness of telephone and SMS reminders. Cost for SMS reminders was reported be lower by both Gurol-Urganci et al. (2013:14) and Hasvold and Wootton (2011:360–361). The evidence from systematic reviews on preventive health behaviours

(Vodopivec-Jamsek et al. 2012) and facilitating self-management of long-term illnesses (de Jongh et al. 2012) is limited, because of a paucity of qualifying studies ($N = 4$ for both papers). Probably as a result of a greater availability of studies due to a more recent publication date and more inclusive eligibility criteria, the systematic review by Schwebel and Larimer (2018:99) found a much larger set of 'medical compliance studies' ($N = 97$), with a high degree of success of interventions (85%).[2]

1.2   Regulatory environment

A major factor in the limited research conducted on the use of SMS in surveys is the restrictive United States regulatory context, as described by Lavrakas et al. (2010:77):

> Under the federal Telemarketing Consumer Protection Act of 1991 (TCPA, 47 U.S.C. 227), which is enforced by the U.S. Federal Communications Commission (FCC), automatic telephone dialing systems cannot be used to contact a cell phone without the user's 'prior expressed consent' – a content-neutral requirement that applies to all calls, including survey research calls. The TCPA defines 'automatic telephone dialing system' as equipment that has the capacity to store or produce telephone numbers to be called using a random or sequential number generator, in conjunction with dialing such numbers. As clarified by the FCC's 2003 report, this includes all forms of autodialers and predictive dialers, and applies to intrastate calls, interstate calls and calls from outside the United States.

This acts to rule out the use of SMS in most survey contexts in the United States.

Australia does not have the level of restrictions on sending SMS that is seen in the United States (ACMA 2019). 'Factual' messages are exempt from provisions of the Spam Act 2003 (Cwlth) regarding prior permission and an unsubscribe link. Factual messages are those that do not contain commercial material, where the name, logo and contact details of the business are not considered to be commercial material. The requirement to identify the sender does apply. As a matter of good practice, the SRC includes opt-out instructions in all electronic communications, even though this is not required by law.

2   Method

2.1   Quality Indicators for Learning and Teaching surveys

The QILT program consists of the following surveys:

- Student Experience Survey (SES). The SES is administered to every commencing (typically first-year) and completing (typically third-year) student at Australian universities and non-university higher education institutions (NUHEIs) each August, with a small September collection. In 2018, the population stood at 719 671. The survey collects information on student satisfaction and experiences. The SES is administered via web mode.[3] The primary mode of survey invitations and reminders is email from the SRC.[4] Cases with low response propensity receive reminder calls and SMS. Response propensities are calculated based on the model from the prior wave, where predictors of response include age, sex and other demographics, mode of attendance, and degree type and level.

- Graduate Outcomes Survey (GOS). The GOS is administered to all university and NUHEI graduates, ideally 4–6 months after the date of degree completion. It is fielded three times a year: in February, May and November. The GOS collects information on satisfaction with various aspects of degrees, preparation for careers, employment status and salary. In 2018, the population surveyed stood at 298 363. The GOS is administered via web mode.[5] The primary mode of survey invitations and reminders is email from the SRC.[6] Cases with low response propensity receive reminder calls and SMS. Response propensities are calculated based on the model from the prior wave, where predictors of response include age, sex and other demographics, mode of attendance, and degree type and level.

- Graduate Outcomes Survey – Longitudinal (GOS-L). The GOS-L is administered approximately 3 years after the GOS. We do not further describe it because no experiments were fielded on it. (See SRC [2019] for further details.)

- Employer Satisfaction Survey (ESS). The ESS is administered in parallel with the GOS. Employed respondents to the GOS are asked to supply contact information for their supervisor. (See SRC [2019] for further details.)

2.2   Experimental design

2.2.1   Graduate Outcomes Survey

The GOS experiments described took place on the May 2018 GOS. The study budget allowed for reminder calls to 40 000 cases and sending 30 000 SMS. The 50% of the sample with the lowest response propensity was assigned to the experiment. Response propensity was estimated from a model fit on the prior wave.[7] Cases were randomised into a 2 × 3 condition design where the reminder calls conditions were no reminder call and reminder call, and the SMS conditions were to receive 0, 1 or 2 SMS. Because a small number of cases (about 7.5%) had a landline telephone only, these cases were randomised into no reminder call or reminder call conditions.

The assignments were as shown in Table 1. Cases were implicitly stratified by response propensity; cases with mobile phones were systematically assigned to treatment conditions by repeated applications of a 60-case 'stripe' that was designed to ensure approximately equal average response propensity for all conditions.

2.2.2   Student Experience Survey

A similar set-up was used in the subsequent experiments on the SES 2018, administered in August. The study budget allowed for reminder calls to 196 238 cases and sending 227 940 SMS.

Based on the results from GOS, it was decided to expand the number of SMS conditions to four: 0, 1, 2 or 3 SMS. The 3 SMS condition was based on the observation that there was a linear relationship between SMS and response propensity for the 0–2 SMS conditions in the GOS experiment, at least for cases that did not receive a reminder call. We wanted to see whether linearity persisted as the number of SMS sent increased to 3. Cases with mobile numbers were randomised into a 2 × 4 condition design where the reminder call conditions were no reminder call and reminder call, and the SMS conditions were to receive 0, 1, 2 or 3 SMS. Unlike the GOS design, cases were unevenly allocated across the 1+ SMS conditions, with approximately half to the 2 SMS condition and the remainder evenly split across the 1 and 3 SMS conditions. This was due to concern that 3 SMS would show diminishing marginal returns.

