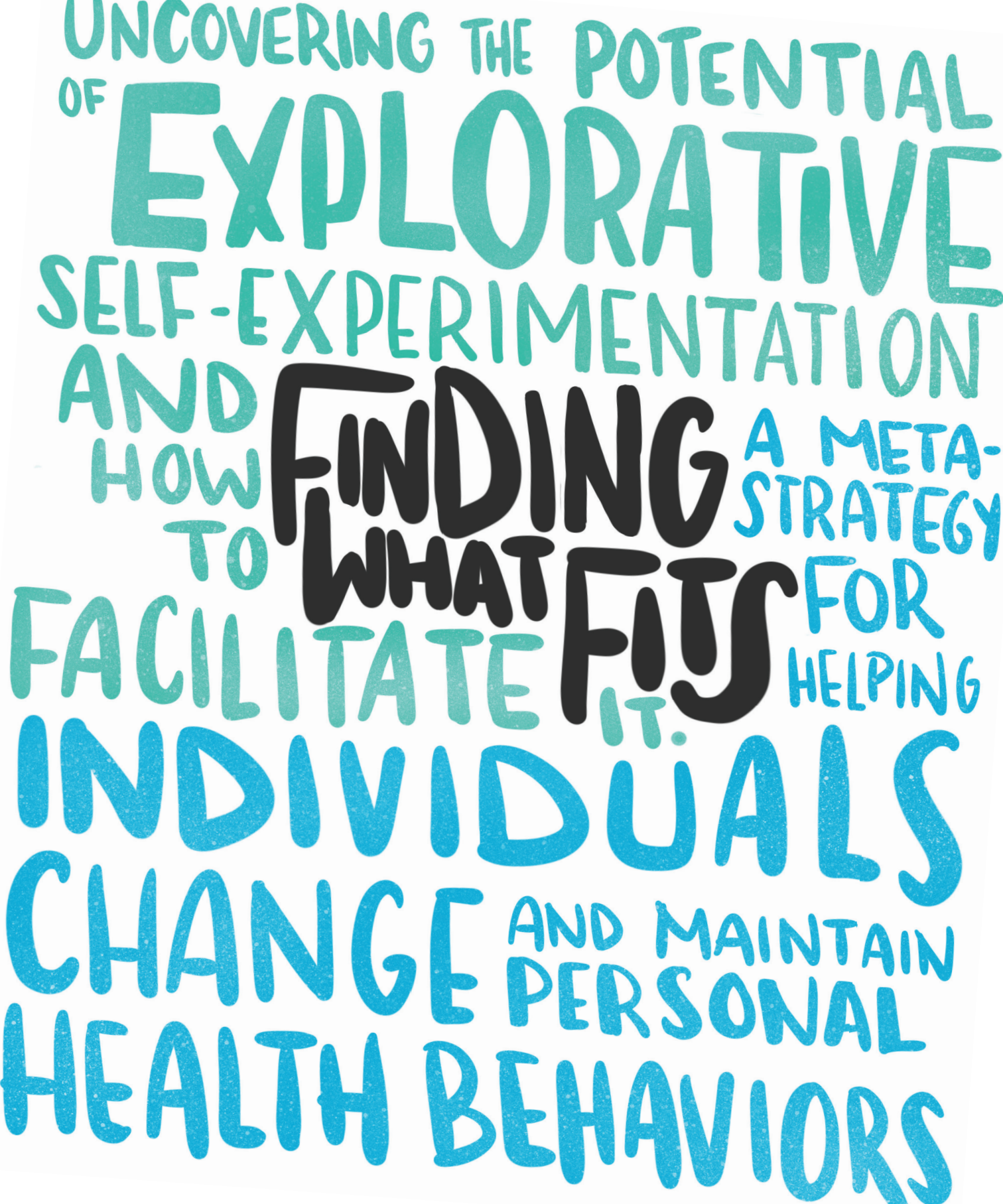
UNCOVERING THE POTENTIAL OF
EXPLORATIVE
SELF-EXPERIMENTATION
AND HOW TO
FINDING WHAT FITS
A META-STRATEGY FOR HELPING
FACILITATE IT
INDIVIDUALS
CHANGE AND MAINTAIN PERSONAL
HEALTH BEHAVIORS

FINDING WHAT FITS

Uncovering the potential of explorative self-experimentation and how to facilitate it: A meta-strategy for helping individuals change and maintain personal health behaviours

MSc Design for Interaction
Antonia Fedlmeier

March 2021

Delft University of Technology
Faculty of Industrial Design Engineering
A project with the Pride and Prejudice research consortium

COMMITTEE

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Also part of the supervisory team were Dr. Merijn Bruijnes and Dr. Mailin Lemke

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FINDING WHAT FITS

Uncovering the potential of explorative self-experimentation and how to facilitate it: A meta-strategy for helping individuals change and maintain personal health behaviours

Master Thesis
Antonia Fedlmeier
Design for Interaction
March 2021

Preface

When I started my Design for Interaction Masters at the TU Delft I hoped to gain new perspectives – both on design and as to what kind of designer I want to be. I found I love for tackling wicked problems with a societal impact, from designing sustainable product service systems in Indonesia, to using human-centred design to create a shift in heath care systems. My studies at the TU Delft have equipped me with a set of methods, approaches and perspectives with which I feel better prepared to tackle these societal challenges. Only one arrow was missing in my quiver, that I felt would be an invaluable addition. Through this graduation project I hope to learn more about how I can influence behaviour through design. Since all design is inherently persuasive (Tromp and Hekkert, 2019) I want to be more conscientious and deliberate in how I apply it. This graduation project presents the opportunity for me to concern myself in depth with design for behaviour change.

I want to thank my exquisite supervisory team: Jos, Marina, Merijn and Mailin. Thank you for trusting me to take on this project and allowing me to make it my own. Thank you for your critical questions, your quick feedback in times of crisis, and for getting your own hands dirty to help advance my understanding of self-experimentation! I hope to get to see you in real life some time soon.

To the volunteers who tested my prototypes: Thank you for the insights you gave me into your personal quests of self-improvement! I greatly value our conversations, and this thesis would not exist without your input!

To Maria, Freddy, Cais, Eva, Chiara and Albert: Thank you for your emotional support, for the coffee dances that fuelled these last months with energy, and for being my anchors in this challenging time of isolation.

To my family, thank you for your unfailing support and for keeping me sane. I would not be here without you.

To my readers: I hope this report inspires you, and maybe even motivates you to embark on your own journey to change personal health behaviours one step at a time.

Executive Summary

We live in a world in which chronic diseases are on the rise. Yet, improving personal health behaviours is a long-term goal, that is often undermined by alluring offers that provide instant gratification and other more pressing day-to-day matters. Often it is not the *intention* that is missing to change personal health behaviours, but there is much evidence that highlights a gap between what individuals intend to do vs. what they actually do (Sheeran, 2002). There are many existing behaviour change tools that provide the "solution" to a problem, yet no one solution will be effective for everyone (Hekler, Burleson, & Lee, 2013). Especially when considering health behaviours, that need to be sustained over time to have significant impact, it is prudent that interventions fit our goal, our ever changing lifestyle and are enjoyable (Phatak, 2019a). An alternative approach is to give individuals the tools to self-experiment with interventions, and through this, find interventions that work for them to establish a lasting effective behaviour change.

This project explores self-experimentation (SE) as a method for helping individuals change their personal health behaviours. A research through design approach was used to answer the questions: (1) What is self-experimentation and why is it needed? (2) What does self-experimentation result in and how can it contribute to individuals achieving sustainable health behaviour change? And (3) how can design facilitate individuals to self-experiment?

In alignment with these questions, this project yields three significant outcomes: First, a new take on self-experimentation was discovered; one that addresses the limitation of existing approaches and caters to the needs of people trying to change their health behaviours. User research into how people go about navigating their health behaviour, and the kind of evidence they need to make decisions revealed that: (1) People generally navigate their health behaviour through intuition. (2) People who practice self-experimentation, are not seeking to answer a hypothesis, but simply want to find an intervention that works for them, explore different options and learn about themselves in the process. (3) People can determine whether or not an intervention works for them simply by trying it out. This reveals if the intervention helps them achieve their goal (i.e. is effective), whether it fits into their lives and with their personality (compatibility) and whether they enjoy it.

These insights created a premise for a new approach which was labelled "Explorative Self-experimentation". It differs fundamentally from the existing "quantitative" method in that it omits the key ingredient of a data-driven scientifically rigorous objective evaluation of the effectiveness of interventions, and instead harnesses the intuitive evaluation formed by a user's lived experience.

By observing 14 participants undergo four weeks of self-experimentation, a set of 13 phenomena were uncovered that engaging with Explorative Self-experimentation results in. These can be summarized in five statements: Explorative Self-experimentation helps people (1) take incremental steps towards a long term goal, through (2) trial and error to success. It (3) leads people to get to the heart of the issue, (4) discover new perspectives and attitudes towards their own health behaviours and (5) find support along the way. These phenomena were linked to prominent behaviour change theories in the context of health in order to establish how explorative self-experimentation can contribute to individuals changing and maintaining their health behaviours.

Finally, the research through design process involved creating three sets of prototypes that explore how to facilitate individuals to self-experiment with health interventions. The design process and the testing of these prototypes revealed three lenses from which to tackle facilitating self-experimentation: (1) designing for the process, (2) designing for different scenarios or stages of change and (3) designing for the underlying needs and values of people trying to change their health behaviours. As part of this third lens, I presented seven concrete starting points for designers to facilitate self-experimentation, linking the underlying values and needs to key ingredients design can provide. The compilation of these outcomes aspire to answer the research question of how design can facilitate SE: Designers can provide guidance through the process, designers can help initiate SE, help people maintain their efforts over time to find something that fits, or help turn fitting solutions into habits. Designers can cater to needs and values by providing guidance, incentives and inspiration over time, by making room for personal growth and flexibility, fostering personal attachment and by forming a resilient mindset.

In conclusion, this thesis uncovers the potential of Explorative Self-experimentation and how to facilitate it. It presents a meta-strategy for helping individuals change and maintain personal health behaviours, and through this hopes to contribute to improving health both at an individual and societal level.

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"Self-experimenting is satisfying because you're making some progress towards something that you've been thinking about for a long time"

Participant 2, SE Phase 2

(Photo source: Participant 2, SE phase 3)

01 Introduction

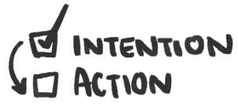
This chapter presents an introduction to the project, including its relevance, the project aims and scope and the project approach. It presents an overview of the process as well as a reading guide for the report.

1.1 Introduction

RELEVANCE

Worldwide healthcare systems are burdened by global trends of aging populations and increases in chronic diseases. In The Netherlands, it is predicted that by 2040, 62% of adults will be overweight and 9.8 million people will have at least one chronic disease (Dutch Ministry of Health, Welfare and Sport, 2018). By far the three leading causes of this burden of disease are smoking, Obesity, and problematic consumption of alcohol (Dutch Ministry of Health, Welfare and Sport, 2019). As a result of this, healthcare systems around the world are overdue for a change. However, health in its complexity and interrelatedness of factors makes it difficult to apply linear problem solving, and identify point solutions (Roberts, MacLaren, & Samuelson, 2018). There is a need to move healthcare upstream, to focus on prevention and increasing the overall population health.

