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Going Mobile: Delivering Behavioural Support via SMS Text Messages

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Health organisations, charities, pharmaceutical companies, and health services are increasingly delivering information and support by SMS text message to help us change our health behaviours. For example, the British Heart Foundation provide a 'Heart Health' texting support service for people wanting to either become more active, eat healthier or give up smoking. So what do we know about the potential of text messaging to deliver behavioural support?

Why text messaging?

Text messaging has a number of advantages over other media for delivering behavioural support. First, most people in developed countries own a mobile phone. According to Nokia, there are currently 13 mobiles for every 10 people in Europe. Furthermore, in the UK ownership is high across the social class spectrum (Ali et al., 2007). Second, text messaging is becoming increasingly popular in Western Europe and other developed countries (Gartner, 2007). In 2009 in the UK, 96.8 billion texts were sent (Mobile Data Association, 2009) – averaging out at over four texts per day sent for every member of the population. As a result, text messaging interventions could have a high reach. There is also evidence that, among adolescents at least, those who engage in health compromising behaviours such as drinking and smoking have higher mobile phone usage (Leena et al., 2005), suggesting that mobile phone interventions may be a particularly good way of targeting these behaviours. Third, sending text messages is relatively inexpensive, particularly if delivery is automated. Finally, text messages allow for the delivery of support in real time, as mobile phone owners usually have them on their person, while still providing an asynchronous mode of communication i.e. receivers can read them in their own time.

However, text messaging also has several limitations. Unlike other services such as email or instant messaging, text messages have a 160 character limit. Although most modern phones allow you to send multiple text messages combined as a single message, the convention is to keep text messages brief. This limits how long and complex a behaviour change text message



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can be. Another potential issue is that you cannot fully control when a recipient reads their text message, such as when they have their phone switched off, or when they respond if a reply is requested. This might lessen its appeal for data collection where the timing of data capture is important.

Overview of the text message health behaviour change literature

Text message based health behaviour change interventions reported in the literature can be split into three main categories: medication adherence e.g. medication reminders, disease management e.g. diabetes self-management, and disease prevention e.g. weight management. A recent narrative review focusing on randomised controlled trials of text message interventions covering these three intervention categories (Cole-Lewis & Kershaw, 2010) report that eight out of nine sufficiently powered studies (total number of studies

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reviewed = 12) found significant differences between trial arms in favour of the text message interventions.

For some of the interventions reviewed it is difficult to isolate the effect of the text messages from the other types of additional support provided, such as written materials or access to specialised websites. Furthermore, the comparison arms received various levels of support. Ultimately the text messages were reported as the primary mode of intervention delivery for all intervention arms. Overall the results suggest that text message support can have a positive impact on health behaviour change, at least in the short to medium term (3-12 months).

There is also evidence that the effectiveness of other types of behaviour change interventions might be increased when text messages are used to supplement the main intervention. A systematic review published by Webb and colleagues (Webb et al., 2010) found internet based health behaviour change interventions that used text messages to deliver supplementary support reported much larger intervention effects (Cohen's $d = 0.81$) than those using other modes of delivery such as telephone ($d = 0.35$) or email ($d = 0.18$). Of course, the difference in effect size may be explained by other differences between these trials.

Text message interventions for smoking cessation

Our specific interest is in smoking cessation. A recent Cochrane review evaluated the impact of mobile phone based interventions for smoking cessation (Whitaker et al., 2009). Four studies were included, two of which used text messaging exclusively and both used the same general texting system. While there was evidence of a short-term impact on smoking abstinence at approximately six weeks post-randomisation when these two studies were pooled (Risk Ratio = 2.18, 95% CI 1.80-2.65), the impact at six months was difficult to assess due to substantial heterogeneity between the trials. Clearly more trials are required to establish the longer-term effectiveness of these types of interventions for smoking cessation. However, what these trials do not provide much insight into is what people think of receiving behaviour change support by text message.

One qualitative interview study we undertook explored this issue (Naughton & Sutton, 2009). The sample consisted of 33 women who had smoked during pregnancy and included those who had received a brief tailored text message intervention and those who had not. We found that for every perceived benefit of text messaging there was a parallel drawback. For example,

the convenience of text messaging and being able to get support wherever you are was a clear benefit. However, several participants highlighted that receiving a smoking cessation text message had the potential to cue them to think about smoking when they were not currently thinking about it. Another benefit highlighted was that they felt receiving a support text message would make them feel less on their own, as if there was someone looking out for them. However, as a result, some had high expectations for support to be delivered in real time, so it would immediately precede the tempting situations they found themselves in. The text message interventions we have developed are not currently sophisticated enough to meet such expectations. But the technology is there in many of our phones to deliver support that is tailored to real-time events as described in the final section.

A current text messaging intervention for smoking cessation

We have developed a smoking cessation text message system that tailors support and advice to individual characteristics, elicited by a questionnaire. This support program is for pregnant smokers (MiQuit) and targets theory-specified cognitive determinants of smoking cessation as well as providing general quitting support. The system delivers approximately 80 tailored text messages of support and advice over 11 weeks. The type of messages participants receive is also tailored to their smoking status, assessed at two time points by text message. In addition to these 'push' text messages, recipients can activate 'pull' text messages, which provide instant support at any time of day or night. Recipients also receive a tailored advice leaflet as a supplement to the text messages. The preliminary findings from a randomised controlled trial evaluating the acceptability and feasibility of MiQuit ($N = 207$) were that the system had high acceptability among participants and that those receiving MiQuit reported higher levels of the three key cognitive determinants targeted in the intervention (self-efficacy, harm beliefs and motivation) and increased quitting initiation compared to controls. Controls received standard self-help. While the trial was underpowered to detect group differences in smoking abstinence, the effect sizes observed favoured the intervention, although the comparisons were statistically non-significant.

Future innovations

Another of our interests is in tailoring self-help support to the individual. At present, the text message behaviour change systems reported in the literature, in-



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cluding ours, either do not individualise support or do so based on characteristics collected primarily at baseline. But there is another level of tailoring that could greatly enhance the power of a text message intervention and turn it from a drip-feed tool into a precision instrument: real-time tailoring using mobile sensing. Picture a smoker approaching the house of a friend or family member who smokes and as soon as he or she gets close, a proximity alert triggered by their phone's GPS sensor activates an individualised support message to be sent straight to their phone. This could remind them of their reasons for quitting to boost motivation or could provide situation-appropriate strategies of what to do instead of smoking. This location trigger could be a pub, a workplace, or anywhere the individual identifies as a smoking hotspot. Another scenario is a smoker's phone using a program such as the pilot system EmotionSense (Rachuri et al., 2010) to analyse voice input via the in-built microphone to identify specific emotions. If the program identifies anger or frustration, say, then this could activate the delivery of relaxation strategies to their phone as alternatives to smoking or could simply warn the individual of the risk of relapse. There are a multitude of ways in which the sensing technology inside modern smart phones—GPS, microphone, accelerometer, Bluetooth, camera—could be used to deliver real-time tailored support for all types of behaviours. However, as this type of support could be perceived as intrusive and is at risk of generating false positives, it is vital that the acceptability of tailoring support in real time is assessed and understood before too much investment in intervention design is made.

Conclusion

As with all areas of intervention research there are still many questions left unanswered. What types of support message are likely to be most effective when delivered by text message and for whom? Which variables should be used to tailor the messages? How should the frequency of push messages be managed or triggered? How interactive should such interventions be? Text messaging is likely to remain a popular and convenient method of communication for the foreseeable future, and offers the potential to be an important component of future behaviour change programmes. ■

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