The assignment of cases is shown in Table 2. Cases were implicitly stratified by response propensity; cases were systematically assigned to treatment conditions by repeated applications of a 1000-case 'stripe' that was designed to ensure approximately equal average response propensity for all conditions.

Table 1 **Graduate Outcomes Survey experimental design**

SMS sent	No reminder call	Reminder call	Total
Mobile			
0	27 000	27 000	54 000
1	5 000	5 000	10 000
2	5 000	5 000	10 000
Total	37 000	37 000	74 000
Landline			
0	3 000	3 000	6 000
Total	3 000	3 000	6 000

Table 2 **Student Experience Survey experimental design**

SMS sent	No reminder call	Reminder call	Total
Mobile			
0	25 938	82 268	108 206
1	9 956	28 034	37 990
2	19 912	57 902	77 814
Total	9 956	28 034	37 990
Landline			
0	4 500	4 500	9 000
Total	4 500	4 500	9 000

2.3 Communication wording

2.3.1 Graduate Outcomes Survey

Telephone reminder

Reminder calls were made between 9 and 26 May 2018 (9–26 days post-launch for most cases). Up to two contact attempts were made. A voicemail message was left, where possible.

An answering machine message was left on the first attempt. The wording was as follows:

> *Good afternoon/evening. My name is <NAME> and I'm calling on behalf of the Australian Government Department of Education and Training from the Social Research Centre. I'm calling to follow up on email invitations we've sent to you for the Graduate Outcomes Survey. We are asking graduates to go online and complete it in the next few days. By completing, you will be entered into the weekly prize draws to win up to $1000. Thanks in advance; your time is really appreciated.*

When a live respondent was reached, the following script was used:

> *<INSTITUTION> and the Australian Government Department of Education and Training from the Social Research Centre.*
>
> *May I please speak to <Full name>?*
>
> *This call may be monitored or recorded for quality assurance purposes. Please tell me if you don't want this to happen.*
>
> **(DISPLAY IF CALLING A MOBILE) May I just check whether or not it is safe for you to take this call at the moment?*
>
> **(RE-INTRODUCE IF NECESSARY)**
> *Good afternoon/evening. My name is <NAME> and I'm calling on behalf of <INSTITUTION> and the Australian Government Department of Education and Training from the Social Research Centre.*
>
> *I'm calling to follow up on email invitations we've sent you for the Graduate Outcomes Survey.*
>
> **(DISPLAY IF PARTIAL = 0, SURVEY NOT STARTED) We are seeking feedback*

> *about what you are doing now that you've completed your studies at <INSTITUTION>. Your feedback will help facilitate the ongoing improvement of <INSTITUTION> and the quality of Australian higher education in general. Your feedback is very important and we would appreciate your participation.*
>
> *The survey is currently open for <INSTITUTION>, and we are asking graduates to go online and complete it in the next few days. By completing, you will be entered into the weekly prize draws to win up to $1000.*
>
> **(DISPLAY IF PARTIAL = 1, SURVEY STARTED BUT NOT COMPLETED) It looks like you've started the survey and, based on the section you are up to, it should only take about <minutes> to finish off.*
>
> *What would be the best email address to send the invitation to?*
>
> **IF NEEDED**: *All information will be used for research purposes only, will remain completely confidential and it will not identify you in any way.*
>
> **IF NECESSARY**: *Your telephone number is provided to us under strict privacy provisions by <INSTITUTION> and will be used only for this research.*
>
> *We will send you an email with a link to complete the online survey. Just to confirm, what is your current email address?*
>
> **(DISPLAY IF EMAILBOUNCE = 1, EMAIL BOUNCED) The email we sent to that address last week bounced. Do you have an alternative email we might be able to try?*
>
> *Thank you so much for being willing to take part in the Graduates Outcome Survey; the email should arrive in the next half hour.*
>
> *Just to let you know, you may also receive another email in the next day or so as part of the normal reminder schedule. But, once you've completed, you will not receive any further follow-up.*
>
> *Your feedback plays a significant role in enhancing Australian higher education. If*

you would like further information, I can give you the details of some websites if you like:

www.gos.edu.au

www.srcentre.com.au/gos

Just in case you missed it, my name is <NAME> from the Social Research Centre and this survey is being conducted on behalf of the Australian Department of Education and Training.

SMS

Initial SMS

The SMS text differed by whether the individual had started the survey or not. It was sent on 12 May 2018 (12 days post-launch for most cases). Those who had not started the survey received the following SMS:

*Dear %%E403**graduate%%, you're invited to complete the Graduate Outcomes Survey! Combine your opinions with other Australian grads in the largest national study of education %%srvylink_sms%% Optout:1*

Those who had started the survey received the following SMS:

*Dear %%E403**graduate%%, if you've started the Graduate Outcomes Survey please be sure to combine your opinions with other Australian grads in the largest national study of education %%srvylink_sms%% Optout:1*

Second SMS

The second SMS was only sent for cases in the 2 SMS treatment condition who had not completed the survey. It was sent on 19 May 2018 (19 days post-launch for most cases). Again, the wording differed by whether the recipient had started the survey or not. Those who had not started the survey were sent the following SMS:

*Dear %%E403**graduate%%, the Graduate Outcomes Survey is still open! Combine your opinions with other Australian grads in the largest national study of education %%srvylink_sms%% Optout:1*

Those who had started the survey were sent the following SMS:

*Dear %%E403**graduate%%, if you've started the Graduate Outcomes Survey please be*

sure to combine your opinions with other Australian grads in the largest national study of education %%srvylink_sms%% Optout:1

2.3.2 Student Experience Survey

Telephone reminder

Reminder calls were made between 6 and 29 August 2018 (5–28 days post-launch for most cases). Up to two contact attempts were made. A voicemail message was left, where possible.

