

**The role of digital technologies when designing web-based interventions as effective self-help platforms for people who drink at increasing and high risk levels.**

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# Context

This document is for alcohol commissioners who wish to make best use of research regarding the ability of web-based technology to support behaviour change.

Given the current economic climate in the UK it is particularly pertinent for those who wish to be innovative in their approach to dealing with the dual challenges of improving services whilst reducing costs.

Although researched and written for alcohol commissioners in Bolton it has beneficial messages for both drug and alcohol commissioners across the UK.

The research has been written by Renate Kalnina from d2 Digital by Design and based on studies by both academics and practitioners it draws on fields of research covering behaviour change, health studies, persuasion technologies, persuasive design systems and economics.

d2 have been developing digital tools and resources for commissioners in the drug and alcohol field for over 15 years.

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# Executive Summary

The UK has the most active online population in Europe. People use the internet to find information and advice on a variety of personal health related issues. The emergence of what has become known as Web 2.0 has meant that users of the internet can have a more interactive experience and services can increase their engagement with people in need of support.

Web based self help is not a new phenomena, both academics and practitioners have had opportunity to analyse different approaches. The findings referenced within this document suggest that web based interventions can support self directed behaviour change. The research shows that the internet offers convenience, reach, and anonymity; it also overcomes many barriers such as available times of access to information and support. However it is also worth noting that many studies have not considered ethnicity, income level, and homelessness when considering use of web-based technologies. This needs to be incorporated into future considerations when designing interventions.

Research participants can show mixed preferences; on the one hand favouring the anonymity and ready accessibility of online support, yet on the other hand appreciating the personal attention from a professional. This is reflected in their concern that an online experience can be dehumanising. Designers of intervention programmes can certainly address this through personalisation and tailoring techniques to make the user experience a more personal and welcoming one. This practice is well established in other areas such as game design and online learning environments.

The nature of digital technology means that data can be monitored, measured and used to provide relevant feedback as appropriate. However, providing the data requires users to engage with a programme over a period of time which has been shown to cause concern. Meaningful engagement must be viewed as an ongoing process for both commissioners and programme designers. It is also worth noting that measurement and consequent analytics provides commissioners with information vital for strategic planning.

Behaviour change is surrounded by theories and models. Web based interventions are shown to have often applied an individual model to programme designs, however researchers have not shown which combination across these models have been the most successful. A recent publication has suggested the use of 'The Internet Intervention Model' which brings different disciplines together to make best use of available theory and research.

Web based interventions are not perceived as a replacement for traditional forms of engagement such as face to face or phone support; however their ability to reach new service users is a clear indication of their undoubted potential. For those alcohol users who do not always seek help, whether through lack of trust or motivation, personal attitudes or access issues; this group are clear targets for web based support and interventions. When considered with costs that are shown to be extremely low in comparison to traditional interventions, commissioners can be assured that research supports innovative approaches using web based technologies.

# Introduction

Alcohol *use* is widely accepted in many Western societies and is often regarded as an essential component of one's social life and when consumed responsibly can be a pleasant and relaxing experience.

Nevertheless, alcohol *misuse* can be harmful to one's health and society as a whole and, for a growing minority in the UK, individual and societal damage caused by alcohol misuse is escalating (NHS East Lancashire, 2009). Also it is recognised that alcohol related crime and health costs are a growing problem in the country.

Health and local authorities continue to face challenges including; the reduction of alcohol related costs, the effective delivery of alcohol treatment as well as harm reduction and an improvement of the well-being of society.

In recent years the increasing use of the Internet for accessing health related information and advice (E-Consultancy, 2010) has caught the attention of health practitioners who realise the potential opportunities of this channel in developing a more cost effective route to reach the target group.

The main focus of this paper is to analyse the sustainability and effectiveness of web-based technologies, in engaging target groups, offering simple brief advice, as well as delivering online self-help, with the aim of achieving desired behaviours resulting in reduced alcohol consumption amongst increasing risk and high risk alcohol consumers.

# Statistical Overview

According to National Statistics on Alcohol (NHS, 2009) in 2007/2008 there were 863,300 alcohol related admissions to hospital, resulting in an estimated cost to the NHS in England of £2.7 billion (in 2006/2007 prices). Other sets of data suggest that the wider estimated annual cost to society caused by alcohol misuse ought to be £20 bn (NHS East Lancashire, 2009) where it is estimated that £7.3 bn would relate to alcohol related crime, and £6.4 bn would represent workplace costs created through loss in productivity (NHS, 2009).

