



Understanding uptake to support mobile service design - towards a practical model to assess the uptake of a mobile application supporting clients with drug and alcohol addiction

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Abstract

'eRecovery' is a suite of software providing an adjunct to clinical support for clients with a substance addiction to help manage relapse behaviour. As part of working on the design and implementation of a 24-month trial of eRecovery, we have created a practical, situated model of the uptake and use of the client facing mobile application software. The model supports organising, visualising and communicating the adoption, appropriation and on-going routine use of the technology. Factors at each stage in the model provide positive and negative tensions that determine whether and how a client progresses from one stage to the next.

Keywords: service design, technology uptake, appropriation, mobile, alcohol and other drugs, justice

Introduction

The health sector has made substantial progress in the use of mobile technologies to support health care practitioners and health care consumers by translating already established eHealth systems into mobile channels (Istepanian, Jovanov, & Zhang, 2004), and comparable developments are evident in the mental health sector (Luxton, McCann, Bush, Mishkind, & Reger, 2011; Mucic, Hilty, Parish, & Yellowlees, 2016). In contrast, justice services have been slow to see the potential for mobile technologies.

This research, set in the context of a person managing substance abuse, questions how best to organize, visualize and communicate information about the uptake and use of mobile software provided to assist clinical counselling where the objective is to provide early indicators of the efficacy of the trial software and to inform and educate future trials and the rollout of the service throughout the justice sector. The approach used a general model of technology appropriation with discrete stages as a template and gathered data to inform aspects of the model within and between the stages through the journey of substance relapse prevention in a forensic context.

The Neighbourhood Justice Centre (NJC) is a 'one-stop-justice-shop' serving the City of Yarra comprising a court, support services, and specialist teams focused on crime prevention, innovation and education. This trial of relapse prevention software (eRecovery) at the NJC in Collingwood, Australia represents an opportunity to examine the service design practice issues associated with the use of mobile applications as an adjunct to clinical interventions for forensic and community clients.

Successful recovery from substance abuse involves developing effective coping responses to high-risk situations, and experiencing a sense of self-efficacy as a result. It has also been argued that a measurement of efficacy based on qualitative studies that focus on people's experience with technology can provide effective early feedback on the efficacy of the intervention (Klasnja, Consolvo, & Pratt, 2011). They explain that especially in early stages of development, a deep understanding of the *how* and *why* of the system use by its target users should be a central goal for evaluation of systems for health behavior change. They also contend that the resulting design knowledge is arguably the biggest contribution the field of Human Computer Interaction can make to the development of effective systems in domains such as this. Thus, key questions for the

eRecovery trial are whether users adopt, appropriate and develop patterns of routine use of the application in a manner consistent with a self-governing relapse prevention model.

eRecovery trial and Connections mobile application

Developed by the Center for Health Enhancement Systems Studies at the University of Wisconsin and commercialised by CHES Health, eRecovery (Gustafson et al, 2014) is a scientifically established behavioral health intervention for AOD addiction. It is based on cognitive social learning models of relapse prevention as described in Larimer, Palmer and Marlatt (1999) and Donovan and Witkiewitz (2012) that see people as active participants in a process of identifying precursors of a lapse and taking action to prevent it.

Since February 2019, any client of the NJC who is concerned about their substance use can participate in the eRecovery program. Most people enrolled in the trial have been charged with offences and are awaiting a hearing or have been sentenced to a community corrections order.

Connections is the client facing mobile application part of the eRecovery suite of software that assists clients in their recovery by providing a 24/7 support system in their pocket. Clients can customise the Connections app with their treatment plans, relapse triggers, intervention strategies, motivational drivers, and services and people to contact when a crisis arises. Features include: discussion groups; appointment and medication reminders; GPS-enabled warnings of high-risk locations; weekly recovery progress tracking through surveys; “Beacon button” access to a 24/7 helpline; goal setting, and a variety of content.

Need help in your recovery journey?

Recovery is about progression, not perfection.
There are many pathways to recovery.

Connections is a new app to support people who are having treatment for alcohol and other drug issues.

The Connections smart phone app

- Install on your smartphone
- Send messages to chat individually or in a discussion group
- Get to know and support one another in teams organised by your worker
- Plan for appointments and medication with reminders and a calendar
- Discover stories and audio visual tools to motivate and inspire you
- Find support near wherever you are
- Set goals, remember motivations and keep a journal of stories and moments
- Receive daily inspirational thoughts
- Check your progress weekly
- Always at your fingertips. No one has to face addiction alone.



