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### **Delay between recruitment and participation impacts on pre-inclusion attrition**

#### **Abstract:**

Despite being a common aspect of psychological research, the impact of delay between recruitment and active participation on dropout rates has received little research attention. This is likely due to the intuitive sense that longer delays will increase the drop-out rate. Pre-inclusion attrition diminishes sample sizes and may threaten data representativeness. One hundred and two university undergraduates were recruited to participate in a short, one-off study via Short Message Service (SMS). Upon receipt of an SMS indicating consent to participate, the researchers delayed sending the study questions for one day, one week, one month or two months. Delay was significantly associated with response rate with an 80% response rate in the one-day delay condition, 56% at one-week, and 42% at one-month. No responses were received in the two month delay condition. This research confirms that the delay between recruitment and active participation impacts on pre-inclusion attrition when conducting research via SMS.

**Article Text:**

A delay between recruitment and active participation can be an unavoidable artefact of data collection, especially in cases where the researcher has a fixed start time for all participants. This is of particular importance to larger studies, which require more participants and thus need a longer recruitment phase, or research with rare or difficult to reach populations. A researcher may choose to delay data collection for pragmatic reasons – it is far easier to keep track of which message has been sent to which participant if they can all be sent on one occasion. A tacitly accepted consequence of this delay is that participants have a tendency to drop out in the period between initial contact, and actual participation.

The lack of citations in the preceding paragraph is symptomatic of a dearth of structured research enquiry on this topic in the psychological literature, despite such delays being common in the research process. Whilst some attention has been paid to using reminders after initial contact to improve attendance and response rates in research (e.g. Ashby, Turner, Cross, Mitchell, & Torgerson, 2011; Virtanen, Sirkia, & Jokiranta, 2007), the effect of the duration of the delay has generally only been examined in the context of medical health and clinical psychology interventions. Experimental variation of the delay between initial contact and clinical appointment attendance has demonstrated significantly higher attendance rates associated with shorter delays (Festinger, Lamb, Marlowe, & Kirby, 2002). Where treatment is ongoing, a shorter delay between initial contact and treatment initiation is also associated with a greater likelihood of attending subsequent appointments (Hoffman, Ford, Tillotson, Choi, & McCarty, 2011).

The current paper conceptualises the delay between initial recruitment and participation in a research context as a form of Flick's (1988) pre-inclusion attrition, where participants do not engage with the researcher any further following initial contact or consent. As in Kendall and Sugarman (1997), participants dropping out at this point in time should not

be confused with those who do not consent to participate from the outset, or who notify the researcher of their formal withdrawal. Though it is common practise to report pre-inclusion attrition defined in this way in psychological research, it is rarely discussed in more detail than a passing count or of drop-outs when the sample is described, making it difficult to distinguish between those who drop out before participation and those who drop out during participation. This has resulted in a lack of cumulative evidence to inform reasonable expectations regarding how many participants may be lost. Attrition itself can be a useful outcome variable as it can indicate a methodological flaw or problematic sample (Cook & Campbell, 1979), and can have effects beyond just diminishing the sample size.

Pre-inclusion attrition has the potential to create subtle bias in research conclusions. It could result in non-representatively low number of individuals with characteristics associated with attrition, such as forgetfulness, taking part in the study (Flick, 1988). In experimental designs, if randomisation occurs at recruitment, it may imbalance the design in terms of numbers of participants in any given condition. These two problems can compound one another in scenarios where experimental conditions are undertaken at different times, potentially resulting in imbalanced and unrepresentative samples being compared within a study (Flick, 1988). This can be mitigated somewhat by post-hoc statistical weighting based upon potentially imbalanced characteristics (e.g. Bloom, 1984), though papers discussing such procedures recommend late random assignment to conditions, and urge researchers to minimize the attrition whenever possible (e.g. Benjamin-Bauman, Reiss, & Bailey, 1984).

