An Argument for Using Participatory Approaches for the Design of Online Health Interventions Targeted At Young Women

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Keywords: Participatory design, PICTIVE, paper prototyping, e-health promotion

Abstract
The Internet is becoming an increasingly important portal to health information and means for promoting health in user populations. As the most frequent users of online health information, young women are an important target population for e-health promotion interventions. Health-related websites have traditionally been generic in design, resulting in poor user engagement and affecting limited impacts on health behaviour change. Mounting evidence suggests that the most effective health promotion communication strategies are collaborative in nature, fully engaging target users throughout the development process. Participatory design approaches to interface development enable researchers to better identify the needs and expectations of users, thus increasing user engagement in, and promoting behaviour change via, online health interventions. This article introduces participatory design methods applicable to online health intervention design and presents an argument for the use of such methods in the development of e-Health applications targeted at young women.

Introduction
Chronic conditions such as cancer, cardiovascular disease, and diabetes are the leading causes of morbidity and mortality in North America. These conditions are largely attributable to lifestyle risk factors (i.e., smoking, poor diet, sedentary lifestyle)¹ which are often established during childhood and adolescence²³ and persist into adulthood. While limited, research suggests that e-health promotion interventions are an effective means of targeting behaviours such as smoking⁴⁵, alcohol use⁶, physical activity⁷, nutrition⁸, and sexual risk behaviors⁹⁻¹¹. Adolescents and young adults view the Internet as an important source of health information¹² and are amenable to engage in e-health promotion programs¹³. Their preference, however, for gender-specific design and content¹⁴,¹⁵ highlights the need, for example, for developers to
engage young women in the development of websites that are successfully tailored to meet young women’s specific design and content preferences.

**Participatory Design and Paper Prototyping**

Participatory design (PD) is a software user interface design approach that is derived from participatory action research (PAR). It draws upon a variety of research methods that allow for the inclusion of multiple voices in the software design process\(^{16}\). Central to participatory design is the notion of democracy; PD empowers users by treating them as experts and encourages them to play a central role in design decision-making by actively participating in the design process. In contrast to other user interface design approaches such as user-centred design, which posit that design is conducted on behalf of users, PD is completed with users\(^{17}\). As a result, users involved in a PD process become an important source of design innovation. PD uses an iterative approach to engage users in the innovation and design process not only during the early stages of problem specification and solution identification, but also during system development and subsequent evaluation. Consequently, PD approaches have been used in several studies to design and test e-health interventions\(^{18-22}\).

An example of a PD approach is PICTIVE (Plastic Interface for Collaborative Technology Initiatives through Video Exploration) – a widely adopted paper prototyping technique used to facilitate user participation in the design process\(^{23}\). Developed by Belcore in the 1990s and popularised in the same decade, PICTIVE is a low-tech approach which allows participants to work as equal partners with designers in the creation of user interface prototypes\(^{24}\). Using ordinary office supplies, users work together on a design surface to create a paper prototype in an informal game-like atmosphere, promoting the sharing of diverse ideas and insights\(^{25}\). As a result, the PICTIVE process has been described as both an enjoyable and a valuable experience by participants\(^{23}\) and software engineers\(^{24}\) alike.

The low-tech brainstorming design aspect of PICTIVE is combined with high-tech video recording of the process. A video recorder (mounted on a tripod and focused on the design surface) is used to accurately and comprehensively capture all user discussion during design sessions – thus it includes a record of the rationale users provide for each design decision reached throughout the process. The video recording from a design session is analysed by the designers in order to develop, based on the participants’ discussion, a prototype of the system.
This prototype is then introduced to the subsequent design meeting and further refined on the basis of participant feedback; this process continues in an iterative fashion until all participants agree that the resulting prototype accurately reflects their needs and specified user requirements. Given the costly nature of website development, paper prototyping is an efficient and cost-effective way to test interface designs and inform design modifications; it also provides some assurances to developers that the system will be usable by, and acceptable to, target end users.

**Benefits and Challenges of Participatory Approaches to Interface Design**

User involvement is widely encouraged for the development of usable interface designs, and is generally associated with positive effects on user satisfaction coupled with more accurate identification of user needs. Damodaran suggests that effectively involving users in the quantitative aspects of the design process (paper prototyping) leads to benefits such as: (1) improved systems since they are more accurately based on user needs; (2) the prevention of development of costly systems that are not relevant or engaging to the user; and (3) increased user engagement with, and sustainability of, the final system.

Although limited, evidence suggests that developing effective e-health promotion interventions for young women is contingent on understanding their specific views about design, content, and navigation. For this demographic, consultation with representative young women would help developers identify important system features to include and others to avoid. It would thereby ensure the effective presentation and inclusion of appropriate website functionality, and typically lead to increased (a) levels of user acceptance and (b) likelihood that the developed website will ultimately be successful.

Involving users early on in the interface design process enables designers to better understand user requirements. This increased understanding typically results in systems that are more relevant and engaging to target users and that increase user satisfaction and the likelihood the system will have a sustainable impact on target behaviours. For instance, the usability of health-related websites can be impaired by issues like poor health literacy, related to this, research findings suggest that participation of, and consultation with, functionally illiterate adults during the design process can result in the development of applications which present more appropriate and user friendly interfaces to users.
The fact that PICTIVE design sessions are videotaped is advantageous in that the video records provide a “social record” of the design process. Compared to other forms of record keeping (e.g., note-taking) video records are an effective means by which to reassure participants that their views have been captured without being too intrusive; it also allows all team members to actively participate in the design process without some members being constrained by the need to take notes. As well as capturing the final conceptualisation of an interface design, the video records used in PICTIVE provide a comprehensive record of the conversational and physical manipulation of the paper prototype throughout the design process.

