# Engagement with Online Mental Health Interventions: An Exploratory Clinical Study of a Treatment for Depression

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**ABSTRACT**
Online mental health interventions can benefit people experiencing a range of psychological difficulties, but attrition is a major problem in real-world deployments. We discuss strategies to reduce attrition, and present SilverCloud, a platform designed to provide more engaging online experiences. The paper presents the results of a practice-based clinical study in which 45 clients and 6 therapists used an online Cognitive Behavioural Therapy programme for depression. Pre and post-treatment assessments, using the Beck Depression Inventory, indicate a statistically significant improvement in depressive symptoms, with a large effect size, for the moderate-to-severe clinical sub-sample receiving standalone online treatment (n=18). This group was the primary target for the intervention. A high level of engagement was also observed compared to a prior online intervention used within the same service. We discuss strategies for design in this area and consider how the quantitative and qualitative results contribute towards our understanding of engagement.

**Author Keywords**
Mental health; online interventions; cognitive behavioural therapy; engagement; depression; healthcare applications.

**ACM Classification Keywords**
H5.m. [Information interfaces and presentation] (e.g., HCI): Miscellaneous.

**General Terms**
Human Factors; Design.

## INTRODUCTION

Mental illness is one of the greatest social and economic challenges facing societies worldwide; depression is already the single most common source of disability in developed countries and is on the increase in many others [31]. While the efficacy of many mental healthcare interventions has been well demonstrated [13], traditional models for the delivery of care have reached a breaking point. In many cases limitations in the availability of trained mental health professionals, coupled with the time intensive nature of treatments, means that only a minority of people experiencing difficulties receive the treatment and support they need [31]. Given the constraints on the capacity of services, issues of cost effectiveness and efficient use of available resources have become important areas of research in mental health service provision. Recent studies in controlled settings have demonstrated the potential effectiveness of computerized or online interventions for many people [29]. Such interventions use computer support to either supplement or entirely replace face-to-face contact with a mental health professional, thereby reducing the cost of individual interventions and increasing overall access to care. However, whilst the effectiveness of online interventions has been demonstrated in controlled settings, problems are commonly encountered in translating these results into practice. Attrition - typically defined as the number of people not completing a course of treatment - is a major problem [17,23,24]. Some strategies for improving engagement and reducing attrition rates in online treatments - such as motivational interviews and telephone support conversations - can be effective, but increase the logistical difficulties, resource requirements and costs of deployment.

Drawing on relevant literature in HCI and mental health, the primary contribution of this paper is to introduce and explore a set of design strategies - *interactive, personal, supportive and social* - to reduce attrition in online interventions. We present a platform that embodies these strategies and investigate clinical outcomes and engagement levels within a detailed, practice-based clinical study. The platform can be used to deliver multiple different programmes; in this paper we focus on a Cognitive Behavioural Therapy (CBT) intervention for depression. This study indicates that the strategies and intervention described in this paper can improve client engagement and reduce attrition rates for online treatment. Clients receiving the intervention also experienced clinically significant improvements in depressive symptoms.

### *CBT* and Online Interventions for Depression

There are a broad range of psychological treatments available for depression [11]. However, the efficacy of CBT has been examined and demonstrated in many more trials than other approaches, making it the most evidence-based and one of the most widely used treatments [7]. It is a structured approach, rooted in both behavioural and


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cognitive traditions and theories, that has been delivered and evaluated in a variety of ways – as individual and group face-to-face therapy, as well as less traditional methods, such as telephone assisted therapy and bibliotherapy. Due in part to its structured nature, but also to its history of effectiveness, CBT has also become the most widely used approach to computerised or internet-delivered therapy [1].

The central component of online interventions is generally a structured delivery of psycho-educational content, usually through text, audio voiceovers or explanatory videos. Questionnaires are also common, some of which are diagnostic, whereas others are therapeutic, and follow a similar format to that found in paper workbooks. Following initial research studies, bodies such as the National Institute of Clinical Excellence in the UK have recommended computerized CBT as the first port of call for mild-to-moderate depression, and online programmes are being deployed in many countries. HCI researchers have begun to consider the topic of design for mental health [5,15], and engaging young people in treatment [22]. While some work reports on the usability testing of online interventions [12], there remains a need for more research on effective interaction design strategies for online CBT interventions.

## ENGAGEMENT

Attrition rates in real world settings are a significant concern for online mental health interventions. Given the increased focus on user engagement in recent HCI research, there is an opportunity for HCI researchers to help improve the design and effectiveness of online intervention programs. Researchers within HCI and the Serious Games community have examined the potential of games to improve motivation and engagement in a range of contexts, including health and education [3,16,19]. Others have looked to games as inspiration for "enjoyable" user interfaces [21]. In 2002 Monk et al. introduced "*funology"* and suggested that HCI was ready for a more fundamental move from "usability to enjoyment" [25]. The term "*gamification"* has been adopted as an umbrella term for the use of gaming elements in non-gaming systems to improve user experience and engagement [14]. Others have discussed strategies of designing for engagement with specific systems, such as public displays [20]. Words such as engagement, fun and play appear frequently in this literature, however Monk et al. [25] also introduce a note of caution, stating that: *"the challenge for HCI research is to systematically address hedonic (non-utilitarian) requirements and combine them with goal orientated requirements".* This has particular relevance in a mental health context; in previous work we have argued that designers must place an emphasis on engagement with the treatment, rather than engagement with the technology [9].