One could also argue that alcohol consumption can be beneficial, for example when serving as a social lubricant (North West Public Health Observatory, 2010c) In addition the revenue generated from alcoholic drinks (almost £14 bn in 2004/2005 (Institute of Alcohol Studies, 2008)) and employment provided in alcohol related industries, contribute to national income.

However, apart from the immediate figures there are extended costs involved such as the non-financial welfare costs which refer to suffering and lost life (World Health Organisation Europe, 2010). For example, various sources inform (Bolton PCT, 2006 and Institute of Alcohol Studies, 2010) that in 50% of all violent incidents, victims believed the offenders to be under the influence of alcohol. Also, there were 6541 deaths in England in 2007 directly linked to alcohol.

Recently the study by The World Health Organisation Europe (2010) suggests alcohol related costs should be composed of 3 parts - health and crime expenditures, labour and productivity costs as well as non-financial welfare costs that in combination would represent 'full economic welfare costs' of alcohol use.

The reader may conclude that there are many areas to consider which relate to avoidable costs resulting from alcohol misuse. The main question is - how best to achieve the optimum results and limit the costly consequence of alcohol misuse nationally and locally?

# What Does It Mean For Bolton?

Currently approximately one quarter of the population in England is thought to 'fit' into 'increasing risk' (20%) or 'high risk' (5%) groups (North West Public Health Observatory, 2010b). However, alcohol consumption varies amongst the population and some regions and groups can be at higher risk than others (North West Public Health Observatory, 2010c).

Data on mortality and some of the crime statistics show that alcohol misuse is an increasing issue in the North West region. More precisely, according to national and regional averages across a range of alcohol indicators (NHS Bolton, 2010) Bolton has shown significantly worse results than the average (LAPE, 2010). For this reason alcohol has been a priority area for Bolton.

Since 2003/2004 Bolton has witnessed a growing increase in alcohol specific (not alcohol 'related') hospital admissions amongst both females and males (LAPE, 2010). In 2004/2005 when ranked against other local authorities in the North West, Bolton was ranked highest for alcohol related sexual offences (Bolton PCT, 2006) and the latest data shows that this type of violent crime has been increasing (LAPE, 2010).

However, neither consumption nor damage caused by individuals fits into a general stereotype of 'alcohol misuser'. Research (NHS Bolton, 2010) suggests that links between alcohol mortality and sensible drinking are complex and that high alcohol consumption prevails amongst many socio-economic groups in Bolton.

For example, in the 16-34 age group the most significant cause related to death is intentional self-harm / event of undetermined intent (39%) and this number would increase if we added mental and behavioural disorders. Also a significant percentage of traffic accidents and fall injuries related to death could be avoided with the prevention of alcohol misuse (NHS Bolton, 2010). The majority of alcohol - specific mortalities include liver disease and ethanol poisoning as well as several cancers.

Death rates are just one of a number of conditions that vary across age and/or gender. The motivation for consuming alcohol varies with 53% of males in the North West who cite socialising being the main reason whereas females (49.8%) believed that alcohol goes well with food. Other reasons for drinking according to North West Public Health Observatory (2010c) were cited as; to forget problems, boredom and just being interested in trying new drinks.

Research also revealed that overall in the North West 15.4% of adults consumed alcohol at increasing risk levels and 4.3 % were estimated as drinking in high risk levels. Moreover, the highest proportions of increasing risk drinkers were young people, students or professional groups. Adults aged 16-24 years were most likely to drink at high risk levels but as age increased the level of high risk drinking amongst older age groups decreased (North West Public Health Observatory (2010a).

Currently Tier 1 interventions include providing information, screening, brief advice and referral to appropriate services. The purpose of these interventions is to identify those in low risk, increasing risk and high risk groups. Tier 1 provision according to Bolton Alcohol Strategy can be delivered by a wide range of agencies whose main focus is not alcohol (e.g. Primary Health Services, Social Service departments, Acute hospitals, Police, etc.) (Bolton PCT, 2006).

