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StreetWise: serious gaming for FMH

Full title: StreetWise: developing a serious game to support forensic mental health service users'

preparation for discharge: a feasibility study

Short title: StreetWise: serious gaming for FMH

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Introduction

Forensic Mental Health [FMH] services are tasked with ensuring public safety whilst supporting service user recovery and reintegration into wider society. Due to past histories of offending behaviour, FMH service users are often detained under the Mental Health Act (2007) within secure settings where they are monitored and their freedom and self-governance is limited. Restricted community access makes risk assessment and skill development for community living problematic. The measures of control and security inherent within FMH services pose a challenge to social integration and recovery, whereby users feel empowered with self-efficacy to work towards their own goals with hope and optimism (Simpson & Penney, 2011). Additionally, detention in secure services leads to isolation from the community which adds risk and stigma to the complexity of the service users' journey of recovery.

This feasibility study explores how new technologies may be used to support FMH service users on their journey to recovery. A prototype serious game was co-produced with FMH service users with the aim of enabling service users to engage safely with community based scenarios and begin to develop skills for community living and consider self-management in risky situations whilst detained within a secure environment.

Ecological validity of risk assessment and rehabilitation in FMH

The predictive accuracy of risk assessment in FMH settings is fraught with problems where even the best actuarial measurement tools perform substantially below that which is commonly acceptable in other branches of healthcare (Swanson 2008). Reviews have repeatedly noted significant limitations of measurement scales and poor quality assessments with a consistent recommendation that scales are not used for routine clinical practice and calling for a focus on the individual patient (Quinlivan et al 2016)

However, it is even more problematic to make judgements regarding risk post-discharge when the service user is detained within a highly controlled environment (Davies et al., 2008, Heyman et al., 2013). Secure environments limit the opportunities for service users to develop social skills and practice coping techniques. Additional restrictions make using technology for social or therapeutic activity in FMH services problematic and further compound users' disconnection from the outside world. Thus providing ecologically valid therapies and risk assessments, which are relevant to real life situations is an ongoing challenge for service providers (Reynolds *et al.* 2012).

This study aimed to explore the feasibility and acceptability of a serious game as a therapeutic tool in planning for the discharge from FMH services. The development of the game was conducted in collaboration with FMH service users who drew on their *in vivo* experience to obtain a realistic virtual environment.

Recovery and risk in FMH

Recovery

The concept of recovery in mental health was initially developed by service users and has led to disparate conceptualisations (LeBoutillier et al 2011) but broadly refers to 'a way of living a satisfying, hopeful, and contributing life even with limitations caused by illness,' while developing new purpose or meaning (Anthony 1993:p527) The importance of addressing service users' personal recovery alongside more conventional ideas of clinical recovery is now supported in guidance for all key professions (Slade 2009).

However, the implementation of recovery principles such as instilling hope, regaining control over one's life and building a life beyond illness within secure forensic settings (Drennan et al 2014) is problematic as services are tasked with ensuring public safety through security measures which reduce patient autonomy, and risk assessment processes which must focus on negative aspects of service user behaviour such as violence and criminal offences.

For example, the HCR20 (History, Clinical, Risk, 20 risk factors) is a structured violence risk assessment tool commonly used in a FMH services (Douglas et al 2013). The twenty key risk factors of the HCR20 are weighted towards historical behaviours or attributes, which the service user is unable to change. However, despite these challenges there is a growing literature on recovery in forensic mental health services, with the development of recovery colleges, peer support and recovery-focused approaches to risk assessment in FMH services (Drennan et al 2014, Livingstone et al 2013, Mckeown 2016, Dickens 2015). A commonality in these is the development of safe communicative spaces to enable open and honest dialogue between users and practitioners (Godin et al 2007; Livingstone et al 2013). We suggest that serious gaming may also promote open communication whereby reactions to scenarios that reflect challenges in real life may be discussed without drawing directly on users' past behaviours.

