



Towards Maintainable Physical Activity Behavior Change: Designing for Reflection in a Technological Intervention

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Problem Statement

Physical activity (PA) helps to prevent the leading causes of death worldwide and is interconnected with 13 of WHO's sustainable development goals for 2030. Nevertheless, worldwide, many people do not currently meet the global recommendations for PA.

Technological interventions are capable of supporting short-term increases in PA, but effects tend to dimish as the follow-up time increases. Throwing technology at the problem does not work to achieve the wanted long-term PA behavior change.

Opportunity

The **self-determination theory (SDT)** provides guidelines to support users with internalizing behavior, a key factor for the maintainability of a behavior.

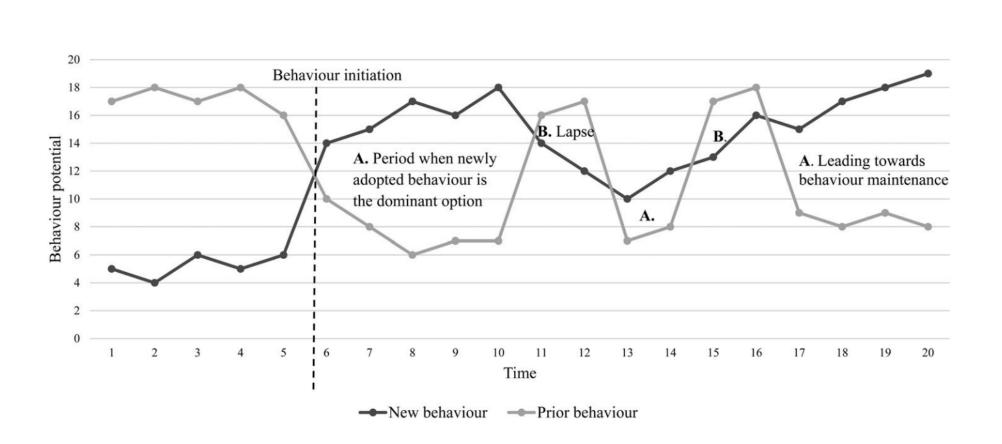
Motivational interviewing (MI) combines well with SDT and provides guidelines on how to support the three innate psychological needs—competence, relatedness, and autonomy—presented by SDT.

Reflection could be a key component in supporting autonomy and can be well-supported by technology.

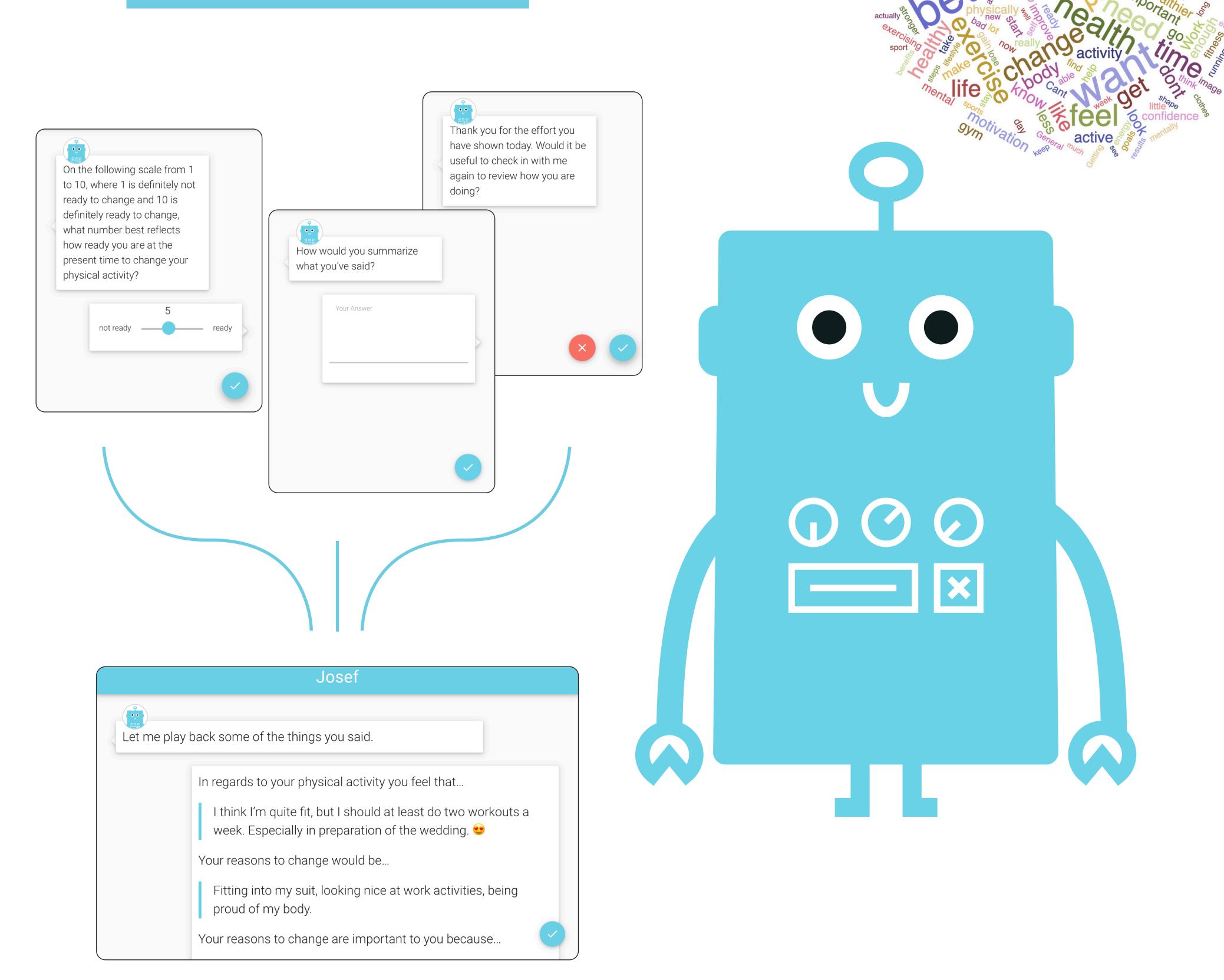
An implementation has to consider perspectives of health behavior change, software engineering, and **persuasive design**.

