# Reaching Optimal Health: The Voice of Clinicians from a Roleplay Simulation

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**ABSTRACT**

Helping patients to reach optimal health entails a holistic approach of complex interventions including clinical decision support systems, patient decision aids, and self-management tools. In real-world settings, understanding the human factors in technological interventions is the core of HCI research; however, it requires a considerable amount of time to run experimental procedures, especially for patients with mental disorders. We conducted a roleplay simulation over a period of two weeks that comprised observations, and semi-structured interviews with eight health care professionals participated in the simulated use of a health optimization system. The study revealed the SWING model of enabling interventions towards optimal health as i) Sharing feelings, ii) Weaving of information, iii) Improving awareness, iv) Nurturing trust v) Giving support. This model establishes a common path from research to practice for researchers and practitioners in eHealth and HCI.


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**KEYWORDS**

Health Optimisation; Mental Health; Roleplay Simulation; Enabling Factors; SWING

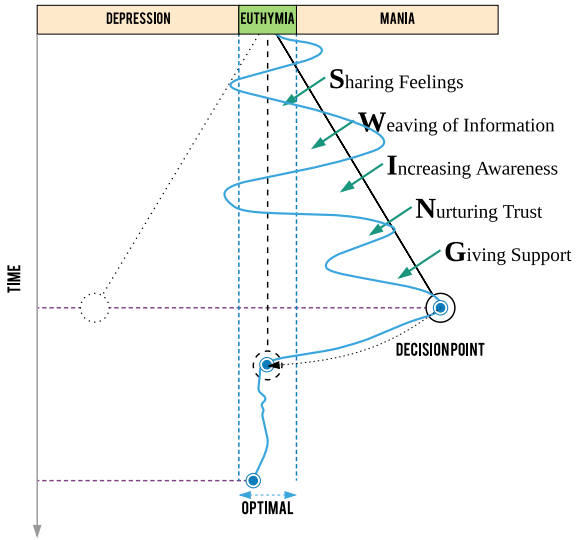


**Figure 1. The SWING model for optimising health**

## 1 INTRODUCTION

With the increasing prevalence of chronic disorders worldwide, care for patients has been widened beyond clinical settings to communities and households. One key objective of health systems is to help patients achieve and maintain the best possible health with the help of technological interventions. It entails a total approach to optimising health which comprises of clinical best practices, shared decision-making, and self-management strategies [1]. Involving both patients and clinicians are more likely effective in improving patient health [11], and health optimisation is promising as a next viable class of computing systems to integrate patients' values and preferences with clinicians' up-to-date knowledge for optimal well-being of patients. Hence, realising health optimisation in various contexts has become a prominent research interest, in which understanding human factors in technological interventions is intriguing in health systems.

Hearing the voice of users is an important task in Human-Computer Interaction (HCI); nevertheless, in some areas, such as mental health, access to patients is typically restricted. In this study, a roleplay simulation with eight health care professionals was conducted to understand the human factors in health optimisation. A web-based portal and a mobile application (app) have been developed over the past 5 years with the vision of optimising patient health in a holistic way. Three triads of doctors, health coaches, and simulated patients participated in the scripted use of the technology; and semi-structured interviews were held on the topics of patient safety, shared decision-making, and technology adoption issues.

The study revealed a SWING model that enables technologies towards reaching optimal health for patients as shown in Figure 1:

1. **S**haring feelings between clinicians and patients in the decision-making process.
2. **W**eaving the threads of personal and clinical information.
3. **I**ncreasing awareness among clinicians, patients and family members.
4. **N**urturing trust in clinicians and health care systems.
5. **G**iving support to patients in clinical and home settings.

The proposed model posits an optimal point of a chronic disease, which is a moving equilibrium balanced by multiple human factors. It enables a common path from research to practice for health care professionals and patients to improve care. The SWING model is consistent with patients' values and preferences, where the relevant information of treatments and outcomes are weaved, validated and presented to patients for health optimisation support.