Bolton PCT internal data (as recorded) suggests that in 2008-2010 brief advice was delivered to 1488 individuals (Audit C to 20,220 people and Full Audit to 1722). According to the source, 82 members of the PCT staff have been trained as well as 33 GP's and practice nurses. Just to conclude, Bolton is one of the largest urban centres in the North West with a diverse population of 264,800 people living in the area. Simple calculations show that approximately 10% of Bolton's population have completed Audit C and 0.1% of them have received brief advice (possibility of unrecorded data exists in this case and results may vary).

This difference between completed Audit C and Brief Advice could be explained by a number of things; the costs involved for target acquisition, staff training, time ('simple brief advice' entails structured advice lasting 5-10 minutes (The AERC (2010)) as well as the issues of a limited reach and an unwillingness to discuss personal alcohol use with professional bodies (Cunningham, et al., 2005 and Saitz, et al., 2004 ).

# Technology, Engagement & Behaviour Change Theories

## Internet

The reader can see that the Health Service and other Public Services face incredible challenges to reduce the harm caused by alcohol misuse. Scarce resources, the complex motivational attitudes of the consumer towards alcohol and the high advertising investment from the alcohol industry do not make this task any easier.

The high costs in service delivery, limited reach, unwillingness to access the service (Linke, et al., 2007), lack of knowledge and awareness as well as habit, peer pressure, experiences that shape one's current behaviour, altogether form significant barriers that practitioners and users would need to overcome in order to create effective change.

However, new opportunities can be developed by integrating technology in the service delivery.

In the last decade the Internet has become a major component of healthcare as its use has dramatically increased all over the world. According to the Office for National Statistics, 18.3m households in the UK (70%) had internet access in 2009. Also the UK has the most active online population in Europe, with the highest average number of daily visitors (21.8 m) (E-Consultancy, 2010).

The emergence of Web 2.0 and mobile platform applications offer opportunity for increased access and present new ways in engaging users with services and influencing behaviour change (Oinas-Kukkonen, 2010).

Currently the online population reflects a 52% /48% male and female split. If compared by the user's age, the 24-44 year olds represent the biggest PC-based internet usage. Whereas with regard to mobile internet use the 15-24 age group are accountable for 25%, 25-34 age groups for 26% and 35-44 age groups for 23% (E-Consultancy, 2010). This data is crucial when considering the delivery of Tier 1 / Tier 2 range of services in the online space for 'increasing risk' and 'high risk' target groups.

## Technology and web-based interventions

Although brief advice (previously known as brief interventions) for alcohol use have been delivered through more traditional methods (face-to-face, post (Bewick, et al., 2008)) a delivery of similar programmes through the internet is not a novelty. Academics in correlation with practitioners have spent a great deal of time trying to analyse the most effective applications in the field of web-based interventions for alcohol misusers.

Previous investigations have concluded that the presence of brief advice is more effective than no counselling (Bewick, et al., 2008) and as explained by Linke, et al. (2007) it can encourage self directed behaviour change when delivered by a professional consultant or as self-help material (Saitz, et al., 2004).

Since the Internet has triggered the opportunity for the online delivery of brief advice and interactive self-help materials it has revealed the following barriers that could be reduced and prevented by practitioners and users.

Research results across the world have concluded that participants in similar studies related to web-based interventions have seen the Internet as a positive channel in the delivery of help to problem drinkers (Bewick, et al., 2008 and Linke, et al., 2004) Convenience, and reach of online services have been mentioned as one of the positives across the literature (Copeland and Martin, 2004; Saitz, et al., 2004). This is a significant turning point since many people with alcohol use disorders don't seek help for a variety of reasons - lack of motivation to change, distrust in treatment, personal attitudes, access to care (geographical limitations or mobility issues), etc. (Cunningham, et al. 2005 and Saitz, et al., 2004).

Of course, the reader should be aware that many studies have not considered ethnicity, income level, homelessness; which are important equality factors when considering web-based technology for delivery of a health service (Watland, et al., 2004).

Other benefits highlighted by research include anonymity and accessibility to a service 24/7 from any point where the Internet is available and it requires minimal if any contact / help from professional staff (Copeland and Martin, 2004; Koski-Jannes, et al., 2009 and Saitz, et al., 2004). This is beneficial not only for the end users but also for the Health Service providers since costs related to Internet-based interventions are smaller than those associated with the practitioner-delivered interventions (Copeland and Martin, 2004).