Service user involvement in FMH research

Government policy has encouraged service user involvement for over 15 years (Department of Health, 2005 & 2006). A continuum of involvement levels covers consultation to genuine collaboration or partnership in the research process to service user-led research (Beresford, 2005; Hanley, 2005). A collaborative approach promotes empowerment and leads to a range of benefits for all involved (Simpson et al 2014, Staley, 2009). Involvement of service users residing in more restrictive forensic health settings is challenging (Sainsbury Centre for Mental Health 2008); however, FMH user involvement in service design, evaluation and research is now seen as a useful approach to improve services and enhance recovery (Drennan et al., 2014; NSUN/WISH, 2011).

Serious Games

Serious games are increasingly used in healthcare settings for therapy and staff training. A serious game uses a virtual environment as a base for exploration, role-playing and problem-solving. It has been suggested that by removing the spatial element of interaction, the mind is provided with a space to explore, in turn allowing the individual to grow in new and different ways (Dini, 2012). It is thought that through active, experiential, situated, problem based settings which provide immediate

feedback serious games provide an effective environment for learning (Boyle et al., 2011). There is a growing evidence base on games based learning and their use is linked to a range of positive cognitive and behavioural outcomes (Connolly et al., 2012). However, the efficacy of most games developed for use in health care have not been fully evaluated (Graafland et al.,2014; Mohr et al 2013).

Serious games have yielded positive outcomes as a therapeutic tool in various mental health settings (Santamaria et al., 2011). One example of this is the PlayMancer game (Fernandez-Aranda et al., 2012) which was designed to treat patients with impulse-related disorders by using biofeedback to help patients improve self-control and emotional regulation. The game was tested as a therapy component in a sample of service users with bulimia (Fagundo et al., 2012). Results suggested training to reduce arousal improved the participants' control over eating disorder symptoms. This study indicates that serious games can be effective tools within mental health services. Several studies, including randomised controlled trials have found virtual environments to be clinically effective in the treatment of both PTSD (Gonçalves et al., 2012) and phobias (Wrzesien et al., 2011). Computer based interventions have effectively reduced anxiety and depression (Cavanaugh & Shapiro, 2004; Opris et al., 2004); more recently there has been an increase in the development and application of such approaches within the mental health setting with virtual reality being used to explore factors influencing service users' experiences of paranoia (Freeman et al 2014) with the potential to develop theraeutic interventions.

Research indicates that serious games are also applicable in FMH services. Gooch and Living (2004) used video games in forensic settings and concluded that exploration in manipulated environments helps FMH service users develop coping skills. According to Stone (2008), simulations/virtual worlds enable challenging or hazardous tasks to be practiced in a safe, cost effective environments, although transferable skill development is dependent on the level of real-world fidelity. Despite promising evidence, serious game application in forensic settings is, so far, limited. Arborelius et al. (2013)

investigated the use of a computer simulation system for risk assessment. They found that the simulated environment was acceptable to service users and discovered differences in response styles between participants with mental disorder and healthy controls. Serious games have yet to be applied in the area of rehabilitation. Effective rehabilitation and recovery needs to deal with preparation for post-discharge life and forming realistic hopes and goals for the future. Treatment programmes often use role play as a technique for exploring difficult scenarios, but there are limited tools available that focus on preparing for the challenges of returning to the community.

Research Design

The study took place in one inner city low secure FMH rehabilitation unit for adult male service users. Ethical approval was given by the NHS Research Ethics Committee (REC No 13/NI/0209) and research governance approval granted which allowed access to the relevant services. Service user involvement was central throughout the project. Prior to commencing the project the games developer and researchers also explored initial ideas for the game and study with an established group of 14 mental health service users and carers (SUGAR) established and facilitated to collaborate and advise on research studies (Simpson et al 2014). The SUGAR group members have extensive experience of discussing a range of research studies and issues, although they do not have direct experience of using secure services.

The study was funded by City University London.