An answering machine message was left on the first attempt, where a voicemail was reached. The message left was:

Good afternoon/evening. My name is <NAME> and I'm calling on behalf of the Australian Government Department of Education and Training from the Social Research Centre. I'm calling to follow up on email invitations we've sent to you for the Student Experience Survey. We are asking students to go online and complete it in the next few days. By completing, you will be entered into the weekly prize draws to win up to $1000. Thanks in advance; your time is really appreciated.

When a live respondent was reached, the following script was used:

Good afternoon/evening. My name is <NAME> and I'm calling on behalf of <INSTITUTION> and the Australian Government Department of Education and Training from the Social Research Centre.

May I please speak to <Full name>?

This call may be monitored or recorded for quality assurance purposes. Please tell me if you don't want this to happen.

*(DISPLAY IF CALLING A MOBILE) May I just check whether or not it is safe for you to take this call at the moment?

(RE-INTRODUCE IF NECESSARY)
Good afternoon/evening. My name is <NAME> and I'm calling on behalf of <INSTITUTION> and the Australian Government Department of Education and Training from the Social Research Centre.

I'm calling to follow up on email invitations we've sent you for the Student Experience Survey.

*(DISPLAY IF PARTIAL = 0, SURVEY NOT STARTED) We are seeking feedback about how your course is going at <INSTITUTION>. Your feedback will help facilitate the ongoing improvement of <INSTITUTION> and the quality of Australian higher education in general. Your feedback is very important, and we would appreciate your participation.

The survey is currently open for <INSTITUTION>, and we are asking students to go online and complete it in the next few days. By completing, you will be entered into the weekly prize draws to win up to $1000.

*(DISPLAY IF PARTIAL = 1, SURVEY STARTED BUT NOT COMPLETED) It looks like you've started the survey and, based on the section you are up to, it should only take about <minutes> to finish off.

What would be the best email address to send the invitation to?

IF NEEDED*: All information will be used for research purposes only, will remain completely confidential and it will not identify you in any way.*

IF NECESSARY*: Your telephone number is provided to us under strict privacy provisions by <INSTITUTION> and will be used only for this research.*

We will send you an email with a link to complete the online survey. Just to confirm, what is your current email address?

*(EMAILBOUNCE = 1, EMAIL BOUNCED) The email we sent to that address last week bounced. Do you have an alternative email we might be able to try?

Thank you so much for being willing to take part in the Student Experience Survey; the email should arrive in the next half hour.

Just to let you know, you may also receive another email in the next day or so as part of the normal reminder schedule.

But, once you've completed, you will not receive any further follow-up.

Your feedback plays a significant role in enhancing Australian higher education. If you would like further information, I can give you the details of some websites if you like:

www.ses.edu.au – provides limited further information about the survey and a link to access the survey

www.srcentre.com.au/ses – provides more detailed information about the survey

www.srcentre.com.au/sestcs – provides terms and conditions of the prize draw

www.qilt.edu.au – the QILT website helps you compare official study experience and employment outcomes data from Australian higher education institutions.

Just in case you missed it, my name is <NAME> from the Social Research Centre and this survey is being conducted on behalf of the Australian Department of Education and Training.

SMS

Initial SMS

The initial SMS was sent on 13 August 2018 (12 days post-launch for most cases). The SMS text differed by whether the individual had started the survey or not. Those who had not started the survey received the following SMS:

Hi %%E403**student%%, a reminder from the Social Research Centre that the SES is still open! Join other Australian students in the largest national study of education %%srvylink_sms%% Optout:1

Those who had started but not completed the survey received the following SMS:

Hi %%E403**student%%, a reminder from the Social Research Centre that if you've started the SES to please complete your survey as part of Australia's largest national study of education %%srvylink_sms%% Optout:1

Second SMS

The second SMS was only sent for cases in the 2 or 3 SMS treatment conditions who had not

completed the survey. It was sent on 23 August 2018 (22 days post-launch for most cases). Again, the wording differed by whether the recipient had started the survey or not. Those who had not started the survey were sent the following SMS:

*Hi %%E403**student%%, remember the SES closes next week. Completing the SES is the best way to ensure your unique experiences count %%srvylink_sms%% Optout:1*

Those who had started but not completed the survey were sent the following SMS:

*Hi %%E403**student%%, remember the SES closes next week. If you've started the SES please complete your survey to ensure your unique experiences count %%srvylink_sms%% Optout:1*

Third SMS

The third SMS was only sent for cases in the 3 SMS treatment condition who had not completed the survey. It was sent on 27 August 2018 (26 days post-launch for most cases). Again, the wording differed by whether the recipient had started the survey or not. Those who had not started the survey were sent the following SMS:

*Hi %%E403**student%%, we've sent you an email to say the final prize draw for the SES closes tonight! Complete the SES now to be entered into the final draw and join other students in the largest national study of education %%srvylink_sms%% Optout:1*

Those who had started but not completed the survey were sent the following SMS:

*Hi %%E403**student%%, we've sent you an email to say the final prize draw for the SES closes tonight! If you've started the SES, please complete it now to be entered into the final draw %%srvylink_sms%% Optout:1*

3 Results

For both the GOS and SES experiments, we conducted analysis using logistic regression models. Logistic regression models are used for variables with two possible outcomes – here, responding to the survey or not.[8] The models are unweighted; weights are unnecessary as both GOS and SES were censuses of the entire eligible population, and all eligible cases are included in the models.

It is important to recall that the modelled results are based on experimental assignments. A person assigned to the reminder call condition would not have received a reminder call had they responded early, before the commencement of reminder calls.