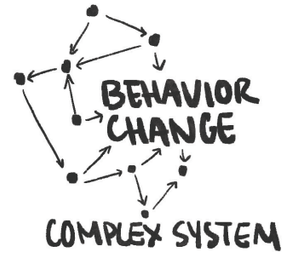
Individual health choices and behaviour not only have far reaching effects on a societal level, but also directly impact a person's vitality and quality of life. Awareness of the importance of leading a healthy lifestyle is starting to seep in, yet there is much evidence that highlights a gap between what individuals intend to do vs. what they actually do (Sheeran, 2002). Efforts to change behaviour are often undermined by alluring offers that provide instant gratification. This is not made easier in our modern affluent society "where food is abundant and available 24/7, and where people are constantly seduced by companies' marketing efforts" (4TU Federation, n.d.). Moreover, improving health and well-being relies on a sustained engagement with these behaviours (Lee et al., 2017). Healthy eating, more exercise, better sleep; new year's resolutions are common, but how often do they result in a structural change in behaviour? Even with a large number of apps and interventions available, individuals often struggle with initiating and sustaining health behaviours (Lee et al., 2017).



This struggle to initiate or uphold healthy lifestyle behaviours has become even more pronounced in the last year due to the ongoing COVID-19 pandemic. Studies in the UK (Robertson et al., 2021), Italy (Di Renzo et al., 2020) and Denmark (Giacalone, Frøst, & Rodríguez-Pérez, 2020) have shown that the imposed restrictions on people's movements through lock-down regulations in combination with a change in food accessibility throughout the day due to being at home, have had significant impact on people's eating habits and exercise behaviours. Many people show an increase in sedentary behaviour and irregular eating patterns, resulting in weight gain and mental health difficulties related to body image (Robertson et al. 2021). This drastic change in lifestyle leads to many existing habits and routines being broken, leaving people with a need to establish new health behaviour routines.

THE CHALLENGE OF CHANGING BEHAVIOUR

Behaviour change is extremely complex in that it is influenced by a large variety of both personal and contextual factors. Some factors that determine whether or not an intervention will be effective for any individual include their personality, social context, personal preferences, perceived enjoyment, time constraints, and environmental factors such as location and weather (Phatak, 2019a) (Glanz, Rimer & Viswanath, 2015). Behaviour change is so complex, in fact, that it can be understood through the lens of chaos theory in that it is highly variable, difficult to predict and extremely sensitive to initial conditions (Resnicow & Page, 2008). Resnicow and Page suggest that "chaos may also arise in human motivation and behaviour" (2008, p.1383). Examples of these initial conditions are knowledge level, current attitudes, mood states, social norms, and many other environmental and personal states. They conclude that "the potential permutations in initial conditions are virtually infinite, which suggests that the potential pathways to change are too" (Resnicow & Page, 2008, p.1383). This suggests that the behaviour change process is not entirely under our conscious control, and seeing as our actions are part of a complex adaptive system, it is difficult to predict exactly how an intervention will work for any individual.



From this and many other behaviour change models (Ganz et al., 2015) (DiClemente, 2007) it is clear that there is no one-fits-all solution. Many existing behaviour change tools provide the "solution" to a problem, yet no one solution will be effective for everyone (Hekler et al., 2013). Especially when considering health behaviours, that need to be sustained over time to have significant impact, it is prudent that interventions fit our goal, our ever changing lifestyle and are enjoyable (Phatak, 2019a). Therefore interventions require a high level of personalization to be effective (Noar, Benac, & Harris, 2007).

An alternative approach that holds much potential, would be to give individuals the tools to self-experiment with interventions and through this develop their own, personalized and effective behaviour change plan (Lee et al., 2017). This self-experimentation approach is linked to the Quantified Self (QS) movement, where individuals work to better understand themselves through self-tracking/ self-study. Within QS, “the goal of self-experimentation is not to find generalizable knowledge, but to find meaningful self- knowledge that matters to individuals” (Choe et al., 2014). Through self-experimenting with various behaviour change interventions, individuals embark on a process of self-discovery that may lead to the desired sustainable change.

PROJECT AIM AND SCOPE

This project will work towards closing the gap between intending to change one’s health behaviour and actually doing it. The goal is to enable individuals who are motivated to change their behaviour, to follow through by facilitating self-experimentation. The intended effect is that individuals will find interventions that best fit their goal, personal values, as well as socio-cultural context, and through this establish a lasting effective behaviour change. Therefore, this project is not aiming to change a specific health behaviour, nor to find out which behaviour change techniques are most effective for a given behaviour, but instead looks at a method that helps individuals explore various approaches and find their own effective intervention.

The main research questions guiding this project are:
1. What is self-experimentation and why is it needed?
2. What does self-experimentation result in and how can it contribute to individuals achieving sustainable health behaviour change?
3. How can design facilitate individuals to self-experiment?

The target group for this project are people that are already aware that they should change their health behaviour and are motivated to do so (creating this awareness/motivation is out of scope). A well established and widely applicable model that describes the stages people go through when changing a behaviour is the Transtheoretical model of behaviour change (TTM) (see figure 1). This project targets people who are in stage (3) preparation or (4) action on the TTM, with the goal to help them reach stage (5) maintenance (DiClemente, 2007). As this project aims to close the intention-action gap, it targets individual who have already contemplated changing, are aware of the pros and cons of changing, and are now preparing to take action in the near future.

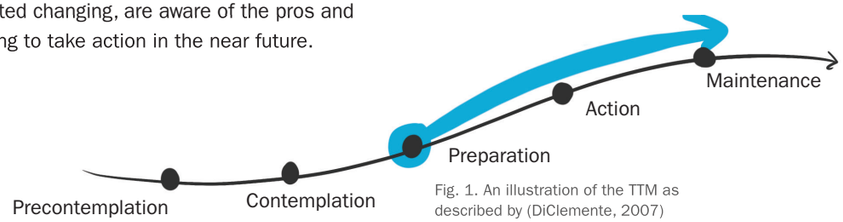


Fig. 1. An illustration of the TTM as described by (DiClemente, 2007)

Furthermore, this project targets people for whom working on their health-behaviour is not an urgent matter (i.e. they have not recently suffered a heart attack, are pregnant or have any diagnosis that would make working on their health a sudden priority). This means that improving health behaviour is considered a long-term goal, a commitment for the future self. When looking at Tromp and Hekkert’s (2009) model mapping the conflicting concern for social design (figure 2), this projects looks at resolving the conflict at an individual level, in order to reach the societal goal of improving population health.

Finally, I will be working with (home) office workers aged 25-50 as a target group (figure 3). Office workers are known to have a sedentary lifestyle, and through the COVID-19 pandemic and transition to a state of persistent home office, have lost even more movement in their daily lives (Robertson et al., 2021). This decision is also based on the feasibility to collaborate with this available group over the course of this project.

The project will be carried out together with the Pride and Prejudice consortium, which is a group of researchers from TU Delft, Wageningen University, TU Eindhoven and Twente University. Together, they aim to develop lifestyle interventions for the prevention of chronic diseases, with a focus on healthy nutrition and physical activity promotion. The program aims to generate new scientific knowledge and innovative technology, including new frameworks for behaviour change, systems to monitor remotely health parameters and behaviour, and design approaches to help people adopt a healthier lifestyle.

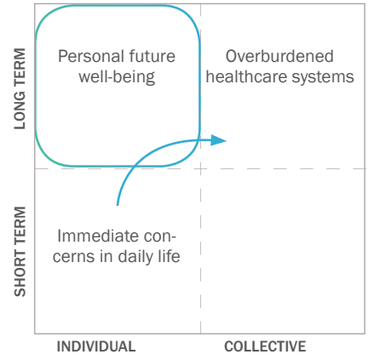


Fig. 2. Adapted model of Tromp and Hekkert’s (2019) conflicting concerns for social design model

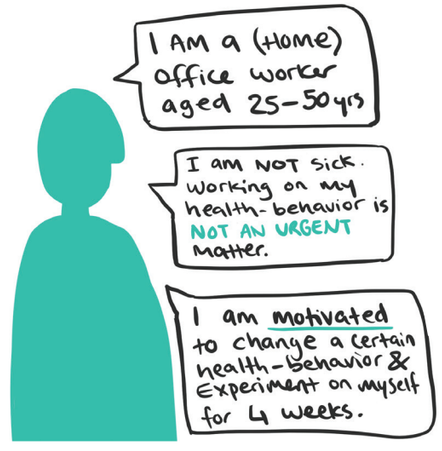


Fig. 3. An illustration of the TTM as described by (DiClemente, 2007)

1.2 Project approach

This report focuses on presenting the key outcomes of a 100-day research through design process. However, it is essential to understand the methods that led to these results. The following chapter presents an overview of the approach used for this project and the key methods used in the research through design process that yielded the upcoming displayed results.

A RESEARCH THROUGH DESIGN APPROACH

This project followed a research through design (RtD) approach. RtD is "a research approach that employs methods and approaches from design as a mode of inquiry" (Dalsgaard, 2016). Throughout the project, design activities such as ideation and prototyping, were used to generate knowledge and help answer the core research questions of why self-experimentation is needed, what it results in, and how design can best facilitate it. As can be seen in figure 4, both research and design activities were running in parallel, with insights from each activity flowing into and inspiring the next. The goal of applying this RtD approach is to gain an actionable understanding of this complex issue, resulting in communicable insights as well as an artefact that addresses the problem (Stappers & Giaccardi, 2017).

"Design is a way to ask questions. Design Research, when it occurs through the practice of design itself, is a way to ask larger questions beyond the limited scope of a particular design problem. When Design Research is integrated into the design process, new and unexpected questions emerge directly from the act of design."
(Zimmerman, 2003)

In RtD, the generative process of designing the artefact can already lead to many insights, as abstract theories and models around behaviour change are placed into real-world scenarios. As Stappers and Giaccardi (2017) put it: "the designer(s) will have struggled with opportunities and constraints, with implications of theoretical goals/constructs, and the confrontation between these and the empirical realities in the world."

A research through design approach is especially applicable when tackling "wicked problems", which are complex issues with many interdependent factors (Jones, 2014). The issue of changing health behaviours can be considered a wicked problem as there are many influential factors, it relates to various other clusters of problems, and there is no true-or-false solution. By applying research through design, an iterative hands-on approach in prototyping and testing, interactions and interconnections that were previously unknown, can become observable (Stappers & Giaccardi, 2017).

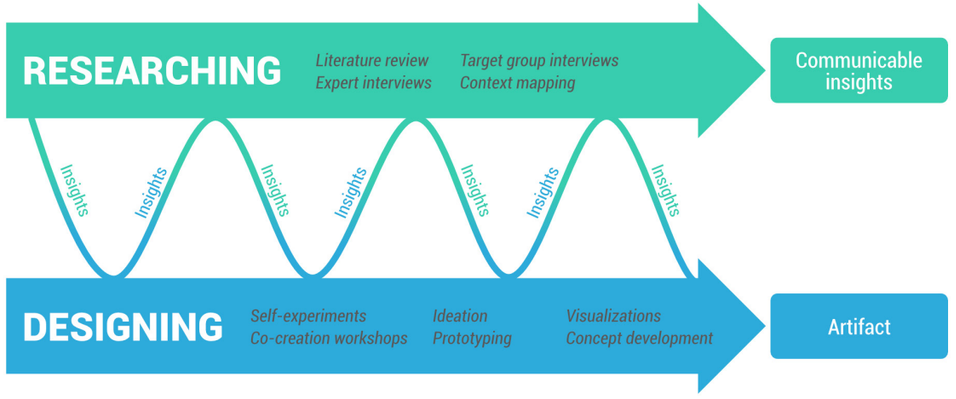


Fig. 4. The research through design process of this project

PROCESS OVERVIEW

In the chosen RtD approach several main activities were running parallel to each other throughout the project. This chapter provides an overview of the five main phases which encompass this project, and the key methodology used to obtain the results presented in this report. The process will not be reported in chronological order, but rather in the five main phases it contained (see figure 5).