In this regard, research on engagement with mental health technologies shares many common goals with HCI research on behaviour change [8] and persuasive technologies [18]. Indeed much of this research has been conducted in physical healthcare areas, targeting issues such as exercise and eating habits. The theories and strategies presented in this prior literature can play a valuable role in helping to design more engaging mental health technologies. However mental health research also provides a rich set of theories supporting personal change. The theoretical model in CBT for example, predicts that meaningful and sustained change is best achieved by focusing, not just on behaviour, but on the interrelated nature of thoughts, feelings and behaviours.

## STRATEGIES FOR ENGAGEMENT

It is important to note that attrition in mental health is not unique to online interventions, but also affects services offered in more traditional ways [6,23]. In considering strategies for engagement in online interventions, it is therefore helpful to consider the key factors shown to contribute to engagement and successful outcomes in traditional face-to-face interventions. Outcome focused research [2] has shown that - above and beyond the contribution of specific theories and techniques - client or personal factors are the single leading contributor to successful mental health interventions. Interventions are most likely to be successful if they take advantage of the clients' existing strengths and resources and if treatment is tailored to meet their needs and interests. After personal factors, supportive therapeutic relationships are the next most important factor in maintaining engagement and achieving successful outcomes. In this paper we build on these findings and consider four key strategies to improve engagement in online mental health services: *interactive, personal, supportive and social strategies*.

The first strategy - *the interactive strategy* - draws most obviously on interaction research. Previous online mental health programmes have typically incorporated limited interactive capabilities. Many provide very linear pathways through the overall content, providing limited scope for user exploration and discovery. Until relatively recently, the ability to provide a more interactive experience was constrained by the available web technologies, however we now have an opportunity to provide richer and more varied exercises, provide immediate graphical feedback, and provide users with the ability to engage actively rather than passively receive content.

The second strategy is to provide a more *personal* experience, including content that is tailored to the user's needs, and giving users a sense of ownership and control, e.g. by allowing them to choose their own pathway through an online treatment. While there is some emerging work on tailored programmes, this research is very much in its infancy. Alongside the potential benefits, tailored treatments can create difficulties when implementing controlled clinical evaluations. For example, personalised approaches are more likely to be acceptable if there is a well-defined and strictly implemented protocol on tailoring, which would make the intervention more amenable to formal evaluation within an RCT format.

Current evidence regarding engagement with online interventions suggests that a guided self-help model is most effective in improving adherence [1,29]. The success of motivational interviewing and regular telephone conversations with therapists (often combined) suggests that human contact is important for achieving high levels of engagement. There are a number of different ways in which we might achieve this within an online intervention. One mode, which we can label the *supportive* strategy, follows the existing model for guided self-help and facilitates contact with a therapist or other trained supporter. Such contact would be used to motivate, increase confidence in the therapy (a factor in successful outcomes), and guide the client in completion of therapeutic activities.

Our final strategy is to facilitate contact with some form of community (the *social* strategy), most obviously peers who are suffering, or have previously suffered from, similar difficulties. While there are obviously ethical concerns surrounding such contact - e.g. the potential for people experiencing difficulties to engage, often unintentionally, in negatively reinforcing discussions - there is a long tradition of both group-based therapy and peer support networks for a range of mental health disorders. When appropriately moderated and supervised, they are generally well regarded by practitioners, and seen as vital in the treatment of some conditions. HCI researchers have also begun to provide a deeper understanding of the potential of social networks in healthcare, e.g. [26,28,30]. Issues such as the differing attitudes to disclosure, in general versus health-focused networks [26], are highly relevant to the mental health area.

## THE SILVERCLOUD PLATFORM

We have developed SilverCloud, a novel platform that provides tools to rapidly prototype and implement a wide range of online computer supported treatment programmes. Programmes created with SilverCloud aim to provide a more engaging and supportive experience to users. To date two treatment programmes have been developed - a psycho-educational programme for self-esteem and body image difficulties; and a CBT-based therapeutic programme for depression. In this paper we focus on the CBT programme, entitled MindBalance.