Participants

Service users were recruited from a low security forensic hospital in an inner London location, where the study was conducted between May and July 2014. Service user participants were (a) planning for discharge within the next twelve months, (b) capacity to give informed consent, (c) assessed by their clinical team as low risk.

The service users were given an option to be a game producer or a tester. All participants understood and spoke English. Eight producers and six testers were recruited. Service user

participants varied in their level of experience with computer games from having no experience to being an experienced gamer. Due to the nature of the research site all service user participants were male.

Eight service providers were interviewed. Three of these had managerial roles whilst five were clinicians (nurses, psychiatrists, psychologists, and therapists).

All participants gave written consent and the capacity and safety of the service users to participate was assessed by their clinical teams.

Procedure

The project had two arms: game development; and exploring service provider acceptability of gaming.

Game development

A production team of service user participants, researchers and a game developer was established. The production team adopted an established user-centred design process, in which service user participants, the game developer and researchers collaboratively created the design and construction of the serious game. The team commented on earlier versions of the software - both visual mock-ups and interactive game segments - to propose additions and changes to software features. In particular, the service user participants were encouraged to comment on the accuracy and authenticity of the player's interactions with different game characters - the physical demeanour and clothing of each character, the dialogue and accent, and responses to different player choices. Each new version of the game software enabled simple formative evaluations of the game's features and usability.

The service users in the production team participated in three focus groups where the nature of the scenario and the design of the game were discussed. The first session was concerned mainly with the

scenario itself. Topics of discussion focused on: challenging situations, positive and negative outcomes of actions, the environment and setting, positive or negative influences from peers. The two subsequent sessions had more focus on the design of the game, such as its name, the environment, character development and the script of each character.

The game was named "StreetWise" by the service user producers. Unlike similar games such as PlayMancer (Fernandez-Aranda et al., 2012) a realistic environment and dialogue were developed from the experiences shared by the service users in the development group. The setting is in an urban park and allows the player to interact with four different characters, through a first person view. The characters make positive, negative and neutral suggestions that test the player's ability and coping skills in the community. These include encouragement to engage in work, being offered illegal drugs or invitations to join in social activities such as having a coffee. Scoring depends on the player's choices and the nature of their next interaction will depend on the outcome of the first. If the player scores well, the scenarios progressively become more challenging and complex. For more detail see ███████████████

[Insert figure 1]

Evaluation

The evaluation took place in situ, using existing computers available within the forensic service. Participants tested the game individually. In the test room two computers were set up and service user testers used the game once whilst being observed by two researchers. The game developer was present to address any difficulties that arose. Notes were taken by the researchers as to the testers' reactions, difficulties and general game play. Once all of the service user testers had used the game a focus group was held and feedback on the usability the game and acceptability of serious gaming for forensic mental health services was sought. The focus group was audio recorded and transcribed.

Service provider acceptability of the game

Service provider participants were interviewed regarding their views on the acceptability of using a serious game to support forensic mental health service users to prepare for discharge. None of the service provider participants had used a serious game before. They were shown a clip of the game that had been developed and asked for their views on whether serious gaming may be used in forensic mental health services. Interviews were audio recorded and transcribed, or notes taken by the interviewer according to the preference of the participant.

Findings

Findings from the evaluation will be discussed in terms of the game's acceptability, and usability. Acceptability will be discussed with regards to how service users and providers evaluated using the game; usability concerns how participants interacted with SteetWise and how readily it could be used within a secure setting. The assessment of usability draws on the researchers' observations and service user self-reports of playing the game. Pseudonyms have been used for all participants.

1. **Acceptability**

Realistic

The importance of a game being realistic for service users was identified by both service users and providers. One of the provider participants clearly stated the importance of ensuring that service users could relate to the graphics used, but also that the outcomes of each scenario needed to reflect the complexity of reality:

> *Stuff they can't relate to…. Such as American street scenes….. it would not be helpful if it was overly optimistic or pessimistic…. if you get a job everything will be great* (Nurse manager Bob).

