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EDITORIAL

Current issues and new directions in *Psychology and Health*: What is the future of digital interventions for health behaviour change?

The digital environment (e.g. Internet, mobile phones, smart phones) that is now an integral part of our daily lives is becoming an increasingly important means of sustaining the health of people worldwide, whether by providing access to a wealth of information, by linking geographically dispersed communities of peers and professionals, or by supporting self-management of health and illness. As the papers in this issue illustrate, the Internet is therefore rapidly becoming both a medium and a focus for health psychology research. The Internet can be used as a source of naturally occurring observations and data, as in the qualitative study by Rodham, McCabe, and Blake (2009) of Internet communication between people with Complex Regional Pain Syndrome. It can also be used to give people personalised feedback about their health risks, as in the study of predictors of online diabetes risk test taking by van Koningsbruggen and Das (2009). Perhaps most significantly, it provides a cost-effective means of making automated behaviour change interventions widely available, such as the stress and alcohol reduction programmes deployed in two papers in this issue (Crutzen et al., 2009; Fridici, Lohaus, & Glaß, 2009).

A meta-analysis of 75 randomised controlled trials has provided support for the effectiveness of digital interventions (Internet, mobile phones, etc.) in the health promotion area (Portnoy, Scott-Sheldon, Johnson, & Carey, 2008). But how and why can digital interventions be effective in promoting sustained behaviour change? And can different digital tools serve different purposes? These were among the questions addressed by 30 researchers who attended the 2008 European Health Psychology Society Synergy Workshop in Bath, UK.

An important theme considered at the workshop was the question: What are the implications of advances in information technology for the future of health psychology interventions? In Eysenbach's (2002) definition of the '10 E's' integral to e-health, three of the key ingredients are *encouragement* of a new relationship with the patient which focuses on *empowering* and *educating* them. Digital interventions can provide new forms of access to self-care, video and audio delivery for those with reading difficulties and anonymous social support for those who are unable or unwilling to consult health professionals in person. While there is concern that the 'digital divide' could limit the extent to which those from more socioeconomically deprived backgrounds may benefit from digital interventions (Murray, Burns, See, Lai, & Nazareth, 2005), this problem may diminish as the Internet grows more ubiquitous; for example, young people already routinely use the Internet daily, with minimal differences in access due to socioeconomic background.

Another key problem addressed by the workshop was the finding that high attrition rates seem to pose a potential short-coming of digital health interventions (see, e.g. Matano et al., 2007). Clearly, we need research into how digital interventions can best be

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designed to hold the interest of the user. While the main motivation for initial use is the expected utility of use, continued use is probably heavily influenced by experienced utility (which in turn fuels expected future utility). This may be increased by offering the client relevant, individually tailored material and feedback, which has been shown to increase program use and engagement (see, e.g. Strecher et al., 2008). Specifically, individuals must be able to gauge their progress against some frame of reference, which might include their own change plan (compared with their own prior history), the behavioural progress of others who are in a similar situation to themselves, or a regimen from a trustworthy source (for an overview see Kraft, Drozd, & Olsen, 2009). In other words, efforts to change are likely to be successful when individuals receive timely monitoring and feedback on their progress (see, e.g. Brendryen, Drozd, & Kraft, 2008). With such feedback, individuals can be motivated by their own achievements. They can modify their strategies and gauge the proximity of their goals. For example, Internet weight loss programs are likely to be most effective when they require participants to keep regular records of their food intake and physical activity, and the program provides feedback on their performance (Tate, Jackovny, & Wing, 2003). However, one should be aware of the possible motivational consequences if people do not reach their preset goals. Underachievement is likely to influence motivation to continue to change (e.g. via attributional processes), as well as motivation to continue using the intervention.

Additionally, more elaborate interventions can be more effective. For example, a review of 15 Internet-delivered interventions to promote increased physical activity (Vandelanotte, Spathoris, Eakin, & Owen, 2007) found that interventions were more successful if they required participants to engage more with the intervention (using techniques such as email, weekly modules or online coaching or chat sessions). Generally, increased interactivity seems to improve the emotional quality of an intervention – in other words, how it makes you feel (Norman, 2003). Hence, the extent that interactivity can increase user involvement must be considered a critical characteristic of a digital intervention. The potential for interactivity and complexity in digital interventions is growing rapidly, raising the question of how much is enough? This is an important issue, since considerable resources are required to develop a complex interactive intervention and to keep it up-to-date. Note that an intervention that is theory based and complex in structure and functionality should still be considered easy to use by the client. Moreover, the optimal level of interactivity may depend partly on the nature of the interactive support provided, and also on the target problem and population. A very engaging interface may be needed in order to motivate people to use a website promoting healthy behaviour, whereas patients with chronic illness may be satisfied with a plain and simple website that gives them the information and support they seek. It is clear that the extent and nature of the interactivity required for successful digital interventions is an empirical question that has not yet been sufficiently investigated.

A final issue discussed was how evaluation research can help us develop more effective digital interventions in the future. While number of webpages visited is currently used as a crude indication of engagement with websites, more sophisticated ways of evaluating usage are needed, since more extensive use of a website can be a cause or a result of higher levels of motivation and engagement. Moreover, the number of webpages accessed provides no information about the relative importance of different theory-based components of the intervention, and so cannot be used to evaluate these theory-based techniques. Alternative methods of gaining insight into the effects of specific website components on the causal mechanisms influencing outcomes of digital interventions could include using factorial designs to examine the effects of adding or removing components of the intervention, and

time-series analyses to examine in detail the relationship between outcomes and varying individual patterns of usage (Collins, Murphy, & Strecher, 2007). Newly developed software that allows researchers to easily create, modify and evaluate Internet-delivered interventions (e.g. http://www.lifeguideonline.org) should provide opportunities for carrying out these kinds of studies. For example, this software allows interventions or components of interventions to be instantly copied, facilitating the process of creating different versions for experimental comparison, and permitting sharing and dissemination of intervention components among researchers in order to assess their effects in different health contexts or populations.

By the end of last year's Synergy workshop at which these issues were discussed, it was clear to all participants that we are just at the start of the development of digital health care. Rapid technological change means that this field is already posing new questions and challenges for digital interventions and research. For example, many future interventions can be expected to be delivered through mobile phones, which will offer new opportunities for tracking people's activities and health status and offering timely advice. At the same time, a more focused and tailored approach to intervention design may be needed that is compatible with the restrictions of interacting via a smaller interface. In terms of accessibility, it will be important to take into account large differences in digital skills and confidence, by ensuring that new digital interventions are friendly and appropriate to a wide range of users. Given the exciting scope for innovation and the demand for technological solutions to health problems, it is certain that research into digital interventions is set to grow substantially in the foreseeable future.

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