The SilverCloud system is implemented as an online application, which is accessed through a web browser. Where possible, the design draws on familiar features from social networking and other web 2.0 applications. Consistent with the model of Coyle and Doherty [10], development of the platform proceeded in parallel with the development of the clinical content, with tight integration of both processes. The content of the MindBalance programme was developed through a multi-disciplinary collaboration including clinical psychologists, psychiatrists and psychotherapists, with regular feedback with the system design team as ideas for content presentation and interaction were prototyped. Design workshops were held with people working in a variety of settings, ranging from

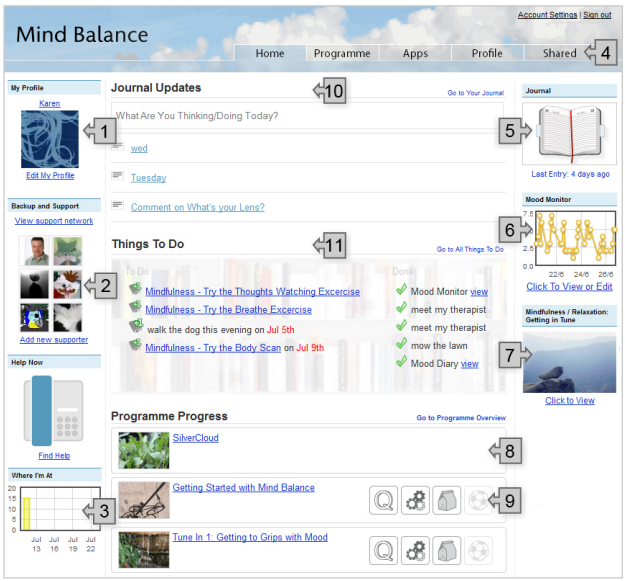


**Figure 1. Annotated screenshot of a client homepage.**

primary care, to specialized referral services, and included people receiving treatment and youth panels associated with NGO's in the mental health sector. The clinical content is based on a review of literature and of best practice in CBT, coupled with interviews with researchers and practitioners. A detailed non-clinical pilot study, of both the system and programme content, was conducted prior to the clinical study presented in this paper.

The MindBalance programme applies a guided self-help model. Clients seeking help for depression can register for the online programme. Each client is assigned a therapist, who acts as their supporter while they use the programme. MindBalance consists of eight modules that introduce the major concepts of CBT, one of which (Core Beliefs) is unlocked at the discretion of the therapist, if they feel the client is ready for what may be an emotionally challenging experience. The user can take a linear path through all of the content if they wish (it is easy to do so), but they have complete control over what they view and in what order, and can take a more exploratory approach if they prefer.

In next section we discuss the overall design of the SilverCloud platform - within which MindBalance is delivered. We focus on the four strategies for user engagement outlined above. Figure 1 shows an annotated client homepage for the MindBalance programme.

### Design Strategies

*Interactive* – The MindBalance programme includes a number of interactive and graphical exercises (see Figure 2), which are aimed at engaging clients with therapeutic exercises commonly used in CBT; for example, reflecting on their own thinking. Users also have the ability to respond to content, indicating whether they like it, and also to comment on it. Both exercises and comments can be explicitly shared with the therapist or supporter. The system also provides immediate feedback wherever possible. For

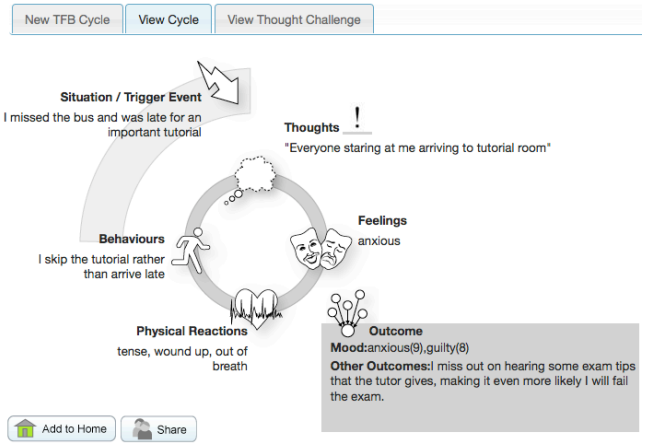


**Figure 2. Thoughts, Feelings and Behaviours exercise.**

example, when a charting exercise such as a mood chart (Figure 1, element 6) or a diagnostic element such as the outcome rating scale (Figure 1, element 3) is completed, the application icon is graphically updated on the user's home page (e.g. with a graph of mood scores). Likewise, items are ticked off on the "to do" list when completed (Figure 1, element 11), and achievements unlock new activities the within the overall programme.

*Personal* – previous online treatment programmes have adopted a largely content-focused approach. When clients log into the system they are presented with links to a series of modules, which are undertaken in a linear manner. MindBalance aims to provide a more person-focused approach. Each time clients log in to the system they arrive at a personalized home page, which is about them and where they are in the programme. As well as the central therapeutic content, links to which are embedded within the personalized homepage (Figure 1, element 8, 9), a range of satellite applications are presented along the side of the interface. The client can also create a personal profile with basic information about themselves (Figure 1, element 1). As well as establishing a sense of ownership, this information is useful for the therapist (discussed below). Applications are released over time, such as the mindfulness application (Figure 1, element 7), as the user completes modules (with the intention of maintaining engagement by introducing new features over time and not overwhelming the user initially). The user can also control which applications appear on their home page. Overall the homepage is intended to provide a reflective space; the user can journal their thoughts and feelings (Figure 1, element 10), and these can be elaborated on within the journal application (Figure 1, element 5), which also acts as the vehicle for therapeutic writing exercises. The user has actions suggested in their "to do" list (Figure 1, element 11); these items are added progressively, rather than initially presenting the user with a long and daunting list. Items on the list are ticked off as they are completed, and as the user completes modules of the programme (Figure 1, element 8), their achievements are noted by highlighting a range of achievement icons (Figure 1, element 9).

