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Developing a quality control framework for mobile app-based health behaviour change interventions: Adapting NICE behaviour change guidance

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**Background**

The WHO estimates 63% of deaths are a result of lifestyle related diseases many of which are preventable through the reduction of smoking, physical inactivity, excessive alcohol use, and unhealthy eating<sup>1</sup>. The advent of the home PC and widespread use of the internet saw a growth of website-based health behaviour change interventions<sup>2</sup>. More recently, the increased capabilities of mobile phones and tablet devices has seen an explosion in the number of mobile applications ('apps'), targeting health behaviour change<sup>3</sup>. 93% of UK adults have a mobile phone, 61% have a smartphone<sup>4</sup>, and 90% of those are in possession of it 24 hours a day<sup>5</sup>. Mobile apps are low cost, can be individually tailored in real time to suit the needs of the user and can collect, analyse and relay data back to researchers<sup>6</sup>. Of the 2.4 million apps available, over 97,000 are related to health and fitness<sup>7</sup>. There is growing evidence for the efficacy of apps in health behaviour change, however, one particular concern is that of quality control<sup>6</sup>. The NHS Apps library uses expert peer review to ensure that apps included in the library are relevant to people living in England, use information from a verifiable or trusted source, comply with the Data Protection Act, and are clinically safe<sup>8</sup>. In addition to these safeguards, it would be useful to have a quality control process for health behaviour change apps that would enable users and health professionals to ascertain how closely the app developers had considered the NICE behaviour change guidance<sup>9</sup>. This study ascertained how the NICE (2014) Behaviour Change Guidance (BCG) could be applied to mobile app health behaviour change interventions.

**Methods:**

A qualitative synthesis of the NICE BCG was conducted in order to ascertain which aspects could be relevant for an app quality assessment process. Suggestions in the guidance were then converted to yes/no questions of relevance to app quality. Health behaviour change intervention apps in the NHS apps library were examined (N=49). Answers to questions extracted from the NICE guidance were entered into a SPSS database, along with other relevant details regarding the apps to be examined, such as; app name, behaviour being targeted, the platform on which the app was available, and cost. Additional questions were added, such as one pertaining to whether or not the app was "Information Standard" certified. Each of the behaviour change apps in the library were then coded into the database, using information that was gleaned from the app description in the library, on the app store, and on any related websites. The individual apps themselves were not installed on any device.

**Results:**

Table 1 shows the 9 themes emerging from a qualitative synthesis of the NICE BCG, average % positive responses and average inter-rater agreement. App purpose was usually clear. Overall, under a quarter of apps showed strong evidence of thorough planning & development and fewer showed evidence of addressing behavioural maintenance and relapse. Few apps demonstrated a thorough focus on usability, and evidence for evaluation of app efficacy was poor. Documentation varied: with less than a third of questions relating to initial assessment and tailoring answered positively. Around a third of questions relating to behaviour change techniques (BCT) were answered positively. Inter-rater agreement was high with the exception of data protection.

**Table 1: Results from qualitative synthesis of NICE Behaviour Change Guidance**

Theme	Example question	Average % Yes	% rater agreement
Purpose	Is the target behaviour clearly specified?	98.9	67.2
Planning & development	App developed in collaboration with target group?	22.4	82.6
Usability	Does the app have special features for specific needs?	6.1	98.9
Assessment & Tailoring	Does the app assess users motivation to change?	30.4	79.0
BCT	Does the app facilitate access to social support?	36.9	79.7
Maintenance & Relapse	Does the app include techniques to address relapse?	17.0	78.4
Evaluation	Will the efficacy of the app be evaluated?	4.6	96.1
Documentation	Is there a publically available manual for the app?	40.5	71.2
Data Protection	Does the app comply with data protection standards?	100.0	33.3

**Discussion**

This study represents the first attempt to apply the NICE Behaviour change guidance to mobile apps aimed at health behaviour change. The nine themes that emerged from this study could usefully form the basis of an app quality assessment process. The importance of clarity in the questions posed during this process was evident in the poor level of inter-rater agreement on the issue of data protection. Further exploration of inter-rater disagreements revealed differences in question interpretation. Space limitations have prevented the full range of quality assessment questions being included here but one issue raised by this study pertains to how much weight an app quality evaluation process should place upon independent raters, and how much of the process could be carried out using self-submission by app developers themselves.

**Conclusions and practice implications**

This adaption of the NICE guidance could form the basis of a structured approach to health behaviour change app quality assessment. Future work could focus on developing a consensus of expert and user opinion. A database of 'kite marked' health behaviour change apps would be valuable not only for users but also for healthcare professionals who could recommend them to patients secure in the knowledge they had been subjected to a rigorous quality assessment process.

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