Figure 1: eRecovery Connections application

Clinicians use an accompanying Companion app to interact with their clients by sending messages or pushing medication or appointment reminders to them. Clinicians also receive dynamic updates through survey results that provide insight into client behaviour.

Research process

The research process entailed identifying a template model of general technology appropriation for the eRecovery trial context and collecting and

analyzing data to understand and categorise the important factors governing processes within and progress between each stage.

The template model of appropriation is based on a general technology appropriation model by Carroll, Howard, Peck, & Murphy (2003) incorporating stages of 'technology as designed', 'technology in hand' and 'technology in use'. However, the influencing factors in this model, situated in general use of mobile devices by young people aged 16 – 18 at the introduction of mobile technology to society was less relevant. A contrasting model with different factors influencing behaviour within and between the stages is exemplified in the study of mediating behaviour change in smokers as proposed by Smith, Ploderer, Wadley, Webber, & Borland, (2017). This work proposes a model describing relevant engagement factors during the use of the technology and along with non-linear trajectories including '*productive engagement*' based on positive reinforcers, negative reinforcers that contribute to '*counterproductive engagement*' and consideration of the end of use conceived as '*productive*' or '*counterproductive disengagement*'. The uptake model proposed in this paper aligns with some of these findings as relevant factors for managing relapse behaviour in relation to substance addiction.

Data to validate the model and identify relevant factors at each stage were collected from:

- Interviews with clients, clinicians & workers (1-month, 3-month and 9-month)
- Surveys
- Mobile application usage reports
- Minutes of project meetings

Participants were required to sign carefully constructed and reviewed consent forms prior to participation. No personal or identifying data was entered or collected and participants used a non-identifiable alias for all communication, interviews and surveys. Participants were not allowed to communicate any data that would identify or locate them. Finally, data collected for this research concerned only technology usage and excluded any clinical information.

At September 2019, 23 clients were participating in the trial with 21 actively using the Connections application. Client interviews conducted

include 6 x one month, 6 x three month and 3 x nine month. 17 baseline client technology survey responses had been recorded and 9 clinician and worker interviews had been conducted.

Findings – Forensic Evaluation Model

The model reflects uptake of technology by clients with three stages: **adoption** (Figure 2) where the technology is designed but as yet unused; **appropriation** (Figure 3) where the technology is in the hands of the client and being learned and evaluated; and finally, **routine use** (Figure 4) where the technology is regularly used within some sort of routine. At each stage the model exposes tensions through positive and negative influences that contribute to the pathway taken into or out of that stage. If the user is satisfied in the current stage, uptake and use of Connections proceeds to the next stage. If negative influences outweigh positives, the technology is rejected and use ceases. Each stage of the model is explained below.

Adoption stage – Technology as designed

Clinicians and workers introduce the app to clients by way of an information flyer (Figure 1) and a physical demonstration of the app. Clients are then taken through the joining-up process of completing the consent form, downloading the app and signing in. Positive and negative influences on adopting the technology are proposed as ‘*barriers*’ and ‘*motivators*’ first identified when Connections is introduced to clients through to when a client has completed the joining-up process (see Figure 2).

Analysis of data identified adoption barriers broadly categorized into three groups. ‘Access’ barriers address physical access to a smartphone device or data, access to identity documents required to register a SIM card (i.e. drivers licence, Medicare card etc), and sufficient literacy and knowledge of technology to participate.

‘Value’ barriers lead to non-adoption where clients decline to participate in the trial. The main barriers emerged as some combination of clients not believing participation would impact their recovery, reporting that they didn’t have time, or simply were unable to see any value in engaging in any activities outside their mandatory correctional order requirements.

Finally, a lack of 'Trust' in either the eRecovery trial or the justice system more broadly was a significant barrier for some clients. For example, some participants expressed concern that using the optional GPS-enabled feature to provide alerts when entering a 'high risk' location was in reality a covert means of tracking/surveillance. Whilst this feature was designed to be a personal warning system rather than a monitoring mechanism, it was found to be a strong disincentive to some clients to join up to the trial.

Conversely, motivating influences emerged and were grouped into three categories. 'Organisational' motivators support clients entering and managing personal reminders for medication and scheduling appointments with clinicians or workers in a personal calendar.

'Communication' supports one-on-one messaging and group discussion client to clinician and client to client.