*Supportive* – The system supports the exchange of messages between the client and therapist, but goes beyond electronic mail as the client is encouraged to share their content (such as completed exercises and comments) with their therapist. This shared content allows the therapist/supporter to respond in a more personal way and provide guidance as well as encouragement to keep using the programme. Adherence information is also available to the therapist, and they can keep track of the client's progress. This is all personally sensitive information, and so a shared tab (Figure 1, element 4) is provided in the client interface where they can check the therapist's view of their data. This includes information on whether they have logged in recently, which modules they have viewed, items they have shared with the therapist, and a history of messages exchanged with the therapist through the system. This interface includes the ability to explicitly change the sharing status of data. By making the visibility of their data to the therapist more transparent, we hope to give clients a greater sense of control, whilst also facilitating meaningful interaction with the therapist.

*Social* – A backup and support network (Figure 1, element 2) draws on a social network metaphor, but mirrors a therapeutic exercise in which the client thinks about the people in their life from whom they can get support, and graphically expresses this on a diagram. While group therapy and peer group support are well established and respected in the area of mental health, introducing contact with other clients within any online system raises a number of understandable ethical concerns. As a first step, we have included a number of anonymous indications of other people in the system. It is important to reassure people suffering from mental illness that they are not alone in experiencing difficulties, and that many other people have experienced similar problems and overcome them. Users can respond to content by indicating that they "like" it (now a common paradigm on the web), and can see how many other people liked it, helping to reduce the sense of isolation. For more detailed contributions shared by users, such as take-home points, tips, and suggested healthy activities, a moderation system is built in to the platform whereby shared user suggestions can be made visible to other users. The structure of the modules themselves also includes a "Personal stories" section, in which the stories of others are presented. Users are asked if they wish to contribute a personal story on completion of the programme, and the hope is that over time, a portfolio of these stories could be built up. There are many other possibilities for future exploration of this engagement strategy, including explicit support for group therapy.

## EVALUATION

To assess the effectiveness of the programme, a practice-based evaluation was carried out within a University

Counseling Service. The service caters to a population of approximately 17,000 students with limited resources and has been very progressive in the use of technology. The service had previously used a commercially available CBT system but experienced significant attrition, as measured by an internal trial (n=43) in which 74% of users dropped out by session 8 [27]. This trial provided useful baseline data for the service and a concrete target for improved engagement. Our trial followed a similar protocol and was as close as possible to how the service would actually deploy such a technology in practice.

## Methodology

Ethical permission for the study was obtained from the relevant institutional boards. The evaluation used a pre-post study design, with the Beck Depression Inventory (BDI-II) [4] administered online before and after use of the programme. The consent form also included screening questions, with exclusion criteria including suicidality, immediate crisis, and psychosis, but none of these were actually encountered in the study. People who scored as severe in the BDI measurement were interviewed by a clinician before being given clearance to participate in the study, following a protocol used in day-to-day practice. Participants were given active support by a therapist for 8 weeks, and hence would be expected to receive 7 weekly reviews. Therapist supporters were assigned to clients following the usual practice in the service. Participants were also free to continue using the system after the end of 8 weeks. Interaction with the system was logged, and a very conservative session time estimation based on user actions is used (session time data reported below can be taken as absolute minima). Qualitative feedback was also solicited following use of the programme. As part of this, participants were asked what attracted them to the programme, their opinions of the programme, the significance of the supporter, about their use of the sharing feature, and whether they had noticed any changes in their life as a result of using the programme. A debrief session was also held with clinicians.

### *Participants*

Participants were recruited through an email circulated to first and second year undergraduate students. The programme was also advertised on the Counseling Service website. The system was used as a standalone treatment by 28 people. These people received online support from a therapist, but had no direct contact with the therapist. Additionally, once this trial was underway, therapists in the service added 17 further pre-existing clients, who used MindBalance as an adjunct to face-to-face therapy (this was unasked for and unexpected). No incentives for participation were given to either clients or therapists.