This study contributes to the cumulative theoretical development of HCI and health information systems in several folds. It highlights the underlying factors for realising a total, integrated approach to health optimisation, which helps reshape the design concepts of computer and mobile systems. We presented a simulation study for the treatment of bipolar disorders with the use of the Activity Theory [8] to substantiate our findings with qualitative interviews. Furthermore, the proposed model develops new ground of adaptive learning for eHealth systems and assistive technologies.

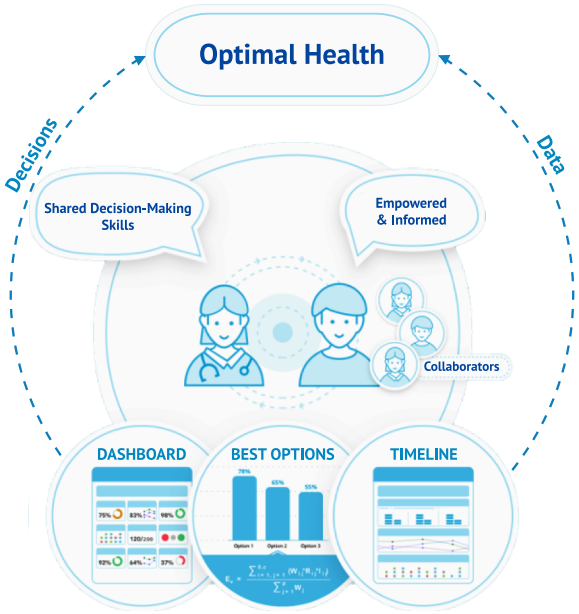


**Figure 2. Health Optimisation System**

**Table 1: Health Optimisation Strategies**

| *No.* | *Strategy* |
|---|---|
| 1. | Find the best treatment |
| 2. | Find the best dosage |
| 3. | Take treatment as agreed |
| 4. | Live more healthily |
| 5. | Get support from others |
| 6. | Participate in all decisions |

## 2 HEALTH OPTIMISATION AND RELATED WORK

Evolved from the "medicine optimisation" approach, health optimisation has a broader aim on enabling health care informed by best available evidence with the use of technologies to ensure patients obtain optimal health from their treatments. Technological interventions in health optimisation encompass a number of technologies such as clinical decision support systems, patient decision aids, and self-management tools. Clinical decision support systems (CDSS) have been designed to assist and improve clinical decision-making, which have been found to reduce prescription errors, to increase adherence to guidelines, to improve health care professionals' performance and to enhance monitoring of patients [11]. Patient decision aids including audio tapes, videos, interactive media, discussion boards, pages have been developed to increase patients' knowledge, foster more patient participation, and improve communications in making health choices [9,12]. And self-management activities such as medication management, nutrition therapy, and physical activity have been recognised as an integral part of clinical treatment, which helps patients to monitor and improve their health [2,7]. However, these technologies often exist in separate silos as different systems for patients or clinicians. Integrated computer systems involving both clinicians and patients are more likely effective in health management [11], and only a few technologies allow joint interactions between them [10].

A digital "health optimisation system" for people with chronic disorders have been developed with the vision of optimising health in an integrated manner. The system consists of a web portal and a mobile app to support patients and clinicians in selecting, managing and assessing treatments with the integration of various technological innovations. The mobile app is designed as self-management tools in companion with the web portal for clinical care support. The health optimisation technologies promote shared decision-making skills and patient involvement using artificial intelligence and multi-criteria decision analysis [5] as illustrated in Figure 2.

The system has been tested using the System Usability Scale (SUS) with 78 potential users: 39 laypeople, 23 patients, 5 nurses, 2 general practitioners, and 9 psychiatrists. The SUS scores ($78 \pm 18$ (75) > 68) and qualitative feedback from clinicians and patients explicated that it is highly feasible for potential users.