1. EXPLORING THE PROBLEM

The project started with a problem exploration phase to better understand the challenges individuals face when trying to change personal health behaviours. Through a series of context mapping activities (Visser, Stappers, van der Lugt, & Sanders, 2005), including creative sessions with 20 students, a workshop with experienced self-experimenters, and five interviews with home-office workers (target group), an overview of the problem was created.

2. EXPLORING SELF-EXPERIMENTATION

In parallel to the problem exploration, the method of self-experimentation was explored in order to uncover important factors to consider when facilitating self-experimentation. This was done by constructing a prototype that facilitates its users to self-experiment, which was sent out to four volunteers for testing over a period of five weeks. Here the prototypes embodied a mode of inquiry (Wensveen & Matthews, 2014) to explore the method and uncover the right questions to ask moving forward.

3. FACILITATING SELF-EXPERIMENTATION BY GETTING THE BALL ROLLING

Based on the insights gained from the first two phases, a second prototype of higher fidelity was designed. The focus of this prototype was to facilitate individuals to self-experiment with health-behaviour interventions in a playful way. It was sent to five new participants and tested over a course of four weeks. Each participant was interviewed after the second and fourth week of testing to collect feedback. This data was used to answer the research questions: What do participants want to get out of self-experimentation? What elements are most helpful in facilitating SE? Where do participants need most support? What phenomena does SE result in?

4. FACILITATING SELF-EXPERIMENTATION BY KEEPING THE BALL ROLLING

A third and final self-experimentation intervention was launched with a third prototype that embodied the learnings from the previous phases. Having uncovered key ingredients that help launch people into self-experimentation as well as common pitfalls that hinder the process; this phase focused on helping people maintain self-experimentation over time. As with the previous interventions, the participants were interviewed twice, once after two weeks of self-experimenting using the prototype, and once after four weeks. Using thematic analysis (Braun & Clarke, 2012), common overarching themes and phenomena were derived to better understand the role of SE in changing health behaviour, as well as the key design components that aid in its facilitation.

5. COMMUNICATING RESULTS

The final phase of the project included compiling the insights gained throughout the previous activities in order to answer the driving research questions: How does self-experimentation contribute to sustainable behaviour change? And how can we design for it? Parallel to the aforementioned design activities, literature on corresponding topics was reviewed to create a theoretical foundation for the project.

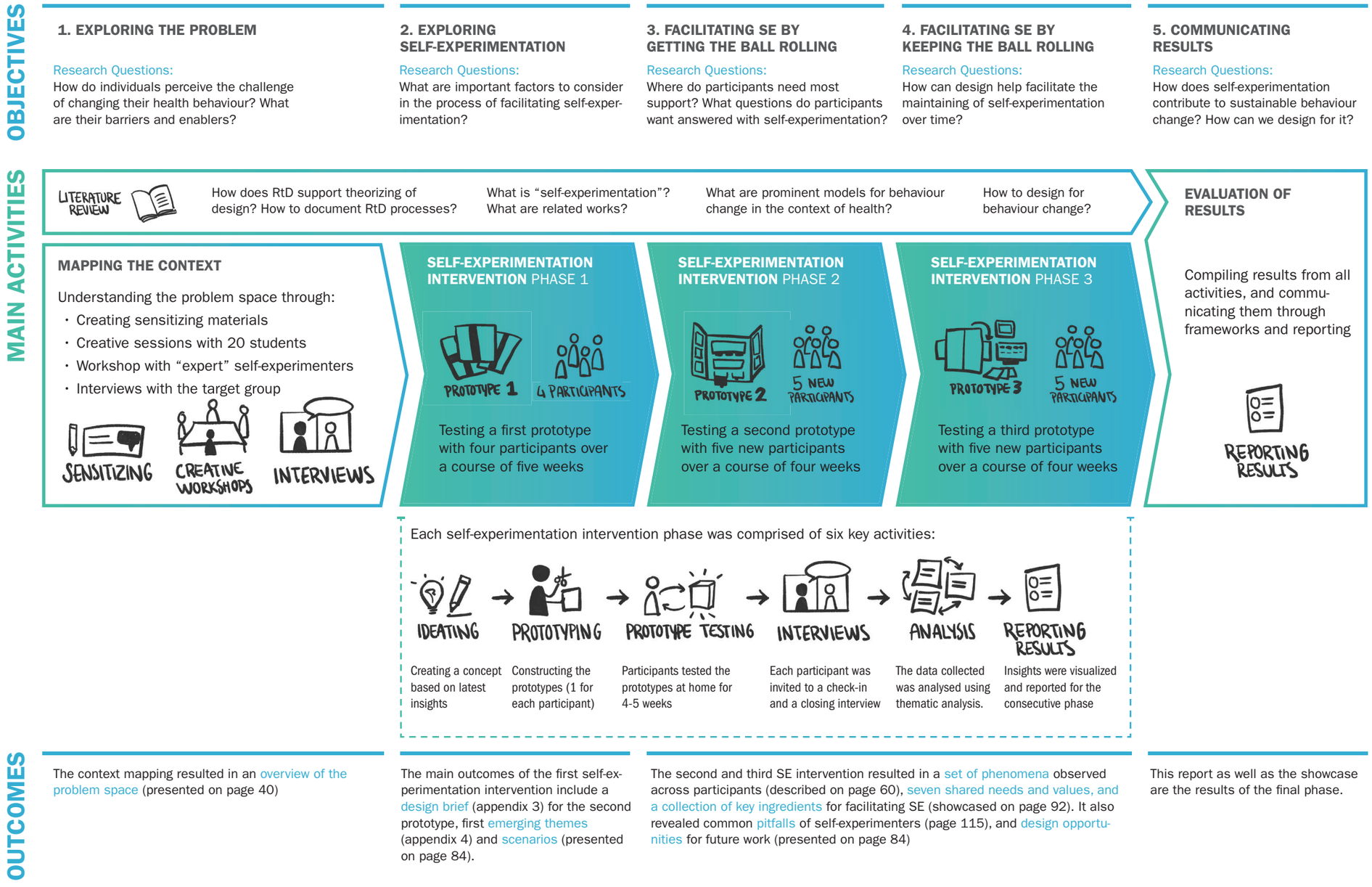


Fig. 5. Project Process Overview

PARTICIPANTS RECRUITMENT AND ETHICS

The participants in this study were recruited using convenience sampling (Lavrakas, 2008). It should be noted that all user-testing performed throughout this project was approved by the Ethics Committee of the TU Delft. All participants joined the study voluntarily, gave written consent, had full control over which health behaviour goals they wished to work on, and were informed regularly about their rights to discontinue the study. For more information on the ethics approval, please see appendix 9.

CONCLUSION

As is summarized by figure 5, the research through design process centred around the three self-experimentation interventions. Most insights presented in this report were derived through designing and testing prototypes that would facilitate participants to engage in self-experimentation over a course of four weeks. Rather than reporting on this iterative process, this document will communicate the outcome of the process with a few incisions on the methods used.

1.3 Reading Guideline

This report presents the main outcomes of the research through design process. As shown by figure 6, the chapters are set up to answer the core questions and research aims behind the project. Chapter 2 starts by introducing the method of self-experimentation, and its background in relation to behaviour change in the context of health. It then presents the way Self-experimentation was understood and used in the context of this project. Chapter 3 looks at answering the question of why self-experimentation is needed by presenting the results of a context analysis. Chapter 4 explores what self-experimentation can achieve and to what extent it can contribute to individuals attaining sustainable behaviour change. Having at this point established the potential of the self-experimentation method, Chapter 5 looks at how it can be facilitated through design. Chapter 6 presents the final prototype design that was key in attaining many of the above results, and finally, chapter 7 presents a discussion of all results, and an outlook for next steps.

The focus of this report lies on presenting the outcomes, rather than the design process. However, each section includes a small chapter about the methods used to obtain the presented results.

Chapter 2

INTRODUCING SELF-EXPERIMENTATION

What is Self-experimentation?
What is Explorative Self-experimentation?

Chapter 3

A PREMISE FOR SELF-EXPERIMENTATION

What challenges do people face who try and change their behaviour? Why is Self-experimentation needed?

Chapter 4

A LINK TO SUSTAINABLE BEHAVIOUR CHANGE

What can Self-experimentation achieve?
How can it contribute to Sustainable Behaviour Change?

Chapter 5

FACILITATING SELF-EXPERIMENTATION

What are underlying values and needs of Self-experimenters?
What are design opportunities?
How to address SE with a design artefact?
What are the pitfalls of self-experimentation?

Chapter 6

THE FINAL PROTOTYPE

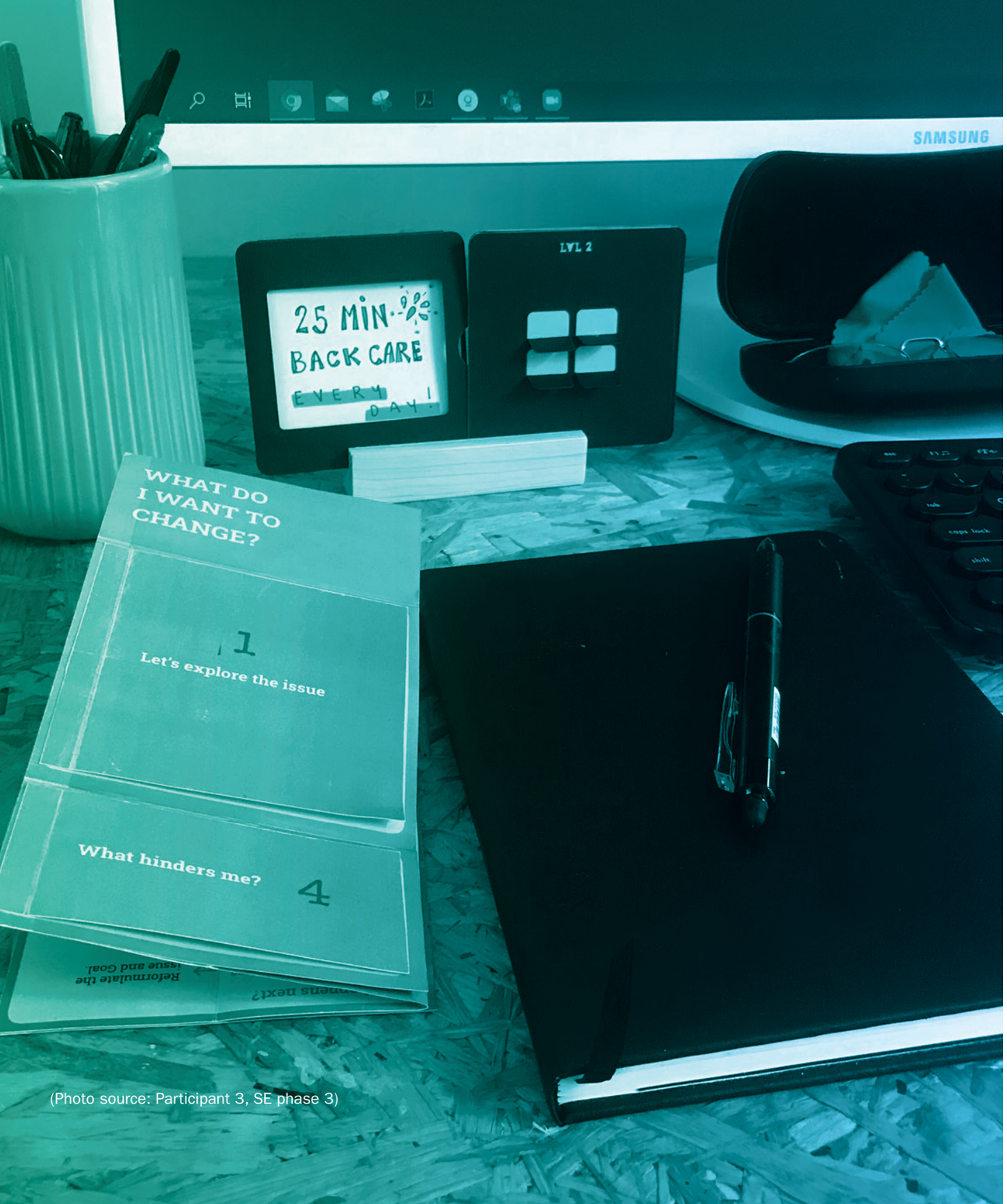
How to communicate main findings through an artefact?