Despite obvious benefits, user involvement in interface design using a PD approach is not without challenges. Using PD approaches like PICTIVE it can take longer to reach a consensus on design decisions: consensus is a necessary requirement for design decisions using PD approaches but this is not always easily achieved, and may require substantial time to be spent by the design team on reaching agreement. PD approaches are also more inclined to encourage a focus on abstract and less technical aspects of interface design. Additionally, if the group of participants chosen is not carefully selected to represent the larger target population, there are risks associated with a small sample of users impairing relevance to more heterogeneous populations. PD approaches also present challenges associated with human communication, which may be particularly challenging when working with, for example, users with special needs, limited computer experience, and poor literacy. As such, designers involved in PD approaches need to be skilled at articulating to users what is required of them during the process and to possess excellent group facilitation skills.

The Future Use of Participatory Design In Online Health Intervention Design
A clear goal of e-health promotion interventions is the elicitation and sustainability of healthy behaviours. By affording anonymity, the Internet can empower young people to gain the information they need to make important health promotion and treatment decisions and thus enable them to make informed lifestyle choices. As such, there is a rapidly emerging desire among behavioural researchers to develop online health promotion strategies that target younger populations. To date, however, these approaches have only shown modest positive effects, and attrition rates are highest among the most at-risk members. This lack of success highlights the need to develop health-related websites that are more engaging to
young users.

Women of all ages are more inclined than men to search the Internet for personal health and fitness information\(^{43}\), and the Internet has become the number one source of cancer risk information for young women\(^{12}\). Despite a rapidly growing number of e-health promotion interventions, researchers currently have a very poor understanding of (1) how to effectively engage young female users in these online programs and (2), what factors motivate long-term changes in their behaviours. Thus, an opportunity exists for researchers to include young women in the design process for online health interventions aimed at this demographic – an avenue of research has arisen to use participatory approaches to website design in order to explore the effects of early user (specifically, young female) involvement in the development of e-health promotion strategies.

While there is a growing interest among researchers and website developers to consult with target users during the development process for online health interventions, much of the research to date does not utilise a PD approach. Most e-Health application interface designs continue to be developed based on limited consultation with target users, resulting in reduced functionality, usability, and poor user uptake\(^{44}\). While health-related websites tend to be user-centred, they are not typically designed specifically by the user. Website designers often fail to involve users in the design process and instead attempt to simply interpret the needs of users. The result is that many websites adopt a generic appearance and do not effectively reflect the specific needs and preferences of given user populations such as young women. This mismatch between what sites offer and the requirements and/or preferences of their target populations highlights a growing need to get users engaged in the development process for online health interventions. PD approaches represent an ideal mechanism by which to avoid the mismatch between designers’ understanding and users’ needs in the design of online health applications by empowering users to become full participants in the design process\(^{23}\) of health-related applications that could have a profound effect on their own lives and the lives of their contemporaries.

Although prototypes can play an extensive role throughout the design process for online health interventions, research to date has tended to focus on the role of prototypes in the formal evaluation of user interface design. In many cases researchers have simply evaluated the usability of prototype websites (in terms of navigation, design, and content) by consulting
young target users via online survey tools\textsuperscript{9,14,15}; users have not been considered integral to the
design of the prototypes themselves. To date, little research exists about the use of prototypes
to discover and generate designs or explore design decisions in the field of online health
interventions. This underscores the need for more PD research that fully engages users – and
especially young women – in the entire interface design process for such applications. The
anticipated result of using PD approaches in this way will be better quality systems that are
attractive, relevant, and engaging to the target user group, thereby increasing user satisfaction
and the likelihood that young women will engage in desired health behaviours that will be
sustainable over time.

\textbf{Conclusion}

As e-health initiatives continue to emerge as an important means of extending healthcare
services to diverse populations, mounting evidence suggests that engaging users in the
interface design process results in more effective systems which are powerful in their capacity
to motivate healthy behaviour change. Although young females are the most extensive users
of online health information, the interfaces to the majority of online health interventions
targeted at such users fail to meet their measures or relevance and to effectively engage these
users. The needs and preferences of young women have not, to date, been adequately or
appropriately considered during the design of such interventions. This highlights the need to
engage young women in the design process for online health interventions. An argument has
been made in this article for research into the adoption of participatory design approaches –
taking PICTIVE as a candidate method – with young women to design online health
interventions that match their specific needs and preferences and thus stand a greater chance
of engaging young women, of resulting in increased user satisfaction and adoption amongst
young women, and ultimately in affecting positive health-based behavioural change in young
women. Our current research is doing just that: we are adopting participatory design
approaches for the development of an online health intervention to promote cervical health
amongst young women. As a result of our study, we hope to deliver an online health
intervention that engages young women and which affects positive cervical-health-based
behaviour change. Furthermore, we anticipate being able to provide some design approach
guidance to others who are actively engaged in the design of targeted healthcare applications.
References