## Results

### *Clinical Outcomes*

Within our overall client sample (n=45), a sub-sample can be meaningfully investigated for clinical outcome measures. This comprises those clients who were above minimal BDI (n=39), not also receiving face-to-face treatment (n=25), and who completed both the pre and post-intervention measures (n=18). One-sample t-tests revealed no significant difference between pre-intervention scores of the overall sample and the subsample ($p=0.91$), nor between pre-intervention scores of those who completed the post-intervention measure and those who did not ($p=0.86$). The reliability of the BDI was also acceptable (Cronbach's alpha, $\alpha=0.76$). A repeated measures t-test of the pre-post BDI measures (n=18), Table 1, indicates a statistically significant decrease in depressive symptomatology ($p<.01$). Cohen's d was calculated as $d=1.59$, suggesting a large pre-post effect size. This is a very encouraging result regarding the efficacy of the programme, and supports the conclusion that clients benefited from the intervention and also genuinely engaged with the therapeutic content.

| BDI cat. (range) | Pre-score (%) | Post-score (%) |
|---|---|---|
| Minimal (0-13) | n=0 (0%) | n=13 (72%) |
| Mild (14-19) | n=4 (22%) | n=0 (0%) |
| Moderate (20-28) | n=5 (28%) | n=3 (17%) |
| Severe (29+) | n=9 (50%) | n=2 (11%) |

**Table 1. Number of participants in each severity category pre- and post- intervention (sub-sample) n=18.**

### *Engagement*

The programme received 552 unique logins from 45 users, yielding an average of 12.3 sessions per user. The average session was 12:46 mins, and involved the user viewing on average 9.7 pages of content (a video page is viewed as a single page view). Communication oriented sessions (where the client is viewing and sending messages to the therapist, similar to email therapy) made up 36% of the total. The other 64% we characterize as content-oriented sessions (where the client is going through the psycho-educational content of the programme), and had a longer average session time of 19:49 and an average of 23 content views. Among the clinical subsample (n=25), average session length was 13:00 with 14.1 sessions per user, with a total time in system of 3:03:07. Figure 3 illustrates the level of engagement with the programme for the clinical subsample (n=25). The baseline data is expressed on a session basis, and so this graph depicts the number of users who completed a given number of sessions. 80% of participants were engaged (actively logging in to the system) at sessions 3, 4 and 5, and 64% of participants achieved the target 8 sessions. The figure also allows comparison with the engagement pattern reported by Richards [27] in an evaluation of a widely-used computerised CBT programme utilising no therapist support. Our study took place within the same student counselling service and following a very similar protocol. Taking drop-out to mean the number of participants not engaged at session eight, the drop-out rate

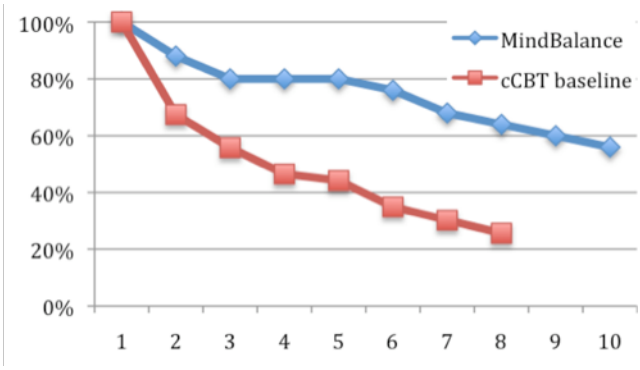


**Figure 3. Engagement figures over time vs. baseline data.**

for the present study stands at 36%. This compares with a drop-out rate of 74% reported by Richards [27].

As well as number of sessions, we can look at the engagement over time. As might be expected given the weekly review protocol, usage follows a similar pattern to the session data. At week 8 and beyond, 64% of users in the clinical subgroup (n=25) were still using the system. Among the overall cohort (n=45), including minimal cases (n=6), the figure is 60%. When we examine engagement by BDI category, differences can be observed (Table 2).

| | Minimal n=6 | Mild n=11 | Moderate n=11 | Severe n=17 |
|---|---|---|---|---|
| Target | 33% | 55% | 73% | 71% |
| Sessions | 5.3 | 13.6 | 9.1 | 15.9 |
| Time | 35:40 | 3:21:13 | 2:30:36 | 2:54:30 |

**Table 2. Breakdown of engagement figures by BDI**

While, as expected, users with minimal BDI engaged least, mild BDI users fared much better. Contrary to what might be expected, severely depressed users seem to have engaged extremely well with the system. Also surprising is that those who used the system combined with face-to-face engaged well, with 77% achieving the target 8 sessions (we comment further in the clinician feedback section below).