Chapter 7

DISCUSSION & CONCLUSION

What are the contributions?
What are the next steps?

Fig. 6. Visual reading guide



(Photo source: Participant 3, SE phase 3)

02
Introducing Self-experimentation

In this chapter I will describe the background of the method self-experimentation as it is used for behaviour change. Upon reviewing some of the shortcomings of these approaches, I will define how self-experimentation has been defined and used as part of this project.

2.1 What is Self-experimentation?

This chapter looks at the existing use of self-experimentation within the domain of behaviour change. Some limitations of previous applications will be highlighted to explain the premise for the self-experimentation approach used in this project.

BACKGROUND: SELF-EXPERIMENTATION FOR BEHAVIOUR CHANGE

In the last five years, self-experimentation has emerged as a branch under the Quantified Self (QS) movement. The QS movement centres around the interest of self-tracking as a tool for self-discovery, and if it were to have a slogan it would be “self-knowledge through numbers” (“Quantified Self,” n.d.). QS presents self-knowledge as a prerequisite to improve personal life quality (Wilson, 2012), and tracking data as a way to achieve this self-knowledge in a way that circumvents the human fallibility of subjective biases (Bode and Krestensen, 2015). The movement started in the 1970s and gained immense momentum through the uprise of consumer-friendly wearable self-tracking technology in the 2010s.

The purpose of self-experimentation, much in-line with the QS movement, is to aid in self-discovery. The focus lies in creating self-knowledge rather than generalizable knowledge – going from generic contingencies, to more personal ones (Neuringer, 1981) (see figure 7). The focus of SE is to create this self-knowledge through empirically testing the effect of an intervention on an aspect of their lives (Phatak, 2019a). For example, through SE a person could scientifically test if meditation helps them feel more focused, or which other intervention has this desired effect. It is a tool to help users find out what works for them and in this way help them decide which activities are worth pursuing (Phatak, 2019a).

Within the realm of public health and the challenges of health behaviour change, SE is seen as having great potential for finding individually-tailored solutions. It recognizes that circumstances change for every individual, and

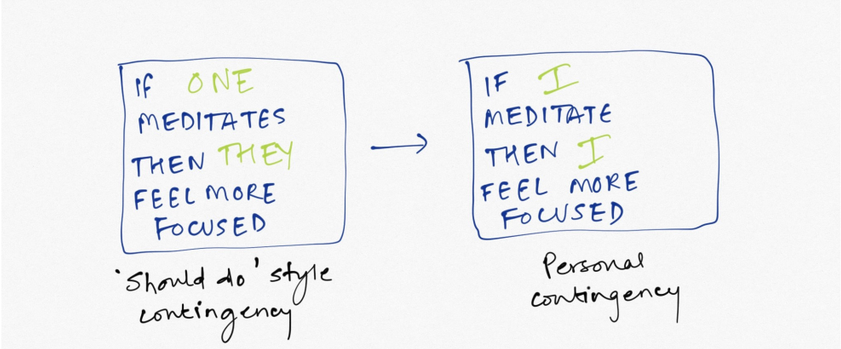


Fig. 7. Illustration of personal contingency (Phatak, 2019b)

that people respond differently to the same interventions due to the complex, multifaceted nature of behaviour change (Phatak, 2019b). Furthermore, in healthcare SE can be applied to understand the cause of symptoms by providing concrete answers to specific health question at an individual level, and through this, help individuals adapt their behaviour (Hekler et al., 2016).

A CLOSER LOOK AT THE QUANTITATIVE METHOD OF SE

Within QS, “Self-Experimentation” is framed as a method to rigorously test causality, as opposed to other self-tracking methods that merely observe correlations (Shroeder, 2018). “In a self-experiment, an individual varies one or more factors in a controlled manner, with the intent of making causal inferences about the effect of those factors” (Shroeder, 2018, p.3). Self-experimentation is thus framed as a method that relies on scientific rigour, and most related work (including SE done by Phatak, Karkar, Hekler and Neuringer) conduct self-experiments with an A/B testing set-up to come to data-driven conclusions about causality. For example, Phatak designed a self-experimentation tool called “Hack Your Health” in which individuals can test whether specific popular health interventions, including meditation, gratitude journalling and vigorous physical activity, improve their psychological well-being. (Phatak, 2019b) As can be seen in figure 9, the experimental set up consisted of 18 days split into 3-day sections of either doing the intervention or sticking to the “usual routine”. At the end of each day, participants filled out a questionnaire to track their psychological well-being (figure 8), resulting in a final report that visualizes the effect of an independent variable (ex. meditating) on the dependent variable (psychological well-being). (Phatak, 2019b) In Karkar’s app “TummyTrials” (2017), patients suffering from Irritable Bowel Syndrome could use a similar experimental set-up to gain insights on which foods triggered their symptoms.

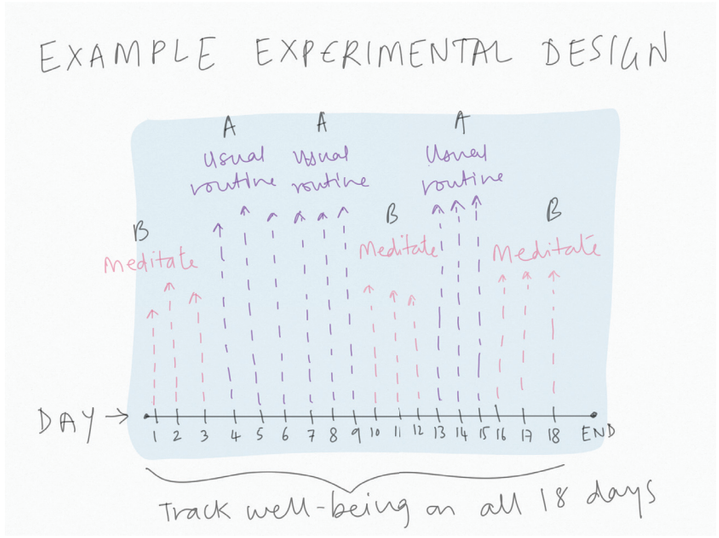


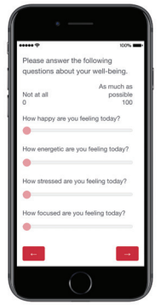
Fig. 9. “If a person is trying meditation, this is what their 18 days would look like if assigned to the BAABAB sequence”. (Phatak, 2019a)

LIMITATIONS AND NEW OPPORTUNITIES

Although self-experimentation presents potential for aiding in self-knowledge to guide behaviour change, there are considerable limitations when applying this method to the general population. Phatak (2019a) with “Hack-your-health” and Karkar et al. (2017) with “Tummy Trials” have both uncovered limitations of SE when applied to public health interventions. These are outlined below.

Scientific rigour vs. user needs

Both studies describe a tension between the scientific rigour put forth by the method, and some user needs. Karkar et al. (2017) found that self-experimentation as a concept was difficult to understand for end-users. Phatak (2019a) brings up this limitation when assessing her interface design for Hack-your-health. In order to uphold the scientific validity, and create empirical evidence through SE, the process of tracking health in daily life becomes time-consuming, which conflicts with the users’ need for ease. This required effort places a burden on the user that “may not be perceived as worthwhile compared to the benefit one receives” (Phatak, 2019a, p.21). Phatak goes on to explain that many participants struggled to comply with the rigid experimental conditions, which collided with their need for flexibility in structuring their days-to-day life. For example, participants were assigned on which days they had to do the interventions, and which days were rest days, which may not suit the participant’s daily plans (Phatak, 2019a).



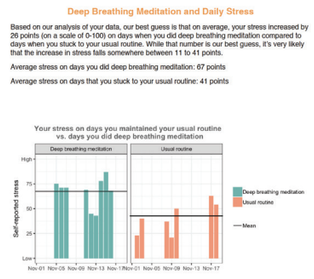


Fig. 8. Self-Experimentation set-up for “Hack Your Health” (Phatak, 2019a)

Intuition vs. Data

Although the main purpose of explorative self-experimentation is to provide empirical evidence *beyond* relying on intuition, both Karkar et al. and Phatak describe tension between the numerical result of an experiment and the participant’s own lived experience. As Phatak puts it: “much of the work in self-experimentation has focused on and given more importance to quantitative tracking and statistical analyses over participant intuition... we assumed that the quantified experiences as systematically collected through the experiment and self-report measures would have a large impact on decision-making.” (2019a, p.123) However, in her study, Phatak found that the participant’s *intuition and subjective experience* were important to their decision-making. She raises the question of what is *lost* when using quantification to understand complex phenomenon such as a person’s experience in trying out behaviour change interventions to find what works for them. “As demonstrated in this study, qualitative reflection can help capture subjective experiences that are important to participants that quantitative data does not.” (Phatak, 2019a, p.123)

Examining these limitations of applying quantitative self-experimentation, it beckons the question of whether a more qualitative approach to self-experimentation could harness the potential while sidestepping some of it’s core limitations. Ultimately, SE wants to help people in self-discovery and to empower them to navigate their health. Perhaps it is time to take a step back to understand how people go about navigating their health behaviour, and what kind of evidence they need to make decisions and propel health behaviour change.

2.2 Introducing Explorative Self-experimentation

Acknowledging both the potential and limitations of quantitative self-experimentation, this thesis looks to open a new chapter on self-experimentation for behaviour change by daring to explore the concept without its most prominent feature: the quantitative data-centered structure. This project centres around a novel, more qualitative approach to SE that I have labelled “Explorative Self-experimentation” (ESE). This chapter will first look to define ESE, explain how this meta-strategy is applied and present a framework of the ESE process.

DEFINITION

In Explorative Self-experimentation, “experimentation” is not defined as the controlled testing of hypothesis as part of applying the scientific method. Instead we look towards how experimenting is viewed in a design context, where Stappers and Giaccardi (2017) present the working definition of a general experiment as “an explorative confrontation with real-world situations”. Here the term takes on a broader sense of “trying something out to see if it works” as part of an inquiry or program (Stappers & Giaccardi, 2017). Following this logic, self-experimentation refers to trying something out yourself (or on yourself) to see if it works. For the purpose of this thesis, explorative self-experimenting for behaviour change is defined as trying out interventions yourself to see if they work, and exploring their effect on personal behaviour in one’s own context.

The intended effect of ESE is that individuals will find interventions that work for them to help achieve their behaviour change intentions in a way that fits their context and personal preferences, and through this establish a lasting behaviour change.

AN EXPLORATIVE SELF-EXPERIMENTATION STORY

In order to paint a picture of what ESE looks like when applied, the process of one of the participants of this study has been illustrated into a short story (figure 10). Emily (not the participant’s real name), has several habits that she would like to change, but other than writing them down as new years resolutions, and giving it a feeble attempt, not much has changed.