Whilst it is intuitive that researchers should, wherever possible, minimise the delay between initial contact and recruitment, a more structured investigation on the impact of response delay on pre-response attrition is warranted. One potential confound to such preliminary investigations is perceived response burden, which is closely associated with response rates and attrition (Bolger, Davis, & Rafaeli, 2003). The current research therefore

seeks to investigate the influence of a time lag between recruitment and active participation on pre-inclusion attrition using a methodological framework of minimal burden to participants.

Short Message Service (SMS) is a ubiquitous text-based communication technology which can be used for bidirectional communication with research participants. It has been used as a research mode in personality and social psychology, investigating topics such as happiness (Conner & Reid, 2012), the dynamics of how couples (Song, Foo, & Uy, 2008) and families (Rönkä, Malinen, Kinnunen, Tolvanen, & Lämsä, 2010) influence one another's moods. It is an ideal test case for the current hypothesis as it is clearly of low burden to participants. It is in common use in the population (75% of Australians send SMS daily; ACMA, 2011) means participants will be comfortable with its use, and as the 160 character limit of sending an SMS guarantees a brief research experience. There is also the added that SMS is flexible in terms of the time frame in which participants may be contacted. There is no impetus to begin data collection immediately following recruitment for research using SMS, as once a participants' contact number is obtained it is likely to remain a valid means of contact. The delay between initial contact and active participation is therefore particularly malleable when using SMS as a mode for data collection.

By recruiting participants for minimally burdensome SMS research, and experimentally manipulating the delay between recruitment and participation, this study will investigate the hypothesis that increasing delay between recruitment and participation will be associated with a lower response rate.

## **Methods and procedure**

Undergraduate university students were invited to participate by way of posters with the following information:

*SMS FOR SCIENCE!*

*Erin, a psychology PhD candidate at the ANU invites you to participate in a study looking at the usefulness of SMS for research. Anyone with a mobile phone is welcome to participate.*

*Interested? Text "Yes" to XXXXXXXX to participate*

*We will text you two questions about yourself, and one question about using SMS for scientific research. All you need to do is reply to our questionnaire with your answers.*

The poster went on to detail ethical considerations, consent and withdrawal – please see the supplementary material. Posters were displayed throughout the Australian National University Campus in popular thoroughfares, such as thoroughfares and dining areas. These areas had variable traffic, but the posters were viewable by several hundred students. Recruitment was undertaken in this way to minimise other effects that may contribute to response rate such as incentives, (see Dillman et al., 2009 or Shih, 2008). Recruitment was undertaken so that all participants would have finished with the study within one academic year. Upon receipt of the “yes” SMS, participants were randomly assigned to a response delay condition of one day, one week, one month (30 days) or two months (60 days) following initial contact. The researcher did not contact the participants in any other way (i.e. to confirm receipt of the “yes”) in the interim, and subsequently communicated only by SMS. A three-item questionnaire was sent to all participants via SMS at 2:00pm on their assigned day, asking for a prompt response via SMS. Analysed as part of a separate study, the SMS questionnaire asked participants for their age, gender, and (depending on random assignment

to two counterbalanced wording conditions) whether they felt there was information they would feel comfortable disclosing via SMS but not other modes, or via other modes but not SMS.

A total of 102 participants contacted the researcher and were assigned to delay conditions (one day  $n=27$ , one week  $n=27$ , one month  $n=24$ , and two month  $n=24$ ). Those who responded to the subsequent questionnaire were aged between 17 and 46 ( $M=24$ ,  $SD=7$ ), 73 were female.

## Results

Descriptively, the response rate diminished considerably with increasing pre-inclusion delays, at 80% following one day delay, 56% at one week, 42% at one month, and complete non-response at two months (Figure 1).