Six core strategies are identified for the health optimisation approach based on systematic methods [1] as shown in Table 1. Nevertheless, understanding the human factors in enabling these strategies requires in-depth analysis of user interactions in real-world settings. In HCI, roleplay has become a viable technique for investigating complex interactions to generate empathy and provide feedback on systems before actual use [4]. Therefore, roleplay simulations are particularly suitable in this study for addressing difficulties associated with working in mental health settings, where access to certain types of users is typically constrained due to uncontrollable impacts, sometimes harmful, to people or environments.

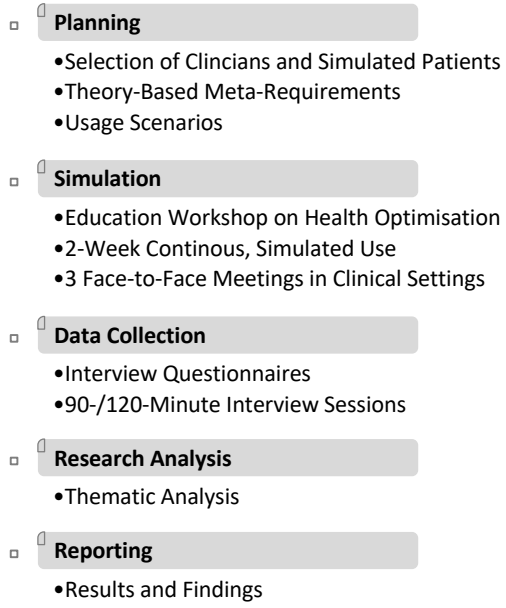


**Figure 3. In-Situ Simulation Design**

## 3 STUDY DESIGN

In this study, we adopted the methodological steps for in-situ simulation design [6], as shown in Figure 3. The primary objective of the study design is to investigate the user interactions to understand the human factors in health optimisation.

*Planning.* Three triads of doctor - health coach - simulated patient were formed, in which three psychiatrists play the doctor role, two pharmacists act as health coaches, and three non-prescribing health care professionals are simulated patients. The simulated patients' profile was defined with a high degree of reality as "a 44-year-old administrative assistant, who is married with one child, with a comprehensive 10-year psychiatric history of bipolar disorder type I and gastroesophageal reflux disease (GERD)".

*Simulation.* A 2-week simulation was developed for continuous and simulated use. It involved a number of activities such as the participant's training workshop and daily tailor-made schedule for two weeks. For example, on day 5 and 6: "*the simulated patient faced moderately severe depressive symptoms but did not require hospitalisation; he slept 6 hours per night and used 1-2 drinks per day; he was required to continue reporting for more days if necessary*". On the other hand, doctors and health coaches were helping him to improve his health conditions.

*Data Collection.* Upon completion of simulation scenarios, each participant joined a one-to-one session with a researcher. Semi-structured interviews were held on the topics of patient safety, shared decision-making, and technology adoption issues. There are eight interviews altogether, which made up to 830 minutes of audio recordings.

*Data Analysis.* We used the technique of thematic analysis to analyse each subset of transcribed audio files. Themes are developed and iteratively clustered using nVivo software.

*Reporting.* The thematic analysis unveiled important human factors in enabling different health optimisation strategies.

## 3 RESULTS AND DISCUSSIONS

In this study, a combination of roleplay, health optimisation technologies and a realistic full mission environment is used in our roleplay simulation. The voice of clinicians from the qualitative interviews as described in Table 2 revealed the human factors on aiding patients reach optimal health. A SWING (**S**haring feelings, **W**eaving of information, **I**ncreasing awareness, **N**urturing trust, and **G**iving support) model posits important affordances as enabling successful health optimisation, with the help of technological interventions.

***S**haring feelings.* Patients' values are personal feelings towards treatment options' characteristics in shared decision-making. Therefore, the most important affordance of health optimisation is about sharing feelings between clinicians and patients. Reaching a satisfactory decision is not without empathy and agreement from both sides.