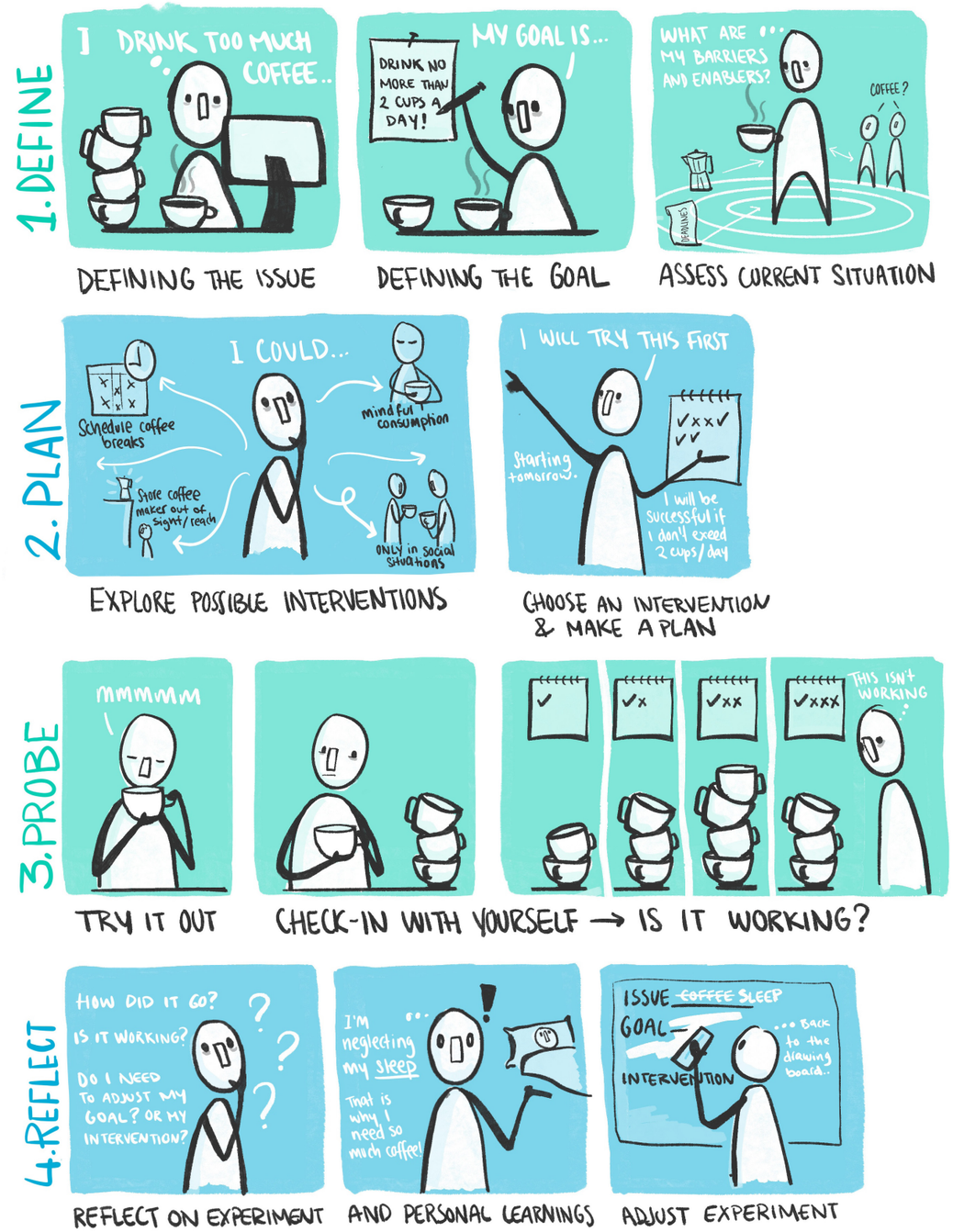


Fig. 10. Storyboard of explorative self-experimentation

Upon starting ESE, she first defines what issue she would like to work on. The one that seems most urgent and relevant to her daily life is her alarming coffee consumption, which often leaves her feeling drained. She then proceeds to define her behavioural goal: she would like to reduce her caffeine intake to maximum two cups of coffee per day. Next, she assesses her situation: does she have everything she needs to fullfill this goal? What barriers and enablers are there to reaching her goal? She reflects and among other things notes that she usually drinks coffee absent-mindedly while working, and takes an additional cup anytime co-workers/house-mates prompt her for a coffee break.

Other participants chose to work on doing yoga regularly, improving quality of sleep, eating less sugar or spending less time in-front of screens.

Having defined what she would like to change, Emily proceeds to brainstorm possible interventions to try out. She could schedule her coffee breaks, or limit herself to only drink in social situations. She could change the location of the coffee machine so it isn't so close to her working station, or she could try mindful consumption. She decides to first try the mindfulness intervention: every time she drinks a coffee, she will stop all other activities and mindfully drink it on the couch and not at her workplace. She hopes doing so will make her more aware of her coffee intake throughout the day and ultimately help reduce it. She sets a starting date: tomorrow! And sets her own success metric: she will declare this intervention successful if she can stick to her goal of 2 cups a day and if she feels less drained at the end of two weeks.

Some participants went through interventions systematically, trying one at a time, others tried multiple interventions at once and continued with the ones they felt had an impact.

Tomorrow arrives and it is time to try the intervention! Seeing as Emily has a daily goal, she decides to check-in with herself every evening: how many coffees did she drink that day? She takes note on the calendar hanging in the kitchen. After four days she already sees that mindful consumption is not reducing her coffee intake as much as desired. She enjoys the mindfulness act of drinking, and wants to keep doing it, but she is just too tired and has too much work to be do at the moment that she can cut out more caffeine. Throughout the four days she feels a heightened awareness of how she feels, before during and after drinking coffee, and which other factors are contributing to her habit. Emily realizes that she has completely neglected her need for sleep, she doesn't sleep well, and often wakes up early, too stressed by work to go back to sleep. Leaving her only with one option to get through the day: coffee. Having reflected about this root cause, she decides to continue experimenting but with an adjusted goal: to stay in bed longer in the morning, allowing herself another attempt at sleeping before rushing to the coffee machine. She will set an alarm in the evening and allow herself to stay in bed until it rings.

Other participants kept track in a journal or an App, or decided to use the prototype tools provided.

Depending on reflection outcomes, participants either changed their goals completely, or made minor adjustments to existing interventions to try and maintain them longer.

Four weeks later Emily is happy to report that by adjusting her morning routine, she feels more refreshed throughout the day, and her coffee intake has also decreased (although she does not keep track of it anymore). Because she enjoys the mindfulness exercise she still drinks her coffee on the couch most days and not at her desk.

THE EXPLORATIVE SELF-EXPERIMENTATION FRAMEWORK

As can be gleamed from Emily's experience, ESE is a qualitative and iterative approach centred around learning through doing. In the process framework illustrated in figure 11, the four main phases of ESE are depicted. These are:

Phase 1 DEFINE: What do I want to change?
Phase 2 PLAN: How will I tackle this?
Phase 3 PROBE: How will I check-in with myself?
Phase 4 REFLECT: What did I learn?

It should be noted that the framework only captures the phases, but not their duration. Typically Phase 1 and 2 are short (done within a day), Phase 3 can last several days to weeks, and phase 4 can happen sporadically throughout phase 3.

This process framework is the result of the research through design process and represents the facilitated process used for the final SE intervention phase (see figure 5 in the process overview chapter on page 18). The framework was inspired by the protocol Lee et al. (2017) used in their study to create

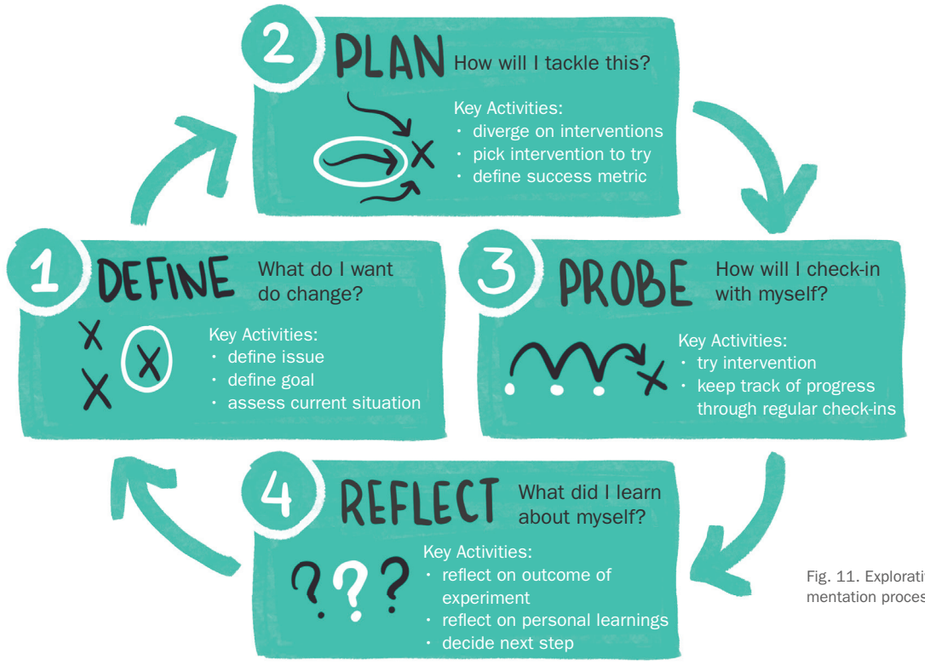


Fig. 11. Explorative Self-experimentation process framework

self-experimentation plans as well as the basic design cycle (van Boeijen, Daalhuizen & Zijlstra, 2020). Lee et al. (2017) defined five steps for creating a behaviour change plan: “1) Choosing a behaviour to attempt to change (the target behaviour), 2) Setting a goal, 3) Generating ideas for attainment of the goal by applying behaviour-change techniques, 4) Formulating a final plan, consisting of one or more complementary behaviour-change techniques, and 5) Devising self-tracking measures to determine if the goal was accomplished” (Lee et al., 2017, p.6840). Phases 1 and 2 of my framework (Define and Plan) were inspired by Lee et al.’s procedure, while phases 3 and 4 (Probe and Reflect) take after the design process mentality of testing, evaluating and iterating. The four key phases of the Explorative Self-experimentation process are outlined below:

PHASE 1: DEFINE

What do I want to change?

In this phase participants define what behaviour they want to change. During this project, it included three steps:

1. Defining an issue to address. This helps ensure that the goal feels relevant and also shapes the perspective that there may be different angles from which to approach the same issue.
2. Defining a behavioural goal to centre their self-experimentation around.
3. Assessing their situation by reflecting about requirements, barriers and enablers that may hinder and help achieve the goal. This step helps inform and inspire phase 2, in which participants must come up with an intervention to achieve the goal. By first assessing the current situation, participants may already identify interventions that fit their current predicament.

PHASE 2: PLAN

How will I tackle this?

The second phase is essentially coming up with a plan to tackle the goal. This involves first coming up with possible interventions to try out. Here an “intervention” is defined as any act or measure to accomplish the goal (for example, putting a reminder in the calendar to go running on 2 days in the week). In the final SE intervention of this project, participants were given a set of behaviour change techniques to inspire evidence-based interventions. However, from the first two SE interventions it is clear that participants can also think of interventions without an inspirational theoretical basis. Next, the participant decides which intervention(s) to try and declare a starting date for themselves. Finally, the participant should define how they will measure if their intervention is successful i.e. how they will know if they achieved their goal. This can range from quantitative measurements (such as amount of times an action was performed, number of steps taken, etc) to qualitative measurements (How do I feel?).

PHASE 3: PROBE

How will I check-in with myself?

In phase 3 participants are actively trying out their intervention, essentially testing how it effects their behaviour in their real-life context. Here participants need to find a way to check-in with themselves to keep track or at least assess their progress. Keeping track can be done in numerous ways, ranging from journalling, to counting steps using tracking technology, to simply making a check-mark on a calendar. Participants can choose an approach that fits with their goal, their success metrics and personal preferences. Important is that there is a regular interaction, in which participants check-in with themselves to determine how their efforts are going.