Logistic regression (with the 60 day delay condition excluded from analysis as it destabilized the model) confirmed this effect was significant. According to McFadden's published cut-offs (McFadden, 1974), the overall model had a reasonable McFadden's Pseudo  $R^2$  (0.15), and indicated that participants experiencing a one week pre-inclusion delay ( $b=1.26$ , wald  $z=2$ ,  $p=0.04$ ) or a one month delay ( $b=1.81$ , wald  $z=2.82$ ,  $p=.004$ ) were significantly less likely to respond than those experiencing a single day delay. Specifically, those in the one week delay condition were 3.5 times less likely to respond, and those in the month delay condition were 6 times less likely to respond. Follow-up Wald tests indicated that the drop in response rate between one week and one month delay was also significant,  $\chi^2(2)=8.1$ ,  $p=0.018$ .

## Discussion

The delay between recruitment and active participation in the brief SMS questionnaire significantly affected pre-inclusion attrition. Similar to the clinical appointment attendance literature (Festinger et al., 2002; Hoffman et al., 2011), increasing delays were associated significantly lower response rates, both statistically and practically. It suggests that, at least when using SMS as a research mode, delaying active participation even for a week can drastically increase pre-inclusion attrition. This brings with it problems of reduced sample size, such as diminished statistical power, and increased likelihood of non-random dropout which can threaten the representativeness of an originally carefully chosen sample (Flick, 1988). This suggests that avoidable delays such as delaying to allow a fixed schedule for the researcher's convenience, is inadvisable.

Due to the formative nature of this research, the time frames of delay were somewhat arbitrary and widely spaced. In particular, the remarkable decline in responses between 30 and 60 days bears closer scrutiny, perhaps with finer differences in delay manipulations (i.e. 30 days versus 35 days, etc). Doing so would help to build a more detailed understanding of potentially useful delay cut-offs to guide planning of research using SMS as a data collection tool in situations where all data must be collected at the same time. For example, a researcher seeking to collect opinion data surrounding a national election would find it useful to know whether they may begin contacting and recruiting participants a month before the election (thus maximising the time they have to recruit as many people as possible), or whether they should wait longer (in order to minimise pre-inclusion attrition).

The current study used only university students. Given that different ages engage with technologies like SMS in different ways (Venkatesh, Thong & Xu, 2012), these findings may differ with an older sample. It is possible that the middle aged and elderly, due to their comparatively lower use of SMS, may have a higher pre-inclusion attrition rate than the current sample. Specific groups, such as clinical populations, may also differ in their SMS

engagement in a way that impacts upon pre-inclusion attrition. One source of difference may be intervening life events that may distract or impair participant's ability to respond, such as an extended holiday, or moving house. In the university student sample, teaching breaks and graduation are such events. Though the current study avoided delays over a new-year period, those in the longer delay conditions experienced a mid-semester teaching break. This may have further distracted them from finally participating, and provided greater scope for mobile telephone loss, or number changes, which could have rendered them unavailable for eventual responding. Delay is one of many factors that may impact on pre-inclusion attrition. In online and paper surveys, there is evidence response rates in single measure surveys and ongoing participation in repeated measures frameworks are modifiable by researcher initiatives such as incentives (Dillman et al., 2009; Shih, 2008), and pre-notification or reminders before participation (Cook, Heath, & Thompson, 2000). A further factor may be the anticipated burden of the research, modifiable by the number, length, and scope of questions to be asked (Bolger, Davis, & Rafaeli, 2003). Though this research focussed on other modes, it is quite possible that the provision of an incentive, or use of reminders, would improve response rates at longer delays in research using SMS as a data collection method, The current study's minimal contact between researcher and participant may serve to provide baseline expectations for the impact of delay on participation, allowing future researchers a framework to guide investigations of the effects of incentives, pre-notifications, reminders, and other methods commonly used to increase response rates in self-report research.