3.1 Graduate Outcomes Survey

3.1.1 Response propensity

The results of the GOS experiments are shown in Table 3, and response propensities are illustrated in Figures 1 and 2. Graduates for whom a mobile telephone number was available were more likely to complete the survey than those for whom only a landline number was available, regardless of other contact attempts made. There was a positive and linear effect of SMS on the propensity for survey response. Being assigned to the reminder call condition was associated with a greater increase in the propensity to respond than for an SMS, indicating that reminder calls were more effective than SMS. (See, however, discussion of cost-effectiveness below.) Combining reminder calls and SMS resulted in a slight diminution of the marginal effectiveness of the components; to coin a phrase, the whole was slightly less than the sum of its parts. In spite of the diminished marginal effectiveness of combining reminder calls with SMS, response propensity was highest for the combination of 2 SMS and a reminder call.

In large part, allocation of experimental conditions appeared to work. There were few significant differences for response propensity between the model with the control and a model without the control (not shown). There were significant but small differences for the coefficients for mobile telephone status, reminder calls and the intercept.[9] There were no significant differences for the coefficients for numbers of SMS sent or the interaction of SMS and reminder calls.

3.1.2 Cost-effectiveness

We calculated the marginal cost per completed interview over what would have been achieved with no reminder call and no SMS; see Table 4. These costs only take into account the cost of sending SMS and making reminder calls. Despite the greater effectiveness of reminder calls in encouraging survey completion (the odds of a completed survey increase by a factor of 0.675 for a reminder call compared with a factor of 0.134 for 1 SMS), the much lower costs per SMS mean that the most cost-effective reminder strategies are those that involve sending SMS without making reminder calls; sending 2 SMS is the most cost-effective. Thus, the marginal cost per completed interview is lower for 1 SMS and no reminder call ($20.50) than for a reminder call and no SMS ($27.45).

3.2 Student Experience Survey

3.2.1 Response propensity

The SES experimental results are shown in Table 5, and response propensities are illustrated in Figures 3 and 4. As with the GOS, having a mobile telephone number was associated with a higher probability of completing the survey compared with having only a landline number. There was a positive and linear effect of SMS on the propensity for survey response, even with the maximum number of SMS sent being increased

Table 3   Odds ratios of the logistic regression of survey response on selected variables, Graduate Outcomes Survey

Variable	Odds ratio	Standard error
Telephone status		
Landline	Reference	
Mobile	1.499***	0.055
Number of SMS sent		
0 SMS	Reference	
1 SMS	1.134***	0.044
2 SMS	1.297***	0.049
Reminder call		
No reminder call	Reference	
Reminder call	1.675***	0.034
Interaction of SMS and reminder call		
1 SMS × reminder call	0.890*	0.047
2 SMS × reminder call	0.862*	0.044
Response propensity	1 580 081.5***	481 606.2
Intercept	0.074***	0.003
	80 000	
Log likelihood	−41 218.200	
Likelihood ratio χ^2	3113.993	
Degrees of freedom	7	
P	<0.001	

* = statistically significant at the 5% level; *** = statistically significant at the 0.1% level

to 3. Once again, being assigned to the reminder call condition was associated with a greater increase in the propensity to respond than for an SMS, indicating that reminder calls were more effective than SMS. Unlike the model for the GOS, however, there was no diminution of the marginal effectiveness when combining SMS and reminder calls; the interaction was not significant.[10] In spite of the diminished marginal effectiveness of combining reminder calls with SMS, response propensity was highest for the combination of 2 SMS and a reminder call.

Table 4   Marginal cost per completed interview (Graduate Outcomes Survey)

| Reminder call	SMS sent	Marginal cost ($)
No	1	20.50
No	2	19.00
Yes	0	27.45
Yes	1	31.52
Yes	2	29.04

Note: Graduates for whom a mobile phone number was available.