*Patterns of use*

All of the different features and applications were used by some users. A range of different patterns of use were visible in the log data. Usage patterns are illustrated in figure 4; programme content is illustrated by the vertical axis (each number representing a full module), user activity over the horizontal axis (each point is a page view or activity). Different colours indicate different login sessions. Many people took a very linear path through the data, viewing practically all of the content (figure 4 top). However, a significant number of people with good adherence took a more exploratory approach (figure 4 bottom). Such data presents an opportunity to begin looking for features which can be used to retrospectively understand engagement. This might lead us to modify the content or the delivery of content, to rectify problems or to take advantage of popular

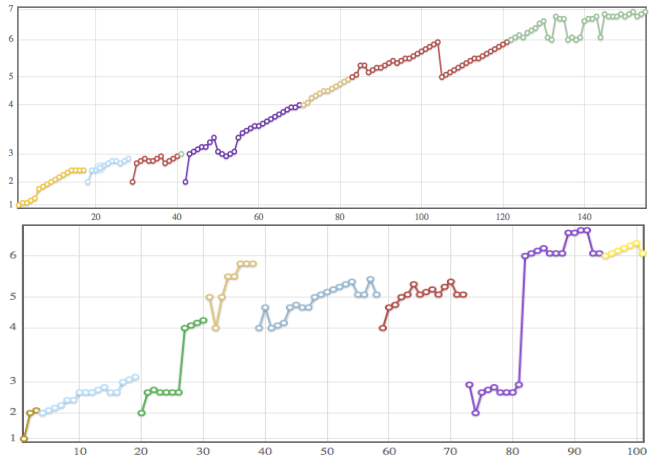

**Figure 4 – User interaction patterns**

features. If a large enough corpus can be gathered, there is also an opportunity to develop a more predictive approach in which the content or delivery is adapted to particular groups of users, their needs, and preferences.

**Qualitative feedback.**

Here we present a brief exploration of qualitative feedback provided by 25 of the clients who used the system, in response to the questions listed in the methodology section. These shed some light onto the issues surrounding the different engagement strategies used within the system.

*Why did people sign up to the programme?*

Immediate need was a factor for several people: *"I wanted anything that could help", "I was feeling very depressed at the time"*. Convenience was also important: *"It seemed like something that would help me without interfering too much with my schedule or activities, something I could participate in from home."*

Several people were quite explicit that the online (and not face-to-face) modality was a draw for them: *"I was initially drawn to the fact it was online and easily accessible.", "I felt I would be more comfortable in doing an online programme than face-to-face counseling."*

Curiosity and novelty also seemed to play a role for some: *"it's convenience and to try something new", "It sounded interesting."*

Several clients were also referred to the system by the Counseling Service. This could be a common modality in many services, but referred clients may differ from those who made an explicit initial request for the online offering.

*Sharing*

As it is one of the novel aspects of the platform, the exit questionnaire included specific questions regarding use of the sharing feature. Among those who made use of the feature, a variety of motivations are touched on, getting feedback: *"I wanted as much feedback as I could get on what I was going through"*, taking advantage of a non-judgemental contact: *"They didn't know me, and therefore were not in a position to judge me"*, feeling safe in sharing:

*"Having grown up with the internet, it's become something of a diary for me, but more of an impersonal one. I shared a lot on this because I felt a lot safer using the service"*, and doing their best to engage properly with the therapy: *"I did share quite a lot because I thought I might as well give it everything and be honest"*. Several comments were also made about trust in the supporter and their discretion.

Among those who made limited or no use of the sharing feature, not wanting to open up to a stranger (caution, shyness and embarrassment are all expressed), and fear of judgement were common: *"I find it difficult to", "I was afraid the assigned support person would be judgemental or intrusive."*

The impersonal nature of online contact, while a positive for some clients, limited sharing in two cases: *"No I didn't like the idea of sharing something with someone when it feels very impersonal by doing it over a computer."*

### *Support*

As a form of guided self-help, some sense of connection with the supporter would seem to be important, particularly for online-only clients. Many comments indicate that simply knowing that someone is there is significant:

*"I felt no longer alone. I felt that I had someone to go to. It was comforting. The ability of linking in with a specific therapist was very attractive as it felt more personal."*

*"It is nice to know someone is monitoring and taking an interest in your progress and that there is someone who will answer any questions you have."*

*"it was comforting to know that someone was checking in with me and my efforts were not going unrecognised."*

*"I liked having the supportive comments every week and knowing that someone was monitoring my progress without actually having to meet them in person."*

Note that while the monitoring aspect was important to clients, it was repeatedly emphasised that therapists would only look at their data when conducting the weekly reviews, avoiding any expectation of continuous monitoring.

### *Social*

There were few comments relating to the social aspects of the platform, perhaps unsurprising given that these were explicitly designed to be subtle and anonymous. One user indicated that they liked *"other people's reactions to various exercises"*. There are many more possibilities for strengthening the social aspects of the platform, particularly in terms of therapeutic support networks, although as discussed previously there are also ethical concerns. From a design perspective a major challenge will be making the visibility of shared information as clear as possible to users, and providing simple control mechanisms over the sharing and visibility of information.

### *Personal preferences*

Qualitative feedback on what features and content that people liked reinforces the quantitative usage data. There were many different preferences in terms of platform and content. While some people disliked features such as video and quizzes, these same features were very popular with other users. These differences in preference support the rationale of providing a range of different components and experiences, but also motivate improved capabilities to tailor programme delivery based on client's preferences.