This study experimentally manipulated the delay between recruitment and participation in self-report research undertaken via SMS. As hypothesised, longer delays between recruitment and participation were associated with a lower response rate. The response rate at one day delay was almost double that at a one month delay. There was complete dropout at two month's delay. Pragmatically, these results suggest that a researcher

should avoid delaying active participation when collecting data via SMS without a strong theoretical rationale for doing so.

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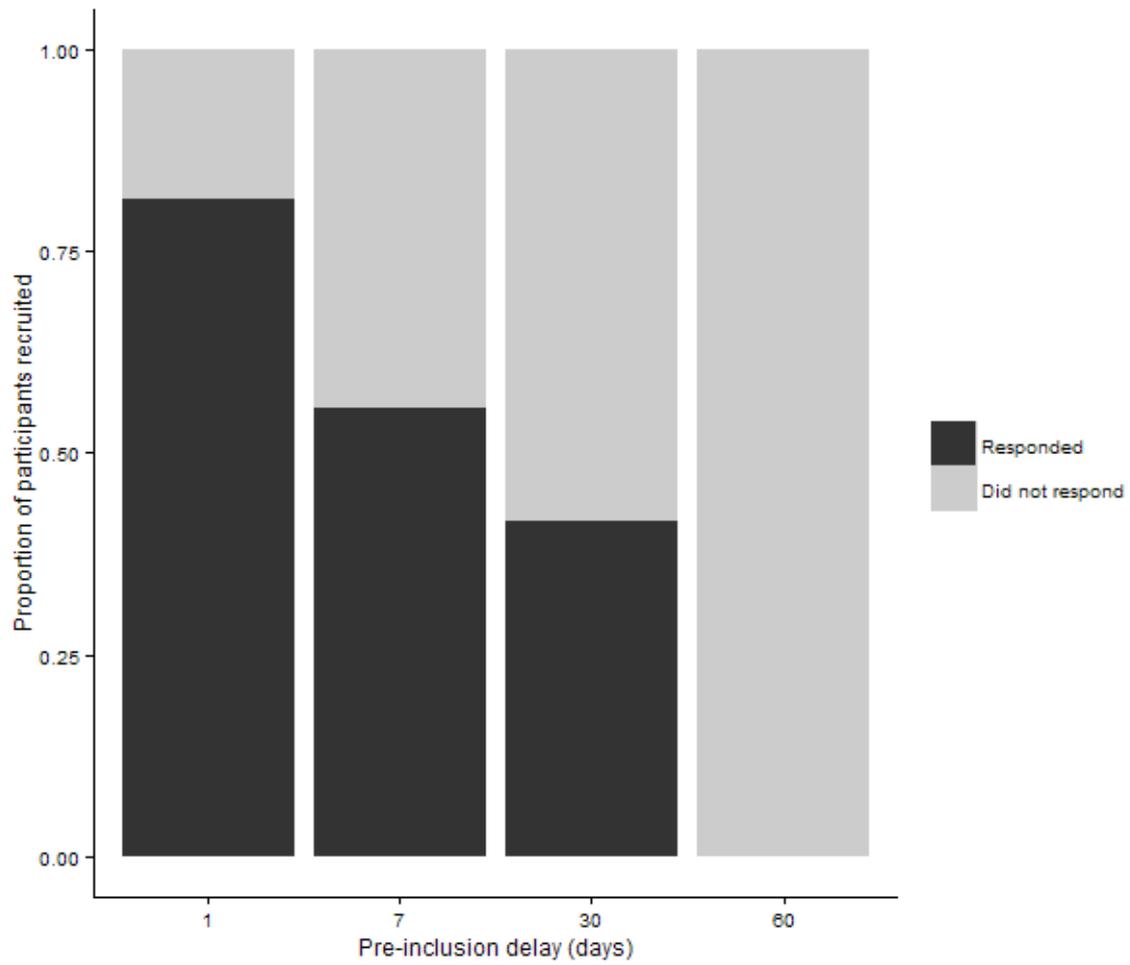


Figure 1. Response rates across the pre-inclusion delay conditions.