Finally, 'Personalisation' features in the application enable clients to directly enter and easily access motivational content such as pictures of family, video recordings, a list of important support contacts and journal entries.

The model illustrates the tension between barriers and motivators and the resulting 'non adoption' where the technology is rejected before use, or the path to first use of the Connections application.

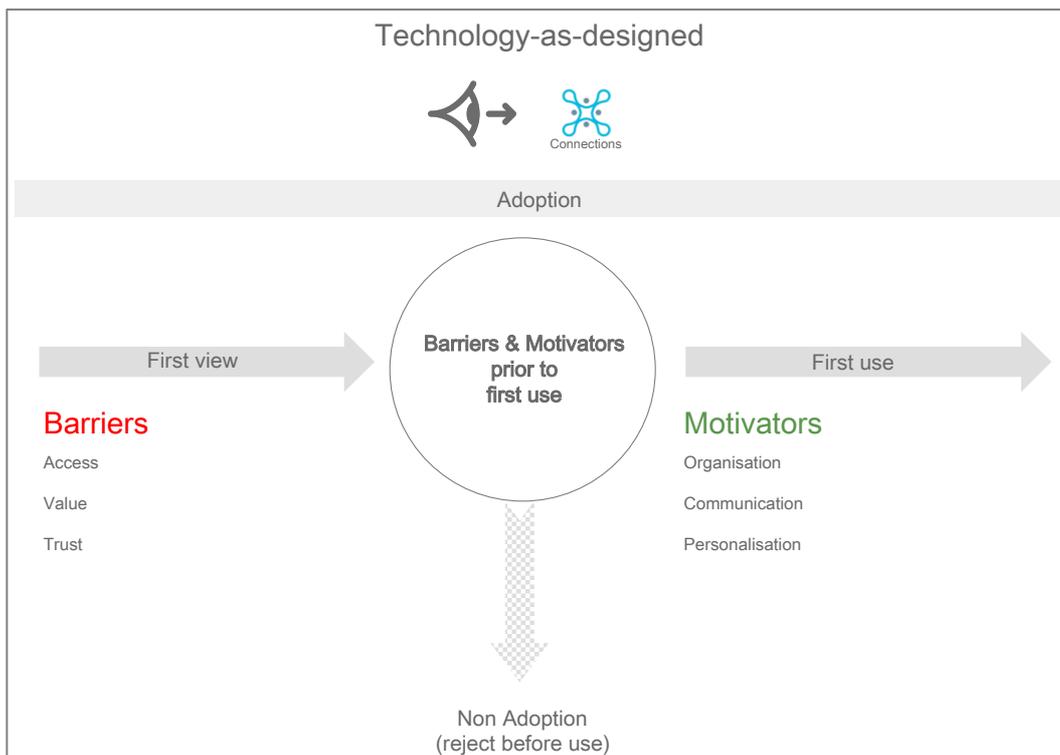


Figure 2: Adoption (technology as designed)

Appropriation Stage – Technology in hand

Following the joining-up process, participants explored, learned and personalised features during their first period of use. Influencing factors during this stage are positioned as *'hindrances'* and *'supports'* and grouped into categories. *'Access'* hindrances reported during approximately the first month of use included phone-charging difficulties for clients who are homeless, and low literacy creating difficulties for a client to read and understand the app and also to fill in the surveys.

'Localisation' hindrances included accents that were difficult to understand; therapeutic focus of content (e.g. the abstinence model in the United States versus the harm-minimisation approach in Australia); and cultural issues such as content with a strong religious theme.

At this stage in the trial, whilst workers were seeding group discussions and receiving some replies, there were not the numbers or organisational resources in place to run a mature online community.

Conversely, categories of influences supporting appropriation also emerged. *'Organisation'* features anticipated as motivators prior to use

were reported by clients to be beneficial in making clinical appointments and setting reminders to take medication.

As expected 'Communication' features emerged as enabling participants to message their clinician or worker about clinical matters or easily change appointments. Whilst client to client communication did not manifest, the feature was one of the most visited in first month of use.

Also as anticipated, 'Personalisation' features were used for motivational entries and inputting personal support contacts. Other personalization features such as GPS-enabled warning feature for high-risk locations was reported by some to be a very useful feature.

Finally, the immediacy of the mobile application emerged as a category of support.