Research Question

What are the effects of components designed to further reflection in a computer-based intervention that aims to elicit long-term PA behavior change?

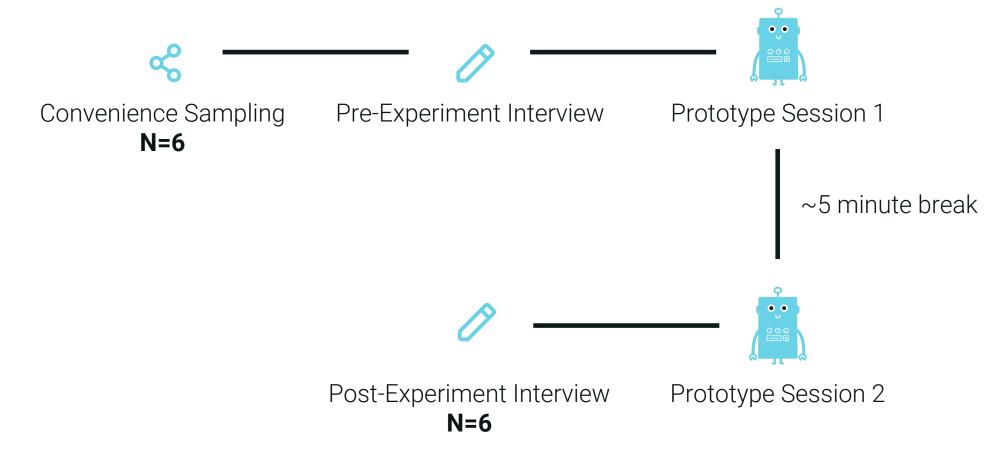


Intervention "Josef"

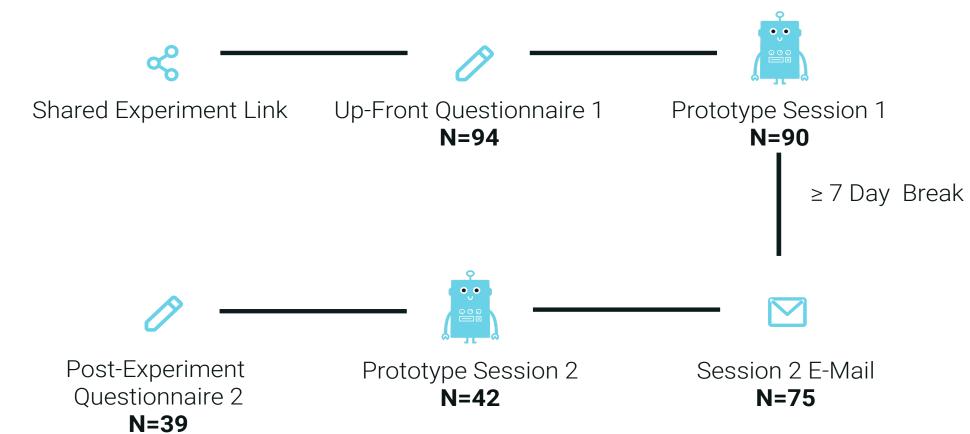


Methodology

- 1. Synthesize theoretical background through literature research and investigation of state of the art approaches
- 2. Concept, design & implement the computer-based intervention Josef
- **3.** Experiment *EX1*: **Qualitative interviews** with six participants using Josef V1



4. Experiment *EX2*: **Quantitative data collection** from 94 participants in 20 countries using Josef V2



5. Analysis: Transcription and thematic analysis for *EX1*. Descriptive statistics and Spearman rank-order correlation for all fields of interest in *EX2*. Word cloud and sentiment analysis of the participant's dialogue responses.

SDT & MI

Our work contributed an **empirical field trial of the combination of SDT & MI**.

- Analysis with paired t-tests showed no statistically significant difference for SDT & MI related questions after a one week intervention period.
- We observed statistically significant correlations between multiple factors of this category, which may provide insights on how supporting one aspect of SDT & MI might have positive effects on another.
- We have seen indicators that Josef achieved one of the core skills of a human MI practitioner by eliciting self-motivating statements.

Results

Reflection

Josef does not have any semantic understanding of the client's answers. Even with this limitation, we have shown how to scaffold for reflection through different types of summaries in dialogues. These results provide knowledge on how to support reflection with technology.

- Participants reflected in terms of the three dimensions of reflection—breakdown, inquiry, and transformation.
- Participants reflected on high levels of reflection, where higher levels are considered to be more reflective lower levels are prerequisites for higher levels.

Persuasive Design

Josef avoided being perceived as judgmental, limited, or negative by being restricted to a picture of a robot that communicated its goal, set clear expectations, and was designed to elicit a positive mood. Our results show the **importance of persuasive design for behavior change interventions**.

- Respondents slightly agreed with rather having talked about PA with Josef than with another human being.
- The ease of use and likability of Josef correlated significantly with responses to questions for the fields of SDT & MI as well as reflection.