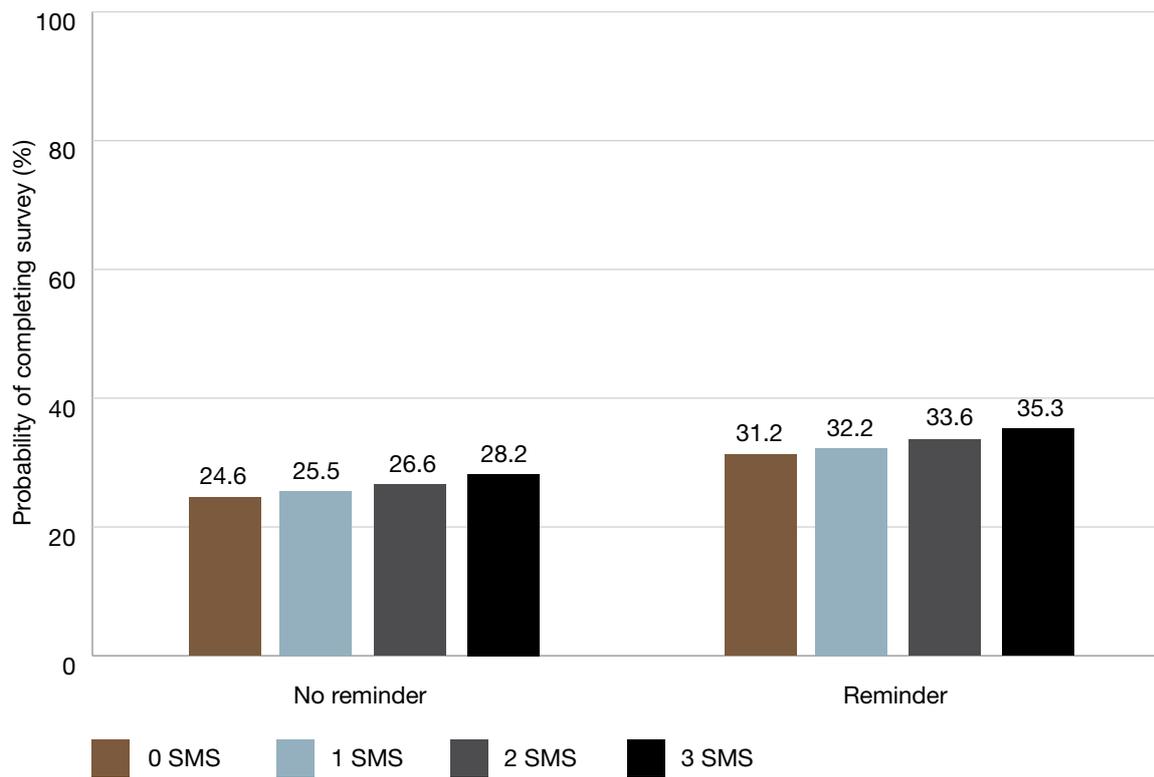**Figure 1   Mobile response propensity, Graduate Outcomes Survey**
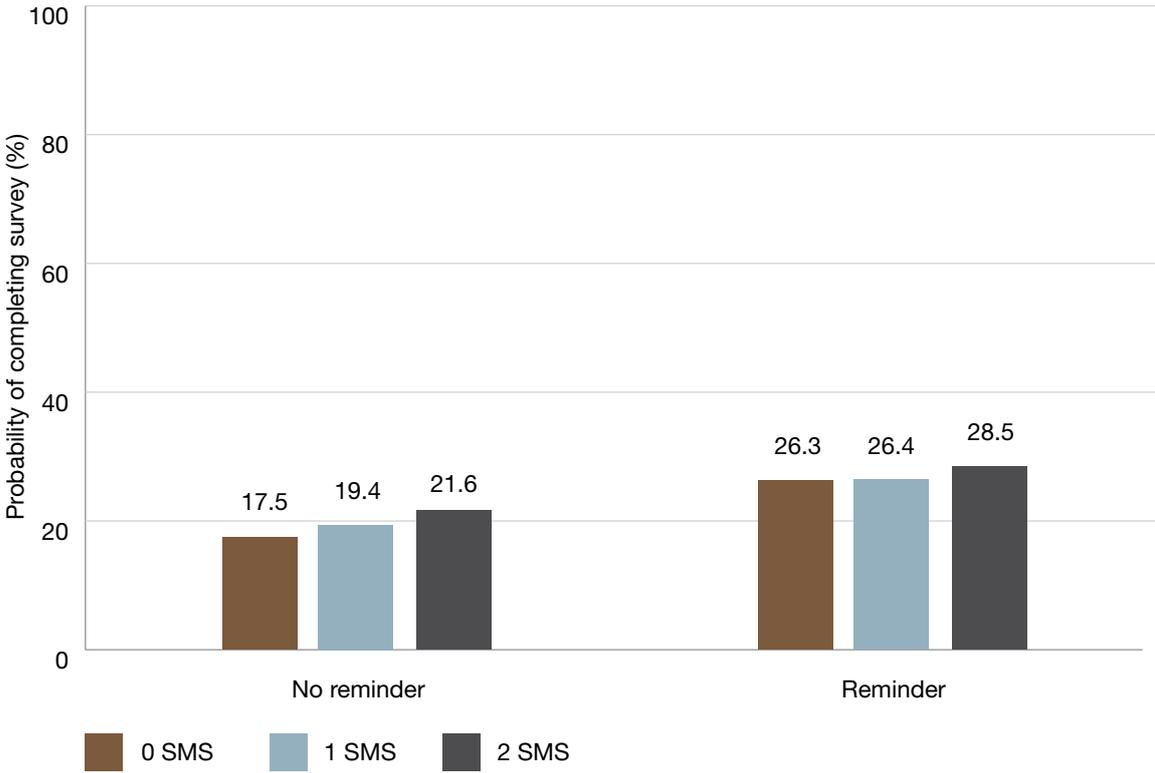
Note: Probability of completing survey calculated holding response propensity at its mean.