PHASE 4: REFLECT

What did I learn?

The final phase is about reflecting on multiple levels:

1. Evaluating and reflecting on the last conducted experiment. How did the intervention play out? Here participants can use their intuition from their recent experiences to evaluate if their interventions is working for them and then explore barriers and enablers for maintaining the intervention in the future. Considering these reflections, the participant can then improve upon their intervention and start a new iteration.
2. Reflecting about their goal and higher purpose – is the goal still motivating? Is the goal the best way to address the underlying issue?
3. Reflect about personal learnings. Often by engaging with SE, participants not only learn about the outcome of their interventions, but learn about personal tendencies and preferences along the way. This phase makes room for these self-discoveries.

The reflections often occur throughout phase 3 and are not set to specific time interval. For example, participants may notice four days into the experiment that their plan has no chance of working, and can immediately adjust it based on reflections. For this study, participants were asked to reflect latest after two weeks of doing an intervention.

Depending on the outcome of these reflections, participants can decide what to do next and embark on a new iteration of experimenting. Possible next steps could be to make slight adjustments to the intervention, or to tweak the goal, or even to start working on a new issue. A decision making aid, depicted in figure 12 was presented to participants of the final SE intervention.

What happens next?

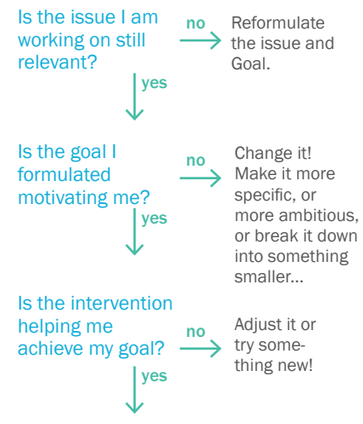


Fig. 12. Decision aid included in Prototype 3

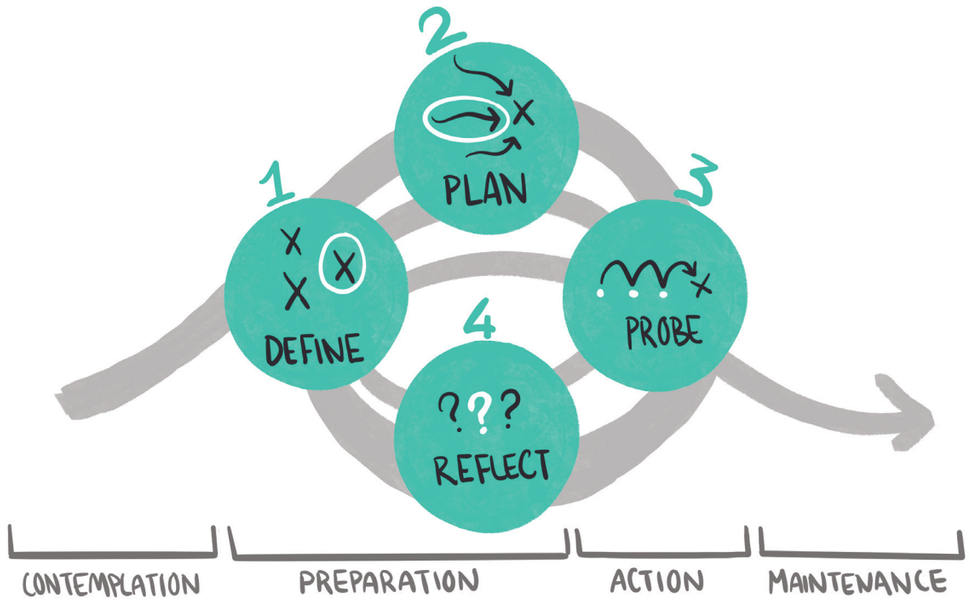


Fig. 13. ESE process framework alignment with TTM

Figure 13 shows how the ESE process framework aligns with the stages of change in the Transtheoretical model (DiClemente, 2007). The method targets people who already have the intention to change, and are thus in the contemplation or preparation stage of the TTM. Through self-experimenting with interventions, users are propelled through the preparation stage to action. Either in the first run-through, or after several iterations, the individual finds an intervention that works for them and is thus easier to maintain over time. To what extent self-experimentation can contribute to establishing a lasting effective behaviour change is discussed in more detail in chapter 04.

DISCUSSION

Explorative Self-experimentation differs substantially from the established framing of self-experimentation in literature described in chapter 2.1. Throughout this report, this traditional concept will be referred to as “Quantitative Self-experimentation (QSE)” to avoid confusion with the “Explorative” turn this thesis embodies.

The main differentiators of Explorative SE compared to Quantitative SE are summarized in figure 14. Both approaches have the purpose to aid in self-discovery, essentially answering the question “what intervention works for me?”. However, whereas QSE focuses on the use of scientific rigour to empirically test contingencies to answer this question, ESE prioritises user needs and values over scientific rigour. Furthermore, ESE looks at harnessing the intuition and lived experience of users over the use of data to facilitate decision making in the process of behaviour change. And finally, whereas QSE is strongly linked to human-computer interaction as a driving force for self-tracking, ESE is not restricted to technology, but is open to any medium, digital or analogue, that helps advance its cause.

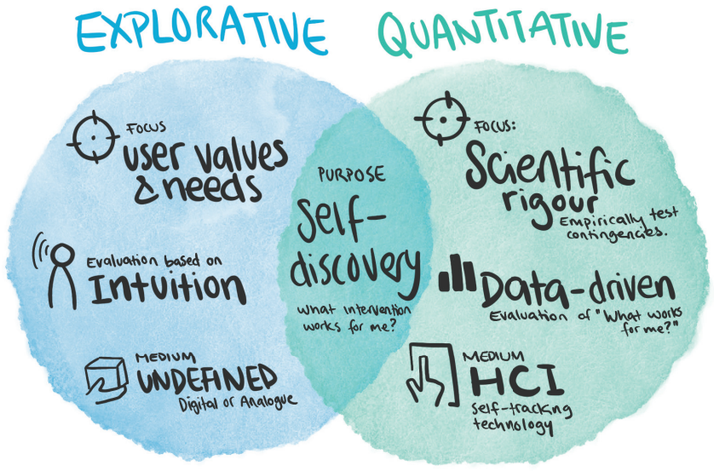


Fig. 14. Ven diagram comparing Explorative SE with Quantitative SE

The process framework of QSE described by Karkar et al. (2015) involves three main steps: (1) formulating a hypothesis, (2) Testing the hypothesis with N-of-1 trial designs in order to (3) examining the results to inform decisions about behaviour change. In contrast, the ESE process does not revolve around empirically testing a hypothesis to decide whether or not to pursue a specific behaviour, but instead helps people make decisions through trial and reflection. Where the QSE process ends with results to inform which behaviour change interventions are worth pursuing, the ESE process does not have a defined ending point. Instead it is layed out as a cyclical process that helps people find an intervention that is compatible with the user’s goal and personal and contextual factors.

In conclusion, although ESE and QSE share a common purpose, and experimentational mentality, the processes are driven by different priorities and will yield different results. The following chapter presents arguments for why the ESE method is needed based on conducted user research.

(Photo source: Participant 1, SE phase 1)

03
A premise for Explorative Self-Experimentation

The purpose of explorative self-experimentation is to help individuals find interventions that work for them to help achieve their behaviour change intentions and maintain them. This would help individuals live healthier lives, and on a societal level, reduce the burden caused by chronic diseases. Prior studies including those done by Phatak (2019a), Lee et al. (2017) Karkar et al. (2015), Neuringer (1981) and Schroeder et al. (2018), already examine the potency and implications of quantitative SE. This chapter looks at why explorative self-experimentation is a warranted approach, by presenting an overview of the problem space, and zooming in on the two main features that differentiate explorative SE from quantitative SE: placing user needs over scientific rigour, and using intuition over data as a way of evaluating if interventions work.

3.1 Changing personal health behaviour: a problem overview

The first phase of this project involved exploring the problem space, to understand the challenges individuals face when trying to change their health behaviour. By taking a step back to understand how people go about navigating their health behaviour, a fresh perspective on the utility of methods such as self-experimentation could be derived.

METHOD USED

The method used to gain a deep understanding of the problem space was context mapping (Visser et al., 2005). Although this method is usually applied to explore the context around a product use, its activities can be adapted to elicit important factors influencing any interaction or behaviour. The main purpose of doing context mapping is to explore the problem space in order to understand the target group, their environment, their needs, wishes and experiences. The outcome of applying this methodology should help empathise with the target group, inform about key influencing factors, and inspire the direction of the impending design activities. (Visser et al., 2005)

Three research questions guided all conducted context mapping activities:

- How do individuals perceive the challenge of changing their health behaviour?
- What are enablers and barriers for individuals motivated to change their health behaviours?
- What factors are important to consider when designing for individuals trying to change their health behaviour?

For mapping the context three main activities were used: first a generative workshop (Sanders & Stappers, 2012) was held with three participants with past experience in self-experimenting with health interventions. Second, a creative session with 20 TU Delft students was conducted to understand the participants' personal experiences or failed attempts to change their health-behaviour. And finally, five interviews were conducted with target users i.e. (home) office workers. The individuals were given a sensitizing booklet, to encourage them to observe themselves and reflect on their own experience with changing their health behaviours. After one week, a 40-minute semi-structured interview was held with each participant to discuss their current struggles, past experiences and future aspirations regarding their health behaviour.

In order to get a deep understanding of the target group I made use of Sanders and Stappers' (2012) "Path of Expression" to structure both the sensitizing materials and the interviews. This framework suggests that by guiding participants through a process of describing their current experiences, then reflecting on memories of past experiences, underlying layers can be uncovered in order to move towards exploring aspirations for future experiences (Sanders and Stappers, 2012). Figure 15 shows some questions from the interview and how they guide the participants through the path of expression.

A qualitative analysis of the data was done using a on-the-wall analysis method (Sanders & Stappers, 2012). For a detailed overview of the conducted context mapping activities and analysis see appendix 1.

After having reviewed and analysed the data and insights collected from the various context mapping activities, the themes that emerged were visualized and paired with a description and evidence in the from of quotes to communicate the result of the research. This short story that summarizes the key findings of the problem exploration is presented on the upcoming pages.

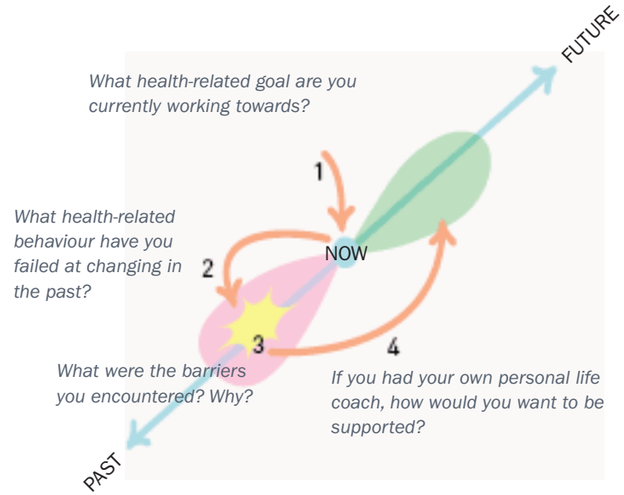
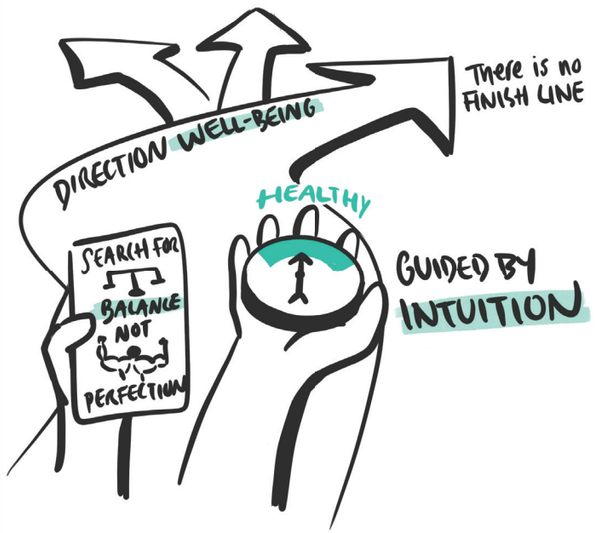


Fig. 15. Adapted figure of Sanders and Stappers'(2012) Path of Expression

Changing your health behaviour is...