Research by Liang, et al. (2006) would argue that participants favoured healthcare information online however; they also preferred more personal attention from the healthcare professionals. Their main concern being that online communication was perceived as 'dehumanised'. Also linguistic barriers (Bewick, et al., 2008) as well as non-familiarity with computers, mobile phone applications and the Internet could lead to them refraining from engagement (Watland, et al., 2004).

The reader will be introduced to the techniques of personalisation, however, at this point it is useful to explain that Web-based brief advice or self-help interactions would not replace alternative methods (i.e. face to face, phone, etc) of engagement with professional advisors. The purpose is to analyse effective ways of innovative engagement when costs must be considered as the incorporation of any support would require time, effort and financial resource (Ritterband, et al., 2009). Moreover, if we consider technology in the context of 'social actor' role, that it plays in the human - machine interaction process, it is proven that technology can mimic attributes of human interaction and serve as a persuader (Cugelman, et al., 2009a). For example such interaction may occur in a dialogue support setting, when receiving feedback or guidelines that support the user through the intervention process.

Besides the advantages highlighted above there are many other important factors that a web-based environment could offer to an end user. For example, there are no issues of fatigue and forgetfulness (Fotheringham, et al., 2000) Furthermore, constant data updates and access for a service user, is provided and supported by online databases.

Moreover, young people who are most likely to drink at high risk levels (North West Public Health Observatory, 2010a) and are most at risk of binge drinking (Linke, et al., 2007) use new technologies and prefer Internet and mobile phones (Fjeldsoe, et al., 2009) rather than more traditional channels for health information and promotion.

## Engagement factor

The need to provide the information in order to receive feedback can require a long term involvement with the programme. This can be perceived as a burden to an individual and cause drop out and disengagement (Ritterband, et al., 2009 and Watland, et al., 2004). This leads to a discussion about the most important aspect of the web-based applications: engagement.

Various studies have concluded (Copeland and Martin, 2004; Linke, et al., 2004) that provision of general health / substance information alone is not as effective in promotion of behaviour change. Early studies have discovered that people who received behaviourally based self-help materials did better than those who received only general advice (Heather, et al., 1990).

There are many ways to create engagement with a target group. Web-based interventions should be designed to personalise and tailor interventions to their specific needs (Cunningham, et al., 2005 and Watland, et al., 2004). According to the research, the ability to personalise and tailor content to an individual's needs has shown an impact on behaviour change outcome and, it suggests further engagement with the application (Bewick, et al., 2008 and Ritterband, et al., 2009).

Also, provision of feedback can serve as an important form of reinforcement, which accordingly can help motivate users to learn and progress through the programme (Ritterband, et al., 2009). Moreover, current technology allows the measurement of; progress, responses and web-based intervention usage patterns that reports user engagement with the programme and can suggest further appropriate intervention (Watland, et al., 2004).

Interactivity plays a major role in engagement. Interactivity can be achieved by using various technology applications and multimedia experiences (use of Flash programmes, interactive responses, email reminders, etc.) (Walters, et al., 2006). Also the ability of the technology to monitor, measure and manage information to deliver feedback has created a new level of engagement (Bond, et al., 2007). A study by Kypri, et al. (2008) has revealed that it is important for participants to receive periodic feedback about their progress over time.

Also when Ramachandran and Canny (2008) compared two speech-based information systems, the dialogic system was found to be more persuasive than the lecture system. For example, this suggests effectiveness of 'chat room' or 'dialogue speech bubble' applications that can be used as one of the multi media experiences (Walters, et al., 2006).

## Source credibility and behaviour change theories

Application developers should not forget two of the basic aspects of effective engagement - credibility and content.

Credibility can appear in various forms and exceptionally important factors according to Fogg (2003) are accurate data measurements and representation. This could contribute to trustworthiness and expertise that accordingly could shape credibility and trust (Cugelman, et al. 2009b).

Various studies regarding 'credibility factors' online (Ritterband, et al. 2009) and empirical research measurements justify the correlation between source credibility and behaviour change (Cugelman, et al. 2008 and 2009b) Therefore, when interactive applications are developed it is strongly recommended that all aspects are evaluated to ensure credibility (accurate data, credible message sources, 'believability' factors, attractiveness, etc.).

Content is one of the factors securing credible perception and in various cases content would serve as the most important component. However, there are a few aspects influencing content structure and the deliverable message.