### *Concerns*

It could be argued that some negative feedback may actually be for the better - confronting difficult issues might ultimately be cathartic for clients but is not likely to be a pleasant experience at the time. However, most of the concerns raised do not appear to fall in this category, and raise a number of interesting design challenges.

Unsurprisingly, confidentiality was a major concern for clients. Even though a number of changes had been made following the pilot, some were still unsure who could see information that they shared. This is distinct from the sharing issue discussed above, where clients know who can see their information, but still don't want to share. One user with a history of major depression dropped out due to extreme concern about privacy of information. Cases like this may be hard to avoid in the mental health area. From a design perspective however, this is clearly an issue that merits further exploration.

Time constraints, and especially the time demands of exams, were frequently referenced by participants. While the university setting is worthy of study in its own right, as many mental health problems emerge at this point, further studies in other settings will provide useful comparison data. The target intervention duration of 8 weeks makes it very likely that overlap with exam preparation and exam-taking will occur. At the same time, these are naturally high-stress periods and may be times of greatest need.

Some participants cited a feeling of pressure imposed by the weekly reviews, however it can be argued that it is better to maintain this in the interests of the client. In practice a flexible approach may be best, where the expectation is of weekly review, but other arrangements may be explicitly negotiated in a way which maintains some pressure and expectation of client effort and progress.

Some comments made reference to the impact of the illness on their ability to engage with the system: *"Reduce the text aspect of the programme as much as possible. When I was feeling especially depressed, the last thing I felt capable of doing was reading through long passages. That felt like homework."*. Again, this would be an interesting topic for future work, and supports the development of personalized and tailored interventions.

### *Change*

While the BDI scores provide quantitative evidence, users were asked if they had made any changes as a result of using the programme. While positive feedback is of course gratifying, the comments provide an indication of the

breadth of change accomplished by users: *"My whole mood changed. The programme helped me to open up communication with others that I had unintentionally avoided. Once I became aware of this it really changed how I was feeling and enabled me to cope with the stress I had"*

*"My mood improved and I started being more healthy. I started exercising, hanging out with friends, going to college more. There are situations that still trigger anxiety and upset me but they are far fewer."*

While the overall results are very encouraging, it is worth remembering that online treatment will not suit all users. Several of the users who did not engage with the programme stated that they found it impersonal and the feedback superficial (we return to this issue in clinician feedback below). From a service design perspective it is important that there are mechanisms by which people can request or be offered face-to-face treatment even if they have initially requested or commenced online treatment. In such cases the online treatment still offers a benefit in terms of encouraging reluctant people to make initial contact with a mental health service.

### Feedback from clinicians

A number of debrief interviews were held following the study. To fit in with the working schedules of the clinicians involved, both individual and group feedback was provided. Overall the MindBalance programme was much preferred to the system previously used by this service.

#### *Need for protocol*

A small number of clients signed up who were with a different therapist for face-to-face – this was unexpected and the therapists found this somewhat uncomfortable, and wanted an explicit protocol for dealing with it.

#### *Conducting reviews*

For each review therapists checked the level of client engagement, examined items shared by the client, and read any messages sent by the client. They then used this information when composing a message to the client. Therapists stated that reviews took between 5 and 15 minutes to complete, but felt that this figure could be improved upon, as much of the time was taken in becoming familiar with the programme - checking the content the client was looking at. It is important to have a clear time benefit for widespread adoption for most services (although this may be less important for some services, who may be more motivated by client preference and need). The provision of a printed manual and an overview of the programme to go on the wall of each therapist was raised during the discussions, as was the need for more training beyond the initial half-day course provided.

#### *Sharing and highly-engaged clients*

Therapists took a needs based approach to the reviews. Clients who engaged more with the programme, shared content, and responded to the messages from the therapist got more time *"almost like online counseling"*. Therapists "*felt the therapeutic relationship more*" with those who filled in their profile and completed journal entries. Generally the workload was seen as very reasonable. Initially time was formally scheduled for dealing with MB clients, however therapists also started to use the reviews to fill gaps in their schedule. This may not be desirable, and might need to be resolved at a local level within services.

#### *Sharing and encouraging less engaged clients*

Therapists found it hard to give detailed feedback when clients were not sharing with them: *"you would need to remind yourself of who they are"*. When there was not much therapeutic content to the conversation, the therapists didn't see the sending of encouragement and motivational messages as a good use of their skills. The opinion was expressed that this could be done by someone with less training. Decreasing the overhead on the sending of messages to clients who are not engaging with the programme might be one solution to this problem. Other possibilities might include combining with other intervention modalities (telephone support), or recognizing that the online treatment is not working for that client and suggesting a shift to face-to-face if symptoms are severe enough to warrant more intensive intervention.