The relevance of the gaming environment was addressed by the production team at each development meeting. At the evaluation all testers felt that the gaming scenario was realistic, with the situations, characters and environment "as it would happen".

Yeah, one of the black men, you know what I mean? The black woman you could tell it was computer animated, but one of the men, it was really, really well done, it looked like a real person. (Tester Caleb)

Testers found the language that had been developed for the characters was realistic and expressed surprise to hear language similar to what they used.

Yeah, and even the lingo, like the action, was correct. The slang terms, everything was correct, that's how they're going to approach you. (Tester Brian)

Initially service providers were worried that the game would trigger an emotional response that would require therapy. This is in part reflected by service provider participants raising a need for gaming to integrated with existing therapies, and thus support systems which would work with service users' reactions. These concerns were allayed by the testers. Basing scenarios on service user experiences meant that similar situations already occurred when service users were escorted by staff in the community. This included being offered drugs.

Before I got my Honour's Code thing [unescorted leave] *I was escorted first, and I was out with this member of staff and a guy just came, a Jamaican guy came up to me and he just said to me do I want anything? And I just tell him look no, no, I don't want nothing, you know, so they do it blatantly.* (Tester Caleb)

Developing skills

Another service user also commented on the potential for the game to support him to develop skills to manage *temptations*, such as being offered drugs or money to engage in illegal activities.

Yeah, it's very useful, yeah, of course, but you're always up against temptations in the community. Even I am still, I am still here in this unit. (Tester Sam**)**

Sam brought a new perspective on the use of the game; how it might prepare him to deal with challenging situations such as being offered drugs whilst still an in-patient, as well as preparing for more independent living.

Service providers recognised that a serious game could support service users gain risk management skills and become more independent in the community.

> *Yeah, so I think that rehearsal and sort of mentally telling yourself about, if this comes to me and preparing yourself for a response, I think would be really helpful … if you can do that within a game session I think that can only help* (Nurse Amelia).

Therapeutic rehabilitation

The majority of the service user participants also felt that a game of this type could be useful for their rehabilitation. They stated that the game was fun and brought a different approach to thinking about discharge. It was suggested by the participants that the game could be played both alone or in a group.

> *I'd like to do it in a session, a psychology session, maybe. ..and having, have it put into psychology sessions, like he said, as well, individual one to one sessions, where the psychologist would bring the laptop and the, the joystick.* (Tester Arthur)

Service users identified the need for their therapist to be able to use the game for assessment and to gauge the needs of the service user in preparation for discharge.

> *And we could do it like that as well, so she can see what we're thinking regarding what we're going to be like once we're discharged, you know?* (Tester Brian)

Similarly a Senior Nurse felt that the game could be used to help service users prepare for the realities of being discharged:

> *Can start a conversation about what comes after the discharge. A lot of times people have ideas that everything will be great and family and friends will be waiting for them, whilst actually people have moved on and things have changed in that time. This can bring on a conversation about that…* (Senior nurse Bob)

This is reflected in the view of a psychologist, who felt that a serious game could help service users to more fully engage in preparation for discharge.

> *… often people find it difficult to think about their own self-management but if you give them a scenario they can be amazingly good judges of character and what the character should do* (Psychologist Bonnie)

Integration with existing therapies

The importance of integrating the game into existing therapy was voiced by service providers.

> *I would be worried if it becomes too much reliance on one tool as can sometimes happen in mental healthcare when there are new and interesting methods. 'SG'* [serious game] *needs to form part of a broader package* (Psychiatrist Michael)

Concerns were raised by a therapist who felt that serious gaming may detract from existing therapeutic work already being done; that serious games may be used to replace part of therapists' work and that this may erode the existing human connection.

> *This work is already being done in a drama session and it [the game] becomes very distancing from stories and characters…part of me wonders if this is good*. (Art Therapist Jed)

Here Jed raises a concern that rather than the game providing realism commented on by Caleb and Brian, that it creates an additional barrier to be overcome in therapy through the use of a distancing artificial environment.