Figure 2   Landline response propensity, Graduate Outcomes Survey
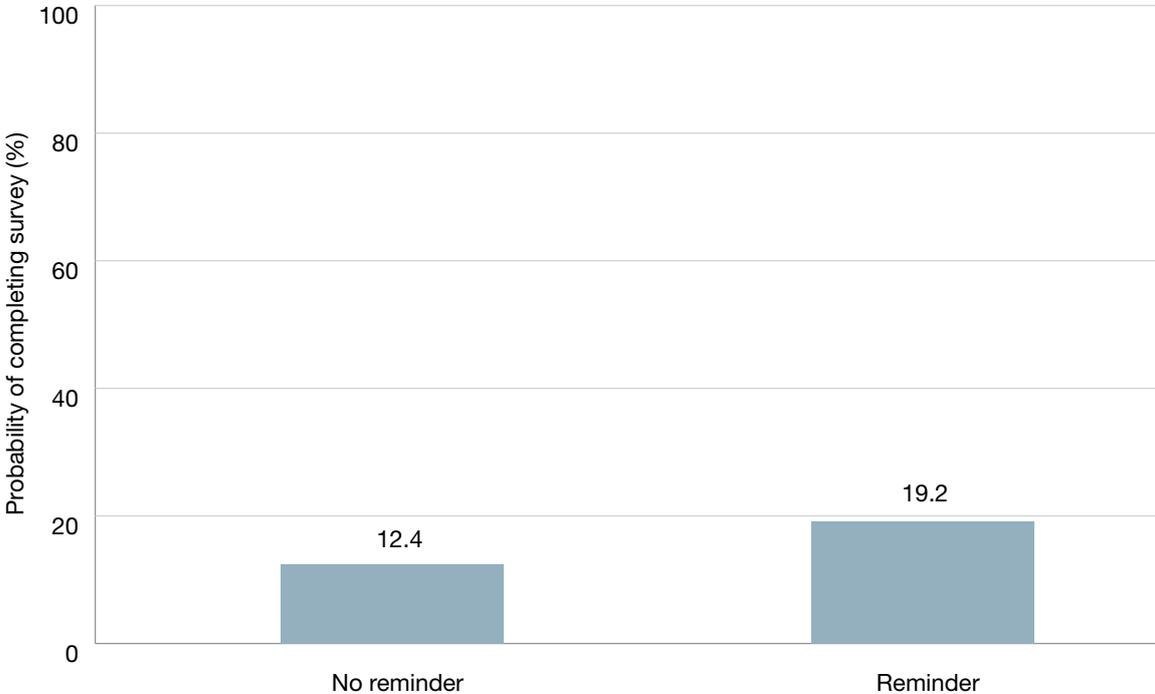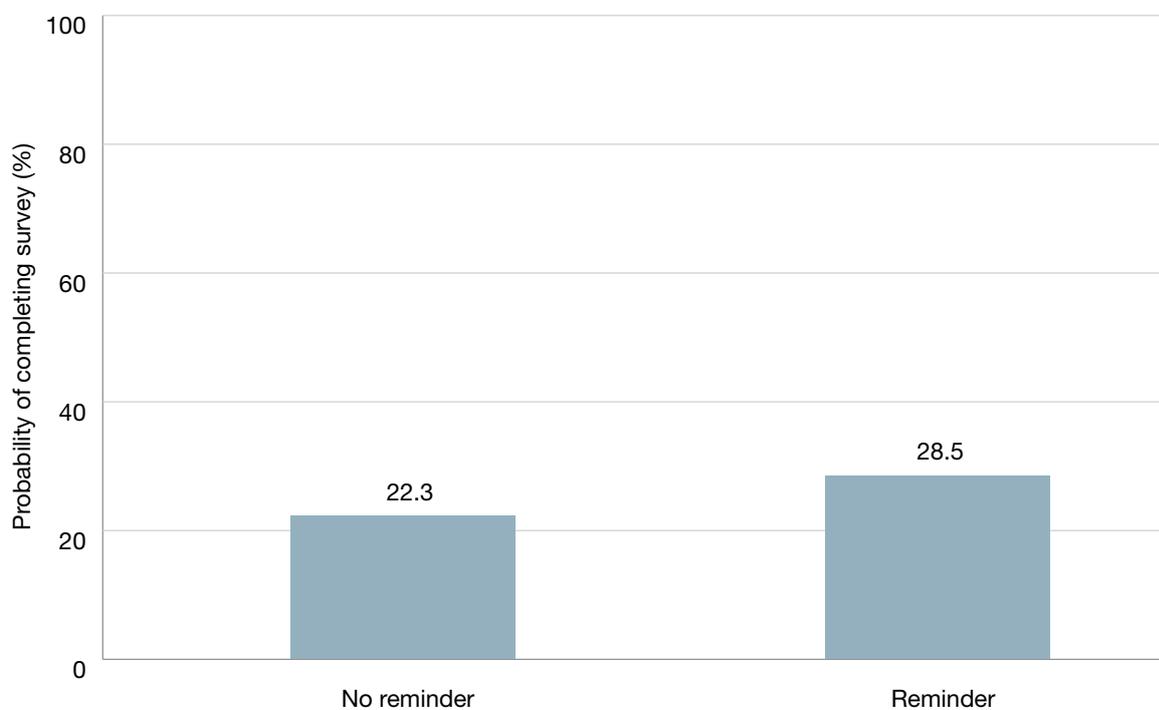

Note: Probability of completing survey calculated holding response propensity at its mean.

Figure 3   Mobile response propensity, Student Experience Survey

Note: Probability of completing survey calculated holding response propensity at its mean.

Figure 4   Landline response propensity, Student Experience Survey

Note: Probability of completing survey calculated holding response propensity at its mean.

Table 5   Odds ratios of the logistic regression of survey response on selected variables, Student Experience Survey

Variable	Odds ratio	Standard error
Telephone status		
Landline	Reference	
Mobile	1.136***	0.029
Number of SMS sent		
0 SMS	Reference	
1 SMS	1.049***	0.014
2 SMS	1.112***	0.011
3 SMS	1.203***	0.016
Reminder call		
No reminder call	Reference	
Reminder call	1.203***	0.014
Response propensity	13.824***	0.758
Intercept	0.107***	0.003
n	271 000	
Log likelihood	−163 974.19	
Likelihood ratio χ^2	3741.13	
Degrees of freedom	6	
P	<0.001	

*** = statistically significant at the 0.1% level

3.2.2 Cost-effectiveness

As with the GOS, we calculated the marginal cost per completed interview over what would have been achieved with no reminder call and no SMS; see Table 6. These costs only take into account the cost of sending SMS and making reminder calls. As with the GOS, the lowest cost per completed interview is for the combination of a reminder call and sending the maximum number of SMS. However, unlike the GOS, there was little difference in cost-effectiveness compared with sending the maximum number of SMS *and* making a reminder call.