“Bit more confident. There is immediate support. Comfortable - stress levels are low and a lot more self control” Client 10

The model illustrates hindrances and supports resulting in either 'dis-appropriation' or proceeding to 'Routine Use'.

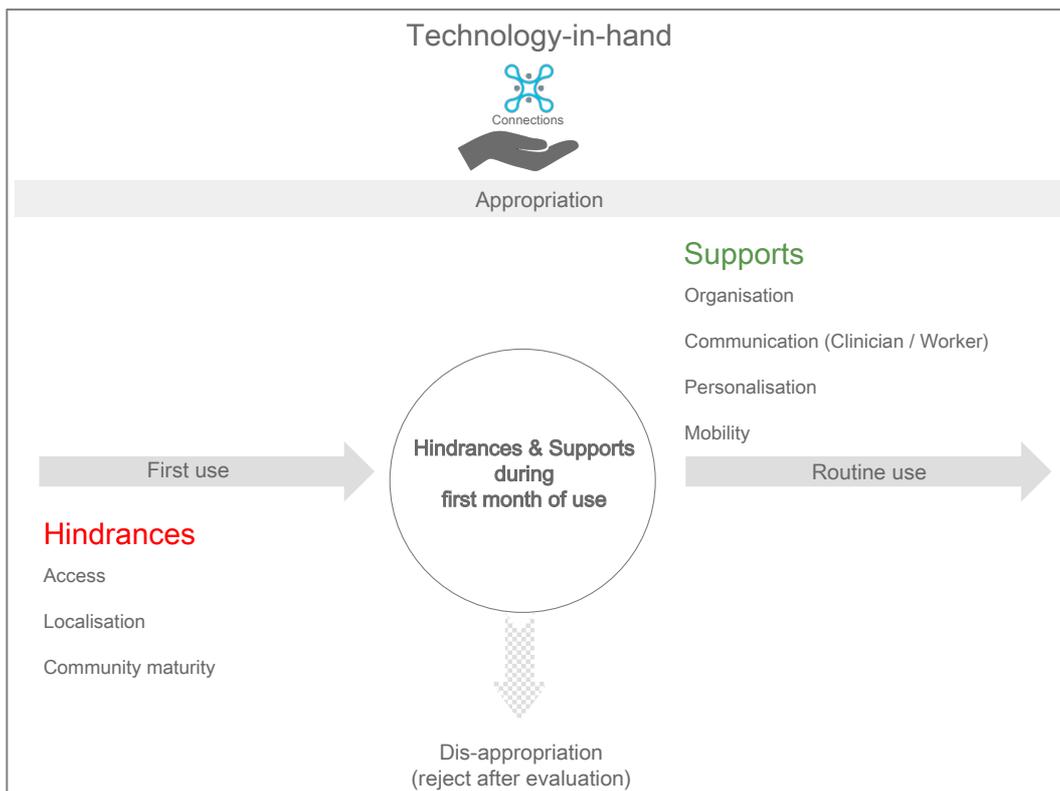


Figure 3: Appropriation (technology in hand)

Routine Use Stage – Technology in use

The final stage of the model considers the technology to be in routine use (see Figure 4) with positive reinforcers encouraging '*productive engagement*' and conversely, negative reinforcers contributing to '*counterproductive engagement*' (Smith, Ploderer, Wadley, Webber, & Borland 2017). End of use is considered in the model leading to the participant abandoning the software or being barred from use, thus experiencing '*counterproductive disengagement*'. Smith et al. also identified an additional pathway based on the idea that use of this type of software may not continue indefinitely despite a period of productive engagement and at some point '*productive disengagement*' occurs. In this case, the participant makes a conscious decision to cease using Connections as a positive part of their recovery process.

A productive engagement reinforcer that has emerged thus far is 'Structure and cadence' where routine use of the app is reported to provide a framework to structure the entire day of the participant, starting with reminders and prompts for appointments received in the morning.

“Sets the morning routine. I get up, check the app, take my medication, answer the survey. Now that I have the app back I'll be getting back into the steady routine again” Client 3

Another participant found the cadence of the sobriety notification provided positive reinforcement.

“It's cool to have this thing that counts every day [of being sober]. I don't have to cross anything off a calendar. It just tells me 'hey it's been 63 days'. Even just for that, I would keep it [the app] if I got a new phone or finished my order.” Client 5

A second reinforcer is ‘Enriched face-to-face therapy’. Clinicians reported data from routine surveys allows them to prepare for client sessions and better understand the behavior and attitude of their client. This means clinical sessions can be more focused on therapy.