Overall, despite these concerns, there was broad acceptance of serious gaming as a tool that could be used to support therapeutic work in FMH care.

Usability

All service user participants (Testers) were observed to actively engage with the game, and seemed to enjoy exploring the environment and interacting with the characters. Reactions to dialogue, scoring and the limitations of the game are discussed below.

Dialogue

Service users were observed to be able to use the game controls easily, and expressed a preference for using a game control pad rather than a keyboard. Some who had hearing problems struggled with the dialogue and requested written dialogue and commands alongside verbal discourse.

> *I think one way of improving it is maybe have captions for when they're speaking, which is sort of proof of what they're saying.*(Tester Wayne)

Two of the service user participants were observed to repeatedly click forward in the game without listening to the dialogue and spending time to consider their decision. Timing for the game would need additional consideration, to limit the effect of the impulsivity of some participants.

Some flexibility would need to be built in to the format of the game as two service users felt that the provision of information before using the game would have been helpful, whilst others felt that information would detract from the gaming experience.

Scoring

Service user testers were observed to be competitive around the scoring system, commenting on the scores of peers and attempting to achieve a better score. However during evaluation the same testers commented that they felt scoring would be unhelpful. This apparently conflicting response

may indicate difficulties with scores for engagement and the potential gaming effect perceived as counter therapeutic.

> *It was kind of exciting. It was good, I enjoyed it, I'm upset that I had scored low points, I thought I played rather well, I should have got more, but the machine just said I must get lower points, yeah.* (Tester Wayne)

Other service users commented that it was unhelpful to have a score but wanted a level to show progress through the game and to encourage continued engagement.

> *You don't need a score, you don't really need a score. You do need a score, you need to know what level you're at there. It should tell you the level that you're at, not a score.* (Tester Charlie**)**

> *I don't think I'd keep going back to it, because there's not a skill level, like FIFA or something, innit.* (Tester Eric)

The motivational aspects of the game are important to ensure ongoing engagement, however the impact of scoring on service users' behaviours and assessment needs to be carefully considered. A service provider also voiced concerns with service user engagement with the game in terms of them acting in ways that they thought were expected.

> *Not sure about assessment. Won't service users just give the answers they ought to give?* (Nurse manager Conrad)

The nurse manager identified that service users may engage in gaming behaviour to increase scores and win the game, rather than develop skills or explore behaviours and attitudes. This reflects ongoing difficulties with existing assessments in FMH services; with service users modifying their behaviour in response to perceived cues in the environment to reduce their risk level and increase

their freedom, and service providers seeking to establish whether this change is authentic or if the user is gaming the system (Reynolds et al 2014).

One service user participant stated that he did not "see the point" of playing the game and felt that more complexity was needed to make the game meaningful. The need for the game to be more attractive to service users was also identified by a service provider participant:

> *[the game] would need to be sexy and have loads of bling to make it appealing to service users.* (Psychiatrist John)

These views may reflect the limited nature of the game developed for this feasibility study. Whilst service user participants were frustrated with the limitations of the game, there was interest in a more enhanced version.

Discussion

The results obtained in this study support the utility of serious gaming in FMH, and new knowledge has also been developed regarding the usability and acceptability of a serious game within a FMH setting. All participants were able to explore the gaming environment, regardless of previous gaming or computer experience. The observation that all participants engaged actively in the game play and stated that they enjoyed doing so is an important finding as the FMH client group is often characterised as low in volition and engagement (Gooch & Living, 2004). The collaboration between mental health professionals, game designers and service users in creating the gaming environment appeared to allow for a realistic and enjoyable gaming experience. The development of environments and dialogue which reflected the service users' real life experiences helped engage service users in the test. These findings are consistent with previous research (Gerardi et al, 2010). However whilst gaming with realistic simulated environments and vocabulary created for a specific

population may increase efficacy, it may not appeal to other groups of service users and will need to be modified to adapt to any change or development in the culture of the end user. To counter this in-built obsolescence the StreetWise game is constructed from underlying blocks of computer code that may be adjusted in response to changes in requirements or feedback from evaluations. It is possible to re-purpose these code blocks to focus on niche areas of concern or address the needs of a wider population. Thus the underlying code of StreetWise and the evaluation process it enables will provide longevity and reach beyond this research project.