Table 6   Marginal cost per completed interview (Student Experience Survey)

Reminder call	SMS sent	Marginal cost ($)
No	1	33.41
No	2	30.07
No	3	25.06
Yes	0	27.30
Yes	1	27.67
Yes	2	26.70
Yes	3	25.27

Note: Students for whom a mobile phone number was available.

4 Discussion

This study is one of the first into SMS and telephone reminders for web surveys in Australia, and one of the first for tertiary students and recent graduates in the world.

We found that calls made by interviewers were more effective than sending an SMS. Experienced interviewers are able to address reasons for reluctance to respond and provide tailored responses to these concerns (Groves et al. 1992, 2000). The social nature of contact with an interviewer is also likely to have an influence in favour of live interviews: it is more difficult to refuse a person than to ignore an unsolicited SMS. It is also likely that the SES and the GOS benefit from the close match with the SRC's interviewer pool, which is largely composed of university students. Although the SES and GOS populations include many mature-age students and graduates, respectively, the bulk of the sample is still of traditional university age, with median ages of 22 for the SES and 24 for the GOS. Younger adults are generally difficult for surveys to reach, and are typically underrepresented.

The costs of live interviewing are, however, much higher than for sending SMS. Taking into account the cost differentials, the use of SMS will result in more completed surveys under a fixed budget. Despite the higher marginal cost per completed survey, live telephone reminders retain a place in surveys of student and alumni populations. For example, when minimum sample sizes are required to enable reporting on subpopulations, the greater effectiveness of interviewers may be needed to achieve reporting quotas for small subpopulations. Interviewers may also help to reduce total survey error when targeting underrepresented populations that may cause serious nonresponse error.

A major factor in the success of both SMS and telephone reminders is likely to be that the mode used differs from those of most contact attempts (i.e. email). This is a recurrent feature of the reported success of SMS used in other survey experiments.

This paper makes a significant contribution to the scant literature on SMS and telephone reminders for web surveys. There has been only limited research on the use of SMS for reminders in web surveys (Mavletova & Couper 2014); we were unable to identify any experiments on the use of telephone reminders for web surveys. We believe that this paper is also the first to draw attention to a parallel literature on the effectiveness of reminder methods for medical appointments and other uses in medicine. Our findings are of particular relevance for surveys of Australian higher education students and recent graduates of higher education institutions. They are also likely to apply to similar populations in other countries. In Australia and elsewhere, web surveys are a common mode for surveying higher education students and alumni of higher education institutions, giving this research wide applicability. Thanks to the large sample sizes of the studies that we used to test the use of SMS and telephone reminders, we had high statistical power.
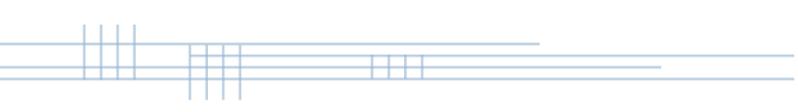
5 Conclusion

The effectiveness of using SMS and telephone reminders to encourage response to web surveys of university students and recent graduates was tested in an Australian setting, where the primary mode of invitations and reminders was email. In both cases, SMS reminders increased response propensity; the increase in response propensity was linear through the 2 or 3 SMS sent to graduates and students, respectively. Telephone reminders also increased response propensity and were considerably more effective than SMS reminders in increasing survey response. For the GOS, there was a negative interaction between SMS and telephone reminders, with the combination of SMS and telephone reminders increasing response rates less than would be expected from the effects of each alone, although the combined effectiveness of SMS and telephone reminders together was still greater than either alone. For the SES, no interaction effect was observed. Taking cost into account, SMS reminders were more effective in increasing response propensity per dollar spent.

Because of the encompassing nature of the SES and GOS sample, this research is generalisable to students and recent graduates of Australian higher education institutions. It may be more cautiously applied to higher education students and recent higher education graduates in other countries, or similar populations in Australia, such as students at high schools, at vocational and technical education institutions, or in apprenticeships. We are cautiously optimistic that the findings are more broadly applicable, given the existence of a large literature on the effectiveness of SMS reminders and their greater cost-effectiveness compared with telephone reminders in a nonsurvey context: health care reminders and, to a lesser extent, other behavioural interventions in a health care setting.

Notes

1. At the time of the research described in this paper, the department was known as the Australian Government Department of Education and Training. It subsequently became the Department of Education after machinery of government changes in the aftermath of the 2019 federal election. We have preserved the name of the department in quotes from study material.

2. All three studies do, however, follow the PRISMA Statement (Moher et al. 2009).

3. Universities and NUHEI may choose – at additional cost – to have the SRC administer surveys via computer-assisted telephone interviewing (CATI) after the close of the field period. These CATI completes are not counted as completed interviews in this analysis.

4. Some institutions also post links to the SES on their learning management system (LMS) and send reminder emails either directly or via the LMS. The survey is also advertised by the SRC on Facebook to selected demographics. Institutions additionally use a wide variety of communications strategies to encourage students to complete surveys, including posters on campus, tiles on institutional websites, slides distributed to faculties to promote the survey in lectures, mailed letters, social media posts and advertisements, and distribution of promotional items.

5. As with the SES (see Note 3), universities and NUHEI may choose – at additional cost – to administer surveys via CATI after the close of the field period. These CATI completes are not counted as completed interviews in this analysis.

6. Institutions could also communicate with their alumni to ask them to complete the GOS. Institutional strategies include sending letters and emails, as well as social media posts and advertisements.