“It [Connections] covers off on stuff that we many not always raise. Gives us an insight into when things are falling apart that we may not always ask about - we get a notification about it, so know to follow up. E.g. we assume housing is stable unless told otherwise, however [their] response in app is opportunity to see this.” Clinician

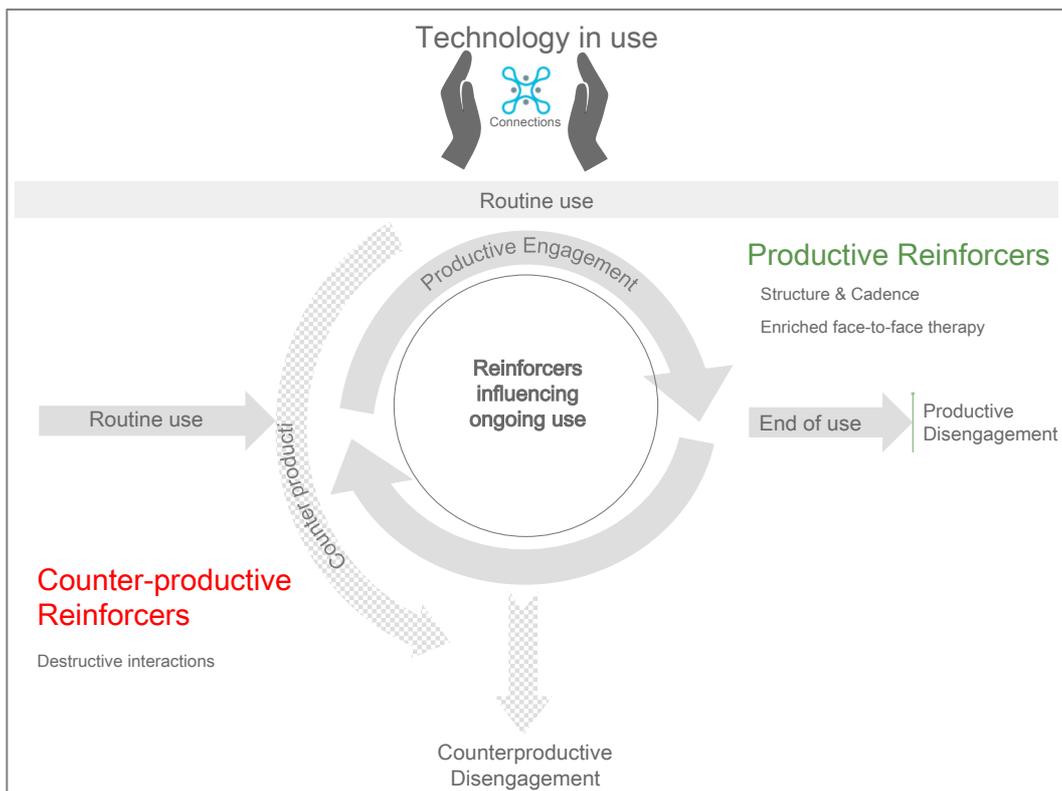


Figure 4: Routine Use (technology in use)

Conclusion, Limitations & Next steps

The model provides a mechanism to organise, visualize and communicate tensions at each stage of the uptake of technology in a forensic context. It enables the practitioner to clearly and practically think through positive participation as well as the various reasons for participants not starting or abandoning the trial. The sensitive context of justice and AOD recovery provides a particularly sharp focus to consider these factors, however it is hoped that the structure of the model will have broader application to other areas in the justice and health domains.

The trial has sixteen months to run. Thus far, it has produced enough data to form the structure of the model and populate most of the significant positive and negative factors relevant to the adoption and appropriation of the software. While it has produced some data to populate factors relevant to routine use, there have not yet been enough participants progress to the 'Routine' – Technology in Use' stage of the trial to identify a comprehensive set of factors. For example, there are potential positive

reinforcing factors that have been discussed by clinicians such as 'Reduction in isolation'. Clinicians have reported that isolation is one of the significant problems many of their clients suffer and other studies have reported that messaging for social connection was the most used feature (Johnson et al. 2016). It is an opportunity for further work to refine the model as the trial progresses and to apply the model to similar relapse support situations where a critical community mass and routine use of peer communication has been established. The effect, if any, on reducing isolation and other factors that might emerge from routine use provide an opportunity for further work.

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