**Table 2: Thematic Data Analysis**

| *Selected Quotes from Semi-Structured Interviews* |
|---|
| **S**haring Feelings between Clinicians and Patients |
| *"I think we have never really thought about how this feels for the patients, that someone just coming to them saying; you are going to take this and this medication for this disease, and you are going to, because we are telling you to … in the long run it will change the way they choose treatments and how the patient is involved … what's the best treatment now at this time, how the patient is feeling"* - Health Coach #1. |
| **W**eaving the Threads of Information |
| *"You could get some more picture about patient's life … it was very good, and it gave me more insight of a patient life … use it for a broader picture of a patient's life"* - Doctor #3. |
| **I**ncreasing Awareness among Health Care Stakeholders |
| *"I think it's very important to be aware all the time of how much authority should a doctor have, and how much authority should a patient have. As a doctor you are a specialist, and it's very important to hear opinion of a patient, and it's his or her body and life, but we still are the ones with more knowledge. So, it's very important to remember that it's not like a patient comes to the shop and orders the treatment."* - Doctor #2. |
| **N**urturing Trust in Stakeholders and Systems |
| *"I think the way I was introduced to the program gave a lot of trust. It's a lot of information, and I feel that it is well documented, so I can use it."* - Health Coach #2. |
| **G**iving Support to Patients |
| *"I think the most important part is the support. When you support and motivate perhaps, to see how things are going, you are the middleman, I think that the coach role is very important in this, to be a support for the patient."* - Simulated Patient #1. |

***W****eaving the threads of information.* Patient health can be viewed as a peart picture with many discrete threads of information. Thus, seeing the whole picture is necessary for clinicians and patients to reach good choices. The data fusion of clinical observations, physical activities and treatment effects is essential in the process of optimising health and daily habits. The patient experience is being crafted based on the information between clinicians and patients, as well as, users and systems.

***I****ncreasing Awareness.* With the information glut in medicine, it is vital for health care stakeholders to aware of all relevant, valid information. In health optimisation, all options should be brought to the discussion between clinicians and patients to facilitate informed, shared decision-making. This is about moving out of clinicians' comfort zone to offer the best possible treatment to patients, based on up-to-date evidence.

***N****urturing trust.* In health optimisation, trust must be built and nurtured constantly in people and techno-social systems to encourage patients to achieve best possible outcomes. It involves patients as the owner of their health and their data in every step of care; and health care professionals must demonstrate their best interest in patient health.

***G****iving support to patients.* Optimising patient health occurs everywhere including clinical and home settings. Hence, enabling patients to connect to health care providers, friends, and family members is a good source of continuous support in long-run.

Reaching optimal health is about balancing between a number of different influences or aspects of health conditions to achieve a state of equilibrium. "*Every patient is different*" - Kazdin [3], and optimal health constitutes individual factors in many ways. The SWING model postulates the rotatory movement of health conditions, where several human factors serve as motivational forces to improve and maintain patient health as displayed in Figure 1.

Similar to the transition states of bipolar disorder, euthymia can be seen as optimal, tranquil mental moods and states such as mania and depression. The SWING model suggests the changes over time of a patient's health status and normal ranges. It allows the explicit understandings of decision points, where motivational forces are highly desirable. The use of technological interventions is not without any of these forces in order to achieve best possible health outcomes.

## 3 CONCLUSION

Health optimisation is an emerging field in which successful deployment is reachable with the affordances of achieving best possible outcomes. This study proposed the SWING model as a unique view of health optimisation to strike a balance of patient's health states. There several implications for theorists and practitioners. First, the proposed model provides meaningful guidelines of human factors in integrated health systems. Second, it opens opportunities in designing interventions for patients based on individual optimal and decision points. Last but not least, the study unveils a moving equilibrium concept of chronic conditions in design intelligence.

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