...A QUEST WITH NO END...

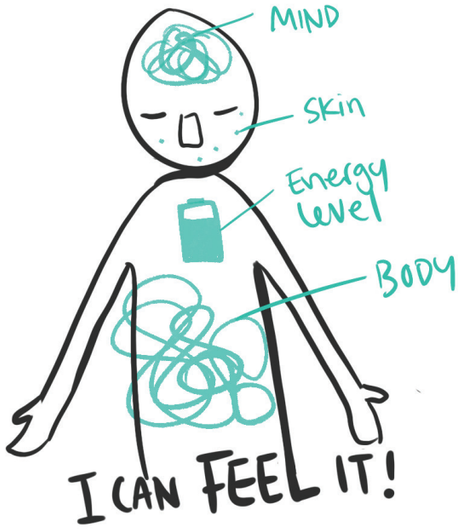
The ultimate goal is not a destination. There is no finish line that can be crossed, instead living a healthy life is more of a direction one follows. Participants mentioned searching for balance over perfection. It is a quest for feeling healthy rather than achieving a “Hercules body”.

“My goal is not to tone my body until it looks like Hercules. I just want to be healthy”

- Participant 5, Context Mapping Interview

“The primary motivation is my well being, not my weight or my diet or the amount of exercise I do per week. It all comes back down to how I feel.”

- Participant 3, Context Mapping Interview



...GUIDED BY INTUITION...

Whether it is one’s energy level, skin outbreaks, stomach problems or mental state, participants mentioned being able to tell whether their health behaviour is effective. Evaluation of whether something is working seems to be intuitive, with very little to no conscious monitoring.

“For me it’s a very intuitive thing... I don’t really monitor that closely, but I feel that it’s not good for me.”

“It’s not like a conscious sort of checkpoint, it’s just okay every single day ‘How am I feeling?’”

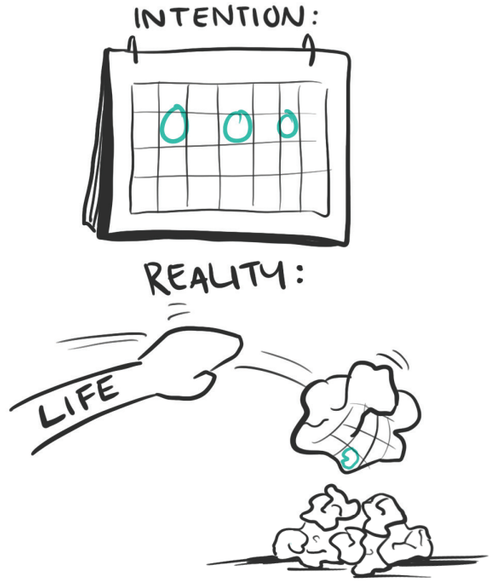
- Participant 3, Context Mapping Interview

“A lot of times it’s really about thinking of the negative consequences that scared me... yeah, if I don’t eat veggies, I will feel my stomach is not good”

- Participant 4, Context Mapping Interview

... SURROUNDED BY INFLUENCES...

One’s habits and health behaviours are strongly subjected to those around us and our living environment. Participants mentioned their established healthy habits breaking when moving together with a partner, or when moving to a new place. Eating habits particularly are reformed to harmonize with those around us. Changing context can also have positive effects, revealing opportunities for new behaviours (like swimming or biking in the forest).



“When I was living in the city I was doing everything by walking and now because I’m living in the countryside, I have to take the car.”

- Participant 2, Context Mapping Interview

“I used to cook [...] this whole thing (established healthy eating habits) doesn’t function anymore since I live with my boyfriend because he has his lifestyle and I somehow put myself into his lifestyle.”

- Participant 2, Context Mapping Interview

“I recently took up swimming. I always liked swimming. And so we recently moved here and then [the swimming place] is now suddenly 5 min away by foot!”

- Participant 1, Context Mapping Interview

...IN AN EVER-CHANGING WORLD...

Life is messy. Often there is a plan, but “things” seem to get in the way, be it unexpected events, a miscalculation of how long things take, a change in weather or an alluring distraction. Any plan needs to leave space for imperfections and unexpected events.

“Sometimes life just punches you in the face!”

- Participant 4, Creative Session 2020

“It never becomes a routine because it’s hard to I guess.. every day is just a little bit different. So it’s hard to fit it in at the same time slot.”

- Participant 5, Context Mapping Interview

...REMAINING TRUE TO YOURSELF...

There is a strong inner dialogue in which individuals struggle to align their health behaviour with personal preferences, values, their self-image, and more short-term needs. There are tensions between being strict and making exceptions, doing things on one's own terms and feeling obligated to others, between doing what feels good today and doing what would be better for one's future self.

"I just want to do it on my own terms."

- Participant 1, Context Mapping Interview

"When I don't eat well, I feel really terrible. When you know food is just food, and like I haven't done anything bad like I haven't gone and slapped a baby, like, I just ate some cake or something. So when I am trying to break habits and build healthier behaviours, there's this whole moral landscape as well. Yeah, that makes that change even harder, because if I'm not perfect. Then I feel awful."

- Participant 3, Context Mapping Interview

...WHILE FINDING SOMETHING THAT FITS...

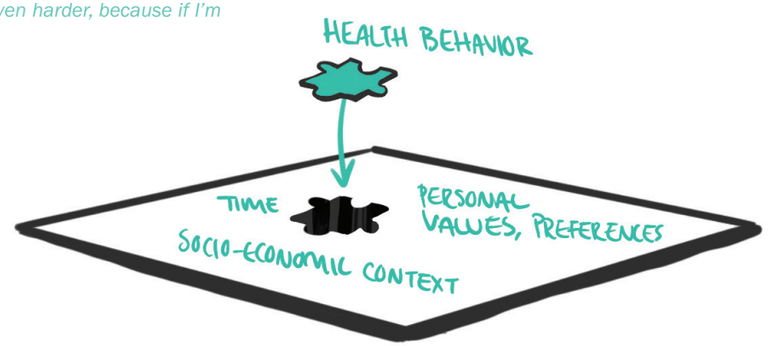
There are many reasons why introducing/ maintaining a health behaviour might fail. The challenge is finding something that fits one's values, preferences, current level of ability, one's socio-economic context, available time, etc.

"I've tried meditation for quite a while, and it was OK-ish but at the same time it was like 'I am definitely forcing myself into this' instead of 'I like this'".

- Participant 1, Context Mapping Interview

"I hate this idea that if you just work hard enough, then you can do it and everything's fine because that's just not the case for so many people. There's a whole myriad of reasons why something could not be working for you."

- Participant 3, Context Mapping Interview



... WITHOUT FALLING OFF THE WAGON...

Attempting to change behaviour is common, but it often doesn't stick. Participants expressed a common problem is slipping up a bit, and then giving up entirely as a result. Things go well for a short time, but once you fall off the wagon, it is hard to get back on.

"I always do that for like 2 weeks, very enthusiastically, and then....yeah [...] It's like 'Well I forgot last week so why should I go?'"

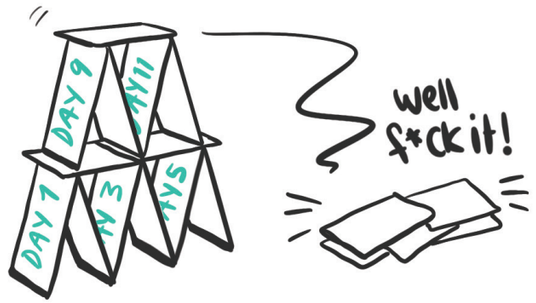
- Participant 1, Context Mapping Interview

*I end up *sigh* there's just too little time to do it. And then I fall behind. And I just, you know, the whole thing just goes to waste, because I just can't keep up with whatever I've planned for myself.*

- Participant 5, Context Mapping Interview

I am really really really bad at drinking enough water. I have been my entire life. And I've gone through periods of time where I'm like, I'm gonna drink this much water every single day.... every single time I fall off the bandwagon.

- Participant 3, Context Mapping Interview



... AND MAKING IT STICK!

Maintaining a health behaviour is difficult. Forming habits is considered a success! Relying purely on willpower will only get you so far, participants say it is never sustainable. However, finding enjoyment in the behaviour and seeing progress, or finding something that is a social fit can work wonders!

"Sometimes I am very strict with myself but that exhausts me after like 4 days. After that it's like anything goes!".

- Participant 4, Creative Session 2020

"So I don't do it, even though I know it's good for me it's just not fun."

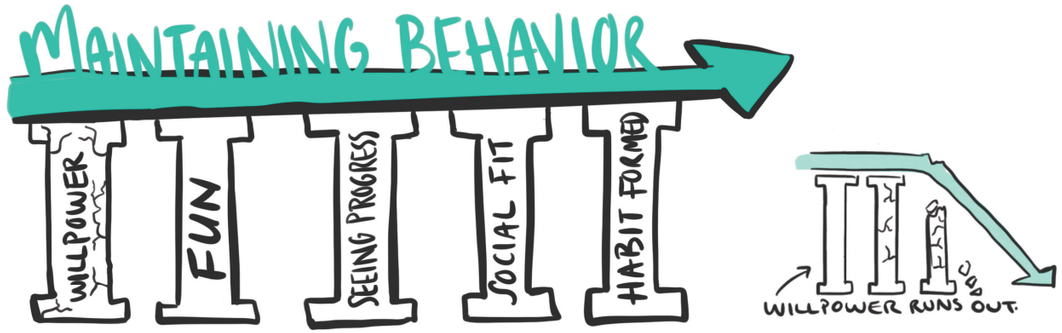
- Participant 3, Context Mapping Interview

"Now that I find swimming fun, it is easier to go there"

- Participant 1, Context Mapping Interview

"Seeing progress is always helpful right? I think its difficult taking on these big things that will probably only show progress after a month, or longer."

- Participant 1, Context Mapping Interview



CONCLUSION – PROBLEM EXPLORATION

From the problem exploration and results, it becomes clear that the issue of changing ones health behaviour is very complex with many influencing factors. The issue is tied to the long-term goal of living a healthy life for one's well-being. Individuals not only struggle with finding interventions that fit, but also in maintaining them. There are many external influences, including one's social context and environment, as well as internal tensions, of balancing current needs with future needs and staying true to one's self-image. Many hurdles were uncovered leading to the tendency to "fall-off the wagon" in an attempt to create lasting behaviour change. However, several factors that lead to successful habit formation were also uncovered, including seeing progress, having fun or enjoying the process, and integrating the activity in social structures. These emerging themes open several opportunity fields to tackle with a design project.

When comparing these insights to the premise of quantitative self-experimentation, it becomes apparent that there is a need for a more flexible, personalizable approach. The struggle is not so much in choosing which interventions to pursue (the outcome of QSE), but rather in finding an intervention that is compatible and enjoyable and finding a way to stick with it. Another remarkable outcome is that people "feel" intuitively whether an intervention works for them and seem content to make decisions and navigate their health behaviours based on this intuition.