Content can be developed for the initial assessment of alcohol consumption behaviour as well as to identify behavioural intent (Liang, et al., 2006). Different forms of survey techniques would help thoroughly investigate behavioural characteristics as well as trigger necessary feedback. This could be recognised as Identification and Brief Advice (The AERC, 2010) and the ensuing information would reflect structured advice as required by Alcohol Commissioners.

However, if an individual wishes to engage with a web-based self- help tool, the content would likely increase in its complexity, because the aim is to change one's behaviour which is often perceived as a long-term process (Boyce, et al., 2008).

It is widely acknowledged that web-based interventions do apply various behaviour change theories to inform the content. However, evidently there is no common pattern emerging that would suggest the right combination of the most successful theories (Cugelman, et al., 2009a and Ritterband, et al., 2009).

In most studies theory-based interventions do apply multiple behaviour change models; including Health Belief Model, Theory of Reasoned Action (Cugelman, et al., 2009a and Liang, et al., 2006), Cognitive Dissonance Theory, Goal-Setting Theory (Consolvo, et al., 2009), Relapse prevention (Cugelman, et al., 2009a), etc. In some cases the application of The Transtheoretical Model as well as Social Cognitive Theory is suggested by various scholars (Consolvo, et al., 2009; Cugelman, et al., 2009a and Fjeldsoe, et al., 2009) and Liang, et al. (2006) who argue that The Transtheoretical Model in comparison with other behavioural theories is more intervention-oriented and can be more applicable for the design of an intervention program. Also Consolvo, et al. (2009) have concluded that The Transtheoretical Model is often applied by designers of persuasive technologies.

However, Cugelman, et al. (2009a) conclude that interventions are normally composed of distinct behaviour change techniques and planners are not always able to identify which combinations can improve effectiveness.

Moreover, in a recent publication academics and practitioners from the USA (Ritterband, et al., 2009) have recognised the issue of a missing link that explains to Internet intervention developers the synthesis of web-based intervention development and behaviour change theory application. Thus, scholars have suggested 'The Internet Intervention Model' that brings all the potential disciplines together including evaluation of; user characteristics, environmental influences, website and its use, support for the user, mechanisms of change, behaviour change and behaviour maintenance.

To conclude, scholars and practitioners have suggested use of various theories and models for Internet intervention development. However, findings suggest careful examination of the most appropriate behaviour change theories when web-based interventions for alcohol misuse are developed and designed.

## **Limitations and barriers**

There is no doubt that the development of effective web-based interventions for the delivery of brief advice and self-help tools is a challenging and thorough task that requires multiple skills, specialist knowledge and understanding about technology, communication theories, behaviour change aspects, etc. Although research in this field has collated meaningful evidence about web-based intervention effectiveness (Bond, et al., 2007) there are still a number of limitations highlighted by practitioners.

In a systematic review paper (Bewick, et al., 2008) that discusses the effectiveness of web-based interventions for the reduction of alcohol consumption, scholars have concluded that some research studies lack quality and accuracy of information. Also there is no clear evidence as to which elements of feedback is the major force in behaviour change.

Moreover, assessment of behaviour maintenance after completion of the interventions should be a focus for future research (Fjeldsoe, et al, 2009). Evaluation and measurement of computer applications is also crucial in order to identify and promote the most effective ones (Walters, et al., 2006).

On the one hand, web-based intervention designers must recognise that both technology and content development costs can be high (Walters, et al., 2006). These would depend on the software or program's complexity as well as the depth of the research and any specialist consultant involvement for content development. Also licensing of the product can involve ongoing costs for practitioners / commissioners / service providers and any other governing bodies.

The ongoing evaluation of the program's impacts is strongly suggested so anyone who pays for the development or licensing could justify the costs. As discussed before, web-based interventions are still lacking strong evidence about various aspects of intervention effectiveness (what feedback triggers change, what theories to apply, what applications are most effective) (Bewick, et al., 2008). However, the technological advantages offering measurement and assessment of interventions can provide practitioners with credible data about the participant progress (Consolvo, et al., 2009) and the programme's results.

On the other hand, without any doubt, most of the research in the field emphasises the cost effectiveness of the delivery of interventions via direct web access from the computer or mobile phone (Copeland and Martin, 2004; Demiris, et al., 2008; Liang, et al., 2006; Linke, et al., 2007; Ritterband, et al., 2009 and Walters, et al. 2006) which is crucial when governing bodies need to consider limited funding and the expense of effective service delivery.

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