One of the greatest challenges of designing serious games is creating a tool that is both entertaining and effective (Mitgutsch & Alvarado, 2012). Game development demonstrated the potential for FMH service users to engage in a user centred design process regardless of limited experience and confidence in using technology. Service users were observed to gain confidence and comment effectively at different stages of development, even the early stages when characters and environment were very basic. The researchers experienced challenges with access when working within restrictions of the secure setting. However with advanced planning, the support of the service providers and the good will of the service user participants this was overcome.

There was a good indication that a serious game could be used to support FMH service users in their recovery. It gives the users a safe platform to begin to rehearse and explore their responses to situations in the community. *In game* the service users are afforded autonomy to make choices, and consider how to address problem situations. The game may be used by health care providers to proactively support service users to become more independent and work towards their recovery (JCPMH 2013). The potential for gaming on a range of mobile devices would allow mental health nurses in their unique 24/7 role the flexibility to work through scenarios with service users and so provide additional opportunities for users to hone skills. However, as noted by the participants, there needs to be caution in the use of the game, to avoid superficial responses through linking scoring directly to assessments of behaviour and risk (Reynolds et al 2014). Although using Serious

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Gaming as a participatory approach for risk assessment and to promote recovery may enable movement away from compliance and a reliance of mental health nurses on bio-medical approaches to care within FMH services (McKeown et al 2016).

This study has demonstrated the feasibility of serious gaming within FMH services; that gaming as part of existing therapies is broadly acceptable and usable by providers and users. However, more needs to be known about how the service users interact with serious games. In particular about how the level of immersion and psychological absorption of the game affects emotional state, motivation and engagement. The potential negative effects in terms of raised levels of anxiety and frustration needs to be explored (Funk et al 2006). This may require the adaptation of Human Computer interactive methodologies for usability testing. More also needs to be known about how serious gaming leads to behaviour change and improved clinical outcomes (Graafland et al.,2014; Mohr et al., 2013).

The findings of this study support the view of Pater et al., (2015) that gaming may be a valid intervention for people with mental health problems. The potential for integration with existing psychology group work was voiced by both service user and provider participants. Different models of integrating gaming within existing services will need to be explored in future studies; including integration with nurse led ward based therapeutic work and activities to support recovery (Chandley and Rouski 2014). The incorporation of serious games such as StreetWise within nursing interventions will extend the reach of forensic mental health nurses beyond the secure setting to engage service users in addressing real life community based scenarios. To be effective this will require mental health nurses to have the skills to use and understand a range of technologies as well as to be able to work effectively across traditional boundaries between health and social care providers in hospital and community services. This is consistent with plans for the future development of the NHS, in which new multi-speciality models of care are to be established and innovative technologies exploited to deliver high quality, person centred care (NHS 2014).

Additional work also needs to be undertaken to develop the game in response to feedback from participants. This would include the development of a larger full-scale game that could incorporate a range of scenarios, including complex algorithms in which the service user may be required to make increasingly difficult decisions as suggested by service user and provider participants.

In conclusion this study shows that serious gaming may be introduced to FMH services and used by mental health practitioners within their current work of promoting recovery and supporting skills development. Serious gaming provides a new and innovative approach which may be used to create communicative space, promote partnership working and shared decision making. However further development work needs to take place for serious games such as StreetWise to be used as therapeutic interventions. Research must also be undertaken to ascertain whether serious gaming as a therapeutic intervention would reduce risk, relapse and readmission. To achieve this, additional funding will be sought for game development, together with research funding to undertake a larger scale feasibility study to determine outcome measures and to trial the game with a range of FMH populations. A concomitant focus on evaluating the health economics of such a development might also be valuably pursued.

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