#### *Use as an adjunct*

Several therapists added their own clients to the programme, using it as an adjunct to treatment. As noted above, these clients engaged surprisingly well. Motivations included keeping clients supported if there was an unavoidable gap in treatment of several weeks. Supporting a natural transition as the client nears the end of the 8 face-to-face session entitlement was also mentioned - *"it's empowering...if you've done a body of work with somebody, say I dunno, 4, 6 sessions and...they are coming into their own a little bit and they are starting to manage things...it's I suppose...like taking the training wheels off and letting them do things themselves"*. One counselor who was not CBT-trained would use the programme where she had a client who would benefit from CBT skills, and then use the face-to-face time to focus more on personal issues.

While therapists are understandably protective of their time and skeptical about technology, they are willing to use it if there is benefit to clients. The initial evidence gathered during this trial is one step in this direction, although further investigation is obviously needed.

## DISCUSSION - ENGAGEMENT AND ATTRITION

While the two terms are often used together, engagement is more than converse of attrition. In the mental health sphere, there is a distinction between adherence to an intervention and the degree to which clients genuinely engage with the therapy - or even recognize that they really have a problem. Clients also have different levels of need, and some will respond more strongly to treatment than others. Our evaluation has brought such issues into clear focus and highlighted the need for a more nuanced view on outcomes, and what constitutes successful engagement.

From a design perspective, a nuanced view on engagement suggests that flexibility is important when designing technology supported interventions and when assessing attrition. For example, people experiencing mild difficulties - perhaps due to some life event - may benefit relatively quickly from the initial stages of an intervention, but if they feel their difficulty has been overcome, they are unlikely to complete the full intervention. This is understandable and represents a successful outcome in many cases. In the study, several people with minimal symptoms sought the intervention and used it to some extent, although much less than the other groups. This leads us to consider how we might better serve their needs, perhaps through tailored versions of interventions which are more lightweight, and by giving users control over which aspects of the intervention they wish to focus their time on.

On the other end of the spectrum, people with severe difficulties may have problems engaging due to the nature of their illness – severe depression for example. They may require more intensive face-to-face or specialized treatment. The problem is that they may be unwilling to access such treatment, or it may be unavailable to them. In this context a successful outcome for an online intervention might be that the client recognizes the benefits of face-to-face treatment and overcomes their reluctance to attend. While this group engaged surprisingly well within the study, some comments were made about the effect of mood on the ability to engage with the system. Hence, from a design perspective, we would like to better understand how this group might differ from others, and identify opportunities to improve their experience.

From an evaluation perspective, concerns regarding engagement and attrition often lead to study designs that are not fully representative of real world situations. As noted above, those with mild difficulties may achieve successful outcomes, but not complete standardised treatment programmes. People with very mild difficulties cannot be expected to demonstrate measurable improvements in standardized outcome measures and are often excluded from studies. Some people with severe difficulties also may not improve in standard quantitative measures over a relatively short-term intervention. Likewise people with multiple problems (co-morbid or multi-morbid) are usually excluded from studies, even though they may make up a significant portion of the caseload of practitioners. From an engagement perspective, part of the difficulty with this cohort is that they may need content targeting more than one condition, but there is pressure towards precisely defined and somewhat rigid interventions which are amenable to study in randomized controlled trials, rather than personalized interventions. The result of this is that the intervention may not seem as relevant to the client and because of this impact on engagement.

Related to this drive towards standardisation is a tendency towards very linear programme delivery (so that each participant in a trial is known to receive exactly the same intervention). Inflexible linear delivery is not always the best for engagement, as in some cases perhaps only a subset of a programme will be relevant or interesting to the client. People may also have a longer history of interaction with services, and may have seen some of the material before. From a HCI perspective, we might also favour giving control to the user unless there is a strong rationale for doing otherwise. While in some cases clinicians will be very clear that they want linear delivery, there is a need to understand whether providing a more user-driven and exploratory experience might provide a benefit. The different usage patterns observed within the study would suggest that this may be the case. For preventative programs we would strongly favour giving users the freedom to explore issues of more relevance to them.

## CONCLUSION

We have presented an innovative platform for the delivery of guided, online mental health interventions, which embeds a number of strategies for improving engagement. Through a practice-based clinical trial we have explored the issues surrounding engagement in real-world service provision. Outcome data for the clinical subsample indicates a substantial benefit to clients, comparable to more resource-intensive treatments. We have also gained some insight on use of the programme as an adjunct to face-to-face therapy. Online guidance yielded engagement comparable to that achieved using more resource-intensive modes of treatment and our programme out-performed the system previously used by the service. From a development perspective, since a platform rather than an individual programme has been developed, there is a relatively low overhead to developing new programmes targeting different disorders and there are many possibilities for future work.

The online, guided self-help model employed may be applicable in other areas of behavior change considered by HCI researchers, including various forms of cardiac rehabilitation, physiotherapy, exercise, and medication adherence. As an example of a personal healthcare system involving both clinicians and end-users it may also be of interest to a range of researchers looking at the design of systems to support users in managing their personal health and health information, particularly where support is provided by clinicians, and data is shared with them.

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