7. Logistic regression of survey response on period (February, May, October), Aboriginal or Torres Strait Islander status, citizenship (Australian, New Zealand, other), mode (internal, external, multimodal, Open Universities Australia), attendance (full-time, part-time), English-speaking background (yes, no), disability (yes, no), study area (agriculture and environmental studies, architecture and built environment, business and management, communications, computing and information systems, creative arts, dentistry, engineering, health services and support, humanities, culture and social sciences, law and paralegal studies, medicine, nursing, pharmacy, psychology, rehabilitation, science and mathematics, social work, teacher education, tourism, hospitality, personal services, sport and recreation), course level (undergraduate, postgraduate coursework, postgraduate research), type of institution (non-university higher education institution, university), gender (male, female), remoteness (Major Cities of Australia, Inner Regional Australia, Outer Regional Australia, Remote Australia, Very Remote Australia), Socio-Economic Indexes for Areas Index of Relative Disadvantage 2016 SA1 decile.

8. See Long (1997), among many other references, for more details on logistic regression models.

9. The coefficient for mobile was 0.405 controlling for response propensity and 0.353 without the control for response propensity. The coefficient for reminder calls was 0.516 controlling for response propensity and 0.501 without the control. The intercept was –2.606 controlling for response propensity and –1.857 without the control. Reported values are coefficients, not odds ratios. Where the coefficient is β, the odds ratio is simply e^{β}.

10. $\chi^2 = 2.70$; DF = 3; $P = 0.441$.

References

ACMA (Australian Communications and Media Authority) (2019). *Spam: industry obligations*, ACMA, Canberra, https://www.acma.gov.au/theACMA/spam-industry-obligations.

Bosnjak M, Neubarth W, Couper MP, Bandilla W & Kaczmirek L (2008). Prenotification in web-based access panel surveys: the influence of mobile text messaging versus e-mail on response rates and sample composition. *Social Science Computer Review* 26(2):213–223.

Brick JM, Brick PD, Dipko S, Presser S, Tucker C & Yuan Y (2007). Cell phone survey feasibility in the US: sampling and calling cell numbers versus landline numbers. *Public Opinion Quarterly* 71(1):23–39.

Dal Grande E, Chittleborough CR, Campostrini S, Dollard M & Taylor AW (2016). Pre-survey text messages (SMS) improve participation rate in an Australian mobile telephone survey: an experimental study. *PLoS ONE* 11(2):e0150231.

de Jongh T, Gurol-Urganci I, Vodopivec-Jamsek V, Car J & Atun R (2012). Mobile phone messaging for facilitating self-management of long-term illnesses (review). *Cochrane Database of Systematic Reviews* 12:CD007459.

Groves RM, Cialdini RB & Couper MP (1992). Understanding the decision to participate in a survey. *Public Opinion Quarterly* 56(4):475–495.

——, Singer E & Corning A (2000). Leverage-saliency of survey participation: illustration and description. *Public Opinion Quarterly* 64(3):299–308.

——, Fowler FJ, Couper MP, Lepkowski JM, Singer E & Tourangeau R (2009). *Survey methodology*, 2nd edn, Wiley, Thousand Oaks, USA.

Gurol-Urganci I, de Jongh T, Vodopivec-Jamsek V, Atun R & Car J (2013). Mobile phone messaging reminders for attendance at healthcare appointments (review). *Cochrane Database of Systematic Reviews* 12:CD007458.

Hasvold PE & Wootton R (2011). Use of telephone and SMS reminders to improve attendance at hospital appointments: a systematic review. *Journal of Telemedicine and Telecare* 17(7):358–364.

Kunz T & Fuchs M (2012). Improving RDD cell phone samples: evaluation of different pre-call validation methods. *Journal of Official Statistics* 28(3):373–394.

Lavrakas PJ, Blumberg S, Battaglia M, Boyle J, Buskirk T, DiSogra C, Dutwin D, Fahimi M, Fienberg H, Fleeman A, Guterbock TM, Hall J, Keeter S, Kennedy C, Link M, Piekarski L, Shuttles CD, Steeh C, Tompson T & ZuWallack R (2010). *Cell phone task force report: new considerations for survey researchers when planning and conducting RDD telephone surveys in the US with respondents reached via cell phone numbers*, American Association for Public Opinion Research, Oakbrook Terrace, USA.

Long JS (1997). *Regression models for categorical and limited dependent variables*, Sage, Thousand Oaks, USA.

Mavletova A & Couper MP (2014). Mobile web survey design: scrolling versus paging, SMS versus e-mail invitations. *Journal of Survey Statistics and Methodology* 2(4):498–518.

Moher D, Liberati A, Tetzlaff J, Altman DG & The PRISMA Group (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Medicine* 6(7):e1000097.

Pennay DW, Borg K & Lavrakas PJ (2016). Using advance text messages to increase response rates and improve calling efficiency. Paper presented at the 69th annual conference of the World Association for Public Opinion Research, Austin, USA, 12 May 2016.

Schwebel FJ & Larimer ME (2018). Using text message reminders in health care services: a narrative literature review. *Internet Interventions* 13:82–104.

SRC (Social Research Centre) (2019). Quality Indicators for Learning and Teaching, SRC, Melbourne, www.qilt.edu.au.

Steeh C, Buskirk TD & Callegaro M (2007). Using text messages in US mobile phone surveys. *Field Methods* 19(1):59–75.

Virtanen V, Sirkiä T & Jokiranta V (2007). Reducing nonresponse by SMS reminders in mail surveys. *Social Science Computer Review* 25(3):238–255.

Vodopivec-Jamsek V, de Jongh T, Gurol-Urganci I, Atun R & Car J (2012). Mobile phone messaging for preventative health care (review). *Cochrane Database of Systematic Reviews* 12:CD007457.