# 博士（人間情報学）論文概要

## Persuasive Mobile Health Technologies for Medical Communication and Interactive Therapy
（医療コミュニケーションとインタラクティブな療育のための人を動かすモバイルヘルス技術）

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# Abstract

Modification of health behaviours is often required to improve health outcomes. As some people have difficulty in achieving positive behaviour changes by themselves, they may need to be convinced or guided. Among different models for promoting behaviour change, this work explores persuasive technologies. Successful behaviour change requires not only the right persuasive strategies or roles, but also intervention at the right time and place. Mobile health technologies may provide new opportunities for this. This work has studied how different mobile health technologies can persuade different target users by using different interaction channels to promote positive behaviour changes in healthcare scenarios. For this purpose, two parallel research questions were addressed.

First, this research investigated how can interactive communication promote positive behaviour changes in patients and medical professionals independently. Two scenarios of communication of medical information were addressed and evaluated. The first scenario, CARMIE, is a conversational assistant acting as a social actor to promote medication compliance behaviours and facilitate interaction between patients and their medical information. The second scenario is a mobile application as a persuasive tool to promote behaviours of collaborative work and workflow adoption to facilitate interaction between a medical professional and medical information of his/her patients. System simplicity and interactivity was found to trigger user engagement. Specific evidence-based health information given by CARMIE was useful in directing users towards positive behaviour changes. Low learnability, low usability, and an approach centred on the functionality have been shown to hinder behaviour changes. Both studies established a baseline of user performance and satisfaction for the proposed persuasive systems and strategies. These results were channelled to a second research question: How can interactive therapy support therapists to promote positive behaviour changes in their patients? After surveying communities of music therapists, it was found that music and mobile technologies are already being used in music therapy practice worldwide, while sensing or emergent technologies are rarely used. Furthermore, therapists expect that new technologies can contribute to evidence-based practice, patient motivation, and tracking of therapy outcomes. Towards these expectations, this work explored a methodology to assess a music therapy group activity and gathered metrics to evaluate patients' performance. Then, these findings were integrated in a new interactive music therapy system, named CHIMELIGHT. This system was designed, implemented, and evaluated as a persuasive medium between a music therapist and their patients. Persuasive strategies included the cause-effect principle, visual feedback rewards, and providing behaviour training experiences. A six-month intervention experiment with CHIMELIGHT was done during music therapy sessions with groups of children with neurodevelopmental disorders. It was found that CHIMELIGHT-delivered visual feedback facilitated the engagement of the children in the activity, as well as a decrease in negative behaviours. Potential changes in positive behaviours were observed only in some children, but evidence was obtained that the developed system is effective in supporting evidence-based therapy. Based on the work done, guidelines and design indications for interactive therapy technologies for children with neurodevelopmental disorders were compiled, opening the way for other play-based feedback devices as evidence-based interactive therapy support tools.

This research observed the importance of tailored evidence-based health information. Other facilitators of positive behaviour change in mobile health were identified as naturalness of interaction, coherence, learnability, and usability. Moreover, this work has

proven the potential of mobile health delivered persuasion in promoting targeted behaviours. Interactive medical communication and interactive therapy allowed new channels of interaction between patient and health information; medical professional and health information; and therapist and patient.