Using technological interventions to elicit behaviour change: the development of a text message intervention.

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Introduction: Mobile health

The new generation of health interventions are moving towards digitised innovative methods which seek to support people to better manage their health condition or as an educational tool to support change. There are several approaches introduced to date such as web based interventions or mobile "apps" which are increasing rapidly. Recently the rise of mhealth has given researchers, psychologists and developers a range of examples which portray, "good" methods of delivering such interventions, but what have we learnt from this and how does this further our understanding of digital health. Although, there is no static method of developing such programmes and each are unique to the sample it is addressing, but there are some basic protocols we need to consider.

As an example, to illustrate this process the discussion will focus on the development of a text message based intervention for patients diagnosed with Inflammatory Bowel Disease (IBD).

Using text messages in health interventions

Tailoring short text messages based on patient's illness and medication beliefs has shown significant improvements in medication adherence (Horne & Weinman, 2002). We know that intentional and unintentional medication adherence is problematic for patient's remission and cost of non-adherence is significant (DiMatteo, Giordani, Lepper & Croghan, 2002). There are several adherence models which attempt to identify different aspects of patient behaviour and the underlying belief structure. Leventhal, (1987) common sense model of illness representation suggests that self-regulation is a function of the representation of health threats and the coping mechanisms adopted by the individual. This suggests that patients with the same condition hold disparate views surrounding their illness, which may explain why some people are adherent and other are not. (Leventhal, Diefenbach, & Leventhal, 1992). Similarly, the Necessity Concerns Framework (Hornes, et al, 1999, Hornes, 2006) measures an individual's illness beliefs and the necessity of medication, which can explain their beliefs associated with non-adherence. Understanding the theory and implementing this into an intervention will help support the robustness of the programme, which we did for the IBD programme.

The process will be explained and hopefully offer readers an understanding of what needs to be done to produce similar interventions. Learning and improving is a significant milestone in Health Psychology research and what we should take away from this is technique to improve future research.

IBD Programme

IBD is a chronic bowel condition and consists of Crohn's and Ulcerative Colitis. Research suggests that identifying an individual's illness beliefs and medication concerns can help shift the beliefs which then improves various other domains such as quality of life, adherence to medication and better

overall self-management of the condition (DiMatteo and Giordani, et al, 2002) However, what does this look like?

The methodology

Developing a text message initiative is a delicate and timely process, there are many factors to consider, such as types of messages, frequency, personalisation and measurable outcomes. Once these variables were defined, the personalisation process then followed. The important element of the IBD programme was to ensure that it was bespoke to the individual, as it was addressing their personal beliefs and illness perceptions of their condition. Remember, this is unique for everyone, and to successfully understand their need participants completed a pre-screener measure using the validated Brief Illness Perception Questionnaire (B-IPQ) and Necessity-Concern scale assisted the personalisation process, from this we could categories the messages based on the measurement domains. It is important to include some type of measurement within the design; this will ensure that the programmes objectives are in line with the outcomes and aims to elicit a "real" change.

Measures

A robust measurement strategy was developed which was used to monitor the effectiveness of the programme. This included a list of validated measures which were used with each participant at the start of the intervention and at the end of the 12 weeks. Text messages were specific to the targeted beliefs as exampled in table 1 and 2. Each belief consisted of 7 messages, with a total of 112 messages. Once the bank of messages were developed the next step was to draft the timeline and frequency of these messages. This can be difficult particularly because you don't want to lose the momentum of ensuring that the messages are meaningful and helpful as appose to inconvenient. Therefore, based on habit formation research, it was decided that the frequency would vary over the course of 12 weeks. In fact, this worked considerably well and participants enjoyed the change in frequency and times of when the messages were sent.

Table 1

Example extracts of text messages mapped onto the illness beliefs questionnaire

IPQ Domains	Example text messages
Identity (low)	"Coming off your medication is likely to worsen your symptoms"
Identity (high)	"Abdominal pain, diarrhea, weight loss and bloody stools can be managed if you follow your treatment plan, this will improve your symptoms"
Consequences (low)	"Crohn's Disease is a condition that needs regular care and attention"
Consequences (high)	"Managing your Crohn's Disease means getting on with life"
Timeline (short)	"Your Crohn's Disease is always there even when you don't have symptoms" "Your Crohn's Disease will always be there but you can learn to manage

Table 2

Example extracts of text messages mapped onto the BMQ (medication beliefs questionnaire)

BMQ Domains	Example text messages
Personal control (low)	"Control your Crohn's, don't let it control you"
Personal control (high)	"I'm doing my best to cope with my Crohn's"
Treatment control (low)	"Using medication reminders can help you control Crohn's Disease"
Treatment control (high)	"Being in control of your medication means you are likely to benefit from symptom reduction"
Concern (low)	"Studies have shown that patients' quality of life worsens during relapse"
Concern (high)	"Worrying rarely helps people to come up with solutions. Your worrying just goes in circles"

To ensure that the messages were sent to the participants on time, segmentation and timescales were developed which was filtered into the text messaging system. Within this template exact times and days of messages were outlined and to which participant for as outlined in table 3.

This method instilled accuracy and allowed the researcher to monitor which messages were being sent to avoid repetition.

their needs. The IBD programme was successful and evidenced an increase in medication adherence and a change in illness perception and beliefs. Although the method of personalising is extremely timely the outcome is beneficial.

Table 3

Process of messages

Participant	Am	Pm	Text message
1		X	"Being in control of your medication means you are likely to benefit from symptom reduction"

Was this programme useful?

Offering a personalised programme as an alternative to the traditional method of delivering health interventions is beneficial, this was evident from the IBD programme. Participants appreciated the novel method of receiving messages which resonated with them as messages were specific to

What are the important things to remember?

1.Mobile interventions should be theoretically driven, therefore offering a robust framework to develop an effective programme.

2.Text messages should be relevant and consistent with the belief they are targeting.

3.Remember to change the frequency of the message and avoid repetition within the same week.

4.Develop a measurement strategy built into your programme this will help record the outcome and determine if a change really occurred.

5.Text message programmes may not always be the best option offered and is dependent on the sample it is targeting. This needs to be considered when deciding on the methodological approach.

6.Text message interventions can be offered as a sole product as we did for the IBD programme or compliment an interventions as an additional tactic.

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