3.2 Overarching goals of Self-experimenters

To understand the value of using an Explorative Self-experimentation approach, one must consider the goals of potential users. What do self-experimenters want to get out of the process?

Answering the research question:

What do people want to get out of SE? What kind of questions do they want answered?

METHOD:

All 14 participants of the three self-experimentation interventions conducted for this project were asked to reflect on the meaning of self-experimentation by completing the prompts "for me self-experimentation feels like..." and "for me the purpose of self-experimenting is...". Their answers were recorded during the check-in interviews which took place two weeks into the intervention. Using thematic analysis (Braun & Clarke, 2012), the common themes in the answers provided across interviews were identified. For a more detailed description of the interview set-up and analysis procedure, see appendix 4. From the analysis the following overarching goals of self-experimenters were derived:

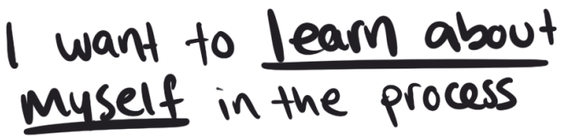
The most prominent goal shared by participants was finding an intervention that fits and works for them. In the words of one participant, this entails finding "something that does not feel forced or annoying... because then at some point I would stop." (Participant 3, Check-in SE phase 2). Both from the user research and literature (see Health Belief Model (Ganz et al., 2015, p. 75)), it appears that there are many factors influencing how well an intervention will work for an individual, including one's preferences, current level of ability, one's socio-economic context, physical environment and available time. An intervention that does not "fit" into an individuals life has low chances of working. By simply trying something out, the participants need not understand the

"I hate this idea that if you just work hard enough, then you can do it and everything's fine because that's just not the case for so many people. There's a whole myriad of reasons why something could not be working for you."

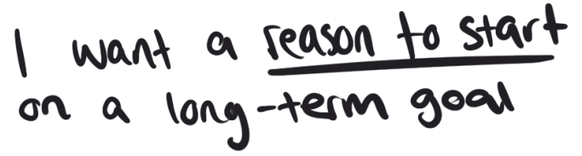
- Participant 3, Context Mapping Interview

complexity behind a potential effect, but rather can experience first-hand if the intervention is a good match. As one participants noted “I’ve tried meditation for quite a while, and it was OK-ish but at the same time it was like ‘I am definitely forcing myself into this’ instead of ‘I like this’”. (Participant 1, Context Mapping Interview).

A second purpose commonly attributed to self-experimentation is the notion of exploring; of trying out new things. Trying more than one approach can be a key part of this, as one participant remarked: “I wrote down it feels like really exploring, like a tool, to find interventions to reach my goals that fit my preferences. So I have this goal for a while now. And I haven’t really done anything. So with this self-experimentation, I’m just exploring, okay, this could work for me. This not.” (Participant 1, Check-in SE phase 1). Embarking on an “exploration” with SE can take three forms: (1) exploring through trying things and observing, (2) getting inspired by exploring different options, and (3) exploring solutions by partaking in a creating process to adjust interventions to fit one’s individual situation. Recognising that the exploration of various options is a desired process, explorative SE can be set up to cater to this need.



Although rarely mentioned at the get-go, several participants soon recognized a higher goal to the self-experimentation process: that of self-discovery. When asking about the purpose attributed to the practice, one participant explains: “the end goal, of course, is improving myself. Actually, I don’t necessarily think this is 100% true.. just the sake of learning about myself, finding out about myself, not necessarily with an end goal of changing but learning as a first step towards being a bit more aware of what I’m doing.” (Participant 2, Check-in SE phase 2). Self-discovery also means better understanding the factors that influence ones behaviour and learning about personal own tendencies. As one participants explains: “The activities are trying to reach this goal, but then the purpose is trying to understand what are the factors that enable or prevent me from achieving this goal.” (Participant 1, SE phase 3 Check-in interview)



For several participants, engaging in self-experimentation (as part of this study) fulfilled a goal by simply having an incentive to finally start working on a long-term goal. As one participant noted: “So for me, it feels like a kick in the butt to actually start doing something... Because I have a deadline. And I need to actually start doing yoga within the next two weeks. I’m setting up deadlines somehow. Um, yeah. And I notice otherwise, it doesn’t work... I want to do yoga since May I’ve done it once. And but now I’ve done it twice in two weeks.” (Participant 3, check-in SE phase 1)

CONCLUSION

Finding what fits, exploring different possible interventions, learning about oneself, and finally being able to start working on a long-term goal are the four overarching goals participants attributed to their self-experimentation. Knowing this, it beckons the question whether the quantitative SE approach would provide the right kind of answers/results participants desire when it comes to trying out health-interventions? The data-driven approach is well suited to rigorously testing correlations between a dependent and an independent variable, yet participants do not necessarily want to answer these types of questions (i.e. how much does doing ___(Yoga) effect my __(health/stress)? Instead participants want to find out “what approach works best for reaching my goal?” or “Does it fit into my life? Can I maintain it?” or “Does this (intervention) work for me?”. By sticking to the Quantitative SE definition, opportunities to meet true needs of the target group may be missed!

3.3 Evaluating through Intuition

From interviews with the target group, I discovered that most participants evaluate whether or not something works for them very intuitively. They go with their gut feeling, and often it is just a matter of whether or not they want to continue doing it. Wendel (2015, p.31) notes that “our conscious minds can override (or ignore) what our intuitive system tells us—but it will feel wrong. And it’s hard to sustain a change in behaviour if it intuitively feels wrong”. Due to this, centring the self-experimentation around the collection of data points would be undesired, instead, I would like to harness this intuitive evaluation as an alternative approach.

DEFINITION OF “WORKING FOR ME”?

As mentioned, finding an intervention that works for yourself is the primary goal of self-experimentation. But what does “it works for me” mean to participants? How do participants evaluate whether an intervention works for them?

In the recent self-experimentation studies, part of the Quantified-Self movement (Phatak, 2019b; Karkar, 2017; ...) determining the effectiveness of the intervention is done using rigorous data tracking. This provides numerical evidence of the effect of an independent variable on a dependent variable, such as the effect of meditating on one’s stress-level.

However, through interviews with participants, and other context mapping activities, it appears that evaluation occurs at an intuitive level. As one participant notes, talking about her coffee consumption: “for me it’s a very intuitive thing... I don’t really monitor that closely, but I *feel* that it’s not good for me.” (Participant 3, Context Mapping Interview). Often it does not take participants 18 days of ABA testing to understand the impact of an intervention. Simply trying it once can do the trick. One participant tried jogging in the morning and easily came to the conclusion: “that just isn’t my jam” (Participant 5, Context mapping interview).

The question that remains is *how* do participants come to these conclusions? What factors into this intuitive judgement? Two weeks into self-experimenting, a check-in interview was held with each of the participants in this study. They were asked if they wish to continue with their current intervention and why (or why not) (see chapter 4.1 for more detail on the method). Their collective answers present three main criteria that play a significant role in their evaluation of whether or not something “works” for them:

1. Effectiveness - Is it working? Am I achieving my goal?

A key determinant for participants deciding if an intervention works for them is it’s effectiveness. Is their intervention helping them achieving their goals? One participant wanted to be more active and do yoga weekly. She found that signing up to an online yoga course the day before was working perfectly to achieve her goal. “The last two weeks really went well for me because it’s kind of a routine for me now; like this Friday morning as the yoga morning before work” (Participant 3, SE phase 1 Closing interview). Another participant found the principle of mindful consumption of be very effective for her goal to eat less sugary foods. She says “I think I’m going to keep going with this sort of mindful consumption one because I found that to have a real impact on the way I feel during my day.” (Participant 1, SE phase 2 Check-in interview).

2. Compatibility - Does it fit into my life? With my schedule, my social context, my preferences?

Compatibility in terms of how well an interventions “fits” into one’s life, is another major determinant. There are many factors that can influence the compatibility, including available time, physical and social context and personal preferences. For example, one participant found that her goal of working out at home was not possible anymore as her living room was undergoing reconstruction “The Living Room was really packed up with stuff from my roommate so I would have to do it in my room and that is like a little bit small” (Participant 3, SE phase 2, Closing interview). In this case the intervention literally did not fit into the participant’s physical environment. Another participant was trying to be more active by using a Fitbit to monitor his steps. After two weeks he declared: “I really feel that this pushing me to walk and nudging me every 40 minutes, it doesn’t really work for me. It’s very inflexible, it doesn’t really fit with what I want and I don’t need a tool that is a second mother for me!” (Participant 2, SE phase 2 Check-in interview). In this case, the participant felt that the intervention was incompatible with his preference of how he would like to be motived.

3. Enjoyment - Is it fun? Interesting? Or does it feel forced?

Enjoyment is the third determinant that came up, and is often mentioned when asking participants if they think they can maintain their intervention. Participants will make adjustment to interventions to make them more enjoyable, they mention stopping interventions that are “just not fun” despite knowing the

positive impact, and finally, they will work harder to make interventions fit into their lives if they enjoy the activity. One participant who wanted to change his diet to include more seasonal fruits and vegetables, found that printing out a seasonal calendar and using it when doing his weekly grocery list worked very well, but added “I sort of started thinking about how might this actually be joyful and interesting to me. So for example, the culinary challenge that is in there.” (Participant 5, SE phase 2 Check-in interview). So although his chosen intervention was compatible and effective, he was missing an element of fun, and was thinking of how to adjust his intervention accordingly in the future. Another participant was determined to stick to running, despite not having found an optimal time slot because “I know when I run, I really like it!” (Participant 4, SE phase 2, Check-in interview).

CONCLUSION

Effectiveness, compatibility and enjoyment, help participants determine whether or not an intervention works for them. This evaluation happens intuitively, without the use of rigorous data, and in many cases, cannot be measured. For example, an individual can feel their level of enjoyment, and can experience if an intervention fits in their life. What would be the added value of having numeric evidence? For checking the effectiveness of an intervention, tracking data may be complimentary, but not necessarily the way to go.

Although it is clear that evaluation happens intuitively, another question is how correct this intuition is? As this study was done using guided introspection, there is no data to compare and leverage what participants have stated. For example, participant 3 says she is eating a lot less sugary foods with her intervention of mindful consumption, but there was no means of observing here actual sugar intake through the four weeks. And finally, is it of significance if the intuitive evaluation is incorrect? Or is it as Wendel (2013) states, that our intuition is an important factor to determine whether or not our behaviour will be maintained.

What is unclear from the research conducted is whether an intervention needs to fulfill all three criteria, or whether these are simply indicators of a good fit. It is also unclear if these indicators are on the same level of importance, of if there is a hierarchy of importance. It is outside the scope of this project to delve deeper into how exactly the intuitive evaluation works. Suffice it to say, participants can determine if an intervention works for them simply by trying it out and using these indicators (consciously or not) as a reference for whether they want to or are able to maintain it.

3.4 Discussion

In this chapter the background of self-experimentation for behaviour change was explained to reveal several shortcomings of the Quantitative approach described in recent literature. By taking a step back to understand how people go about navigating their health behaviour, and the kind of evidence they need to make decisions, a compelling argument for a qualitative SE approach can be formed. The user research conducted as part of this project revealed that:

1. People generally navigate their health behaviour through intuition.
2. People who practice self-experimentation, are not seeking to answer a hypothesis, but simply want to find an intervention that works for them, explore different options and learn about themselves in the process.
3. People can determine whether or not an intervention works for them simply by trying it out. This reveals if the intervention helps them achieve their goal (i.e. is effective), whether it fits into their lives and with their personality (compatibility) and whether they enjoy it.

Taking into account these goals and insights, it is clear that what people want to get out of self-experimentation does not align well with the process of quantitative SE. Using a more qualitative and explorative approach can appropriate the trained tendency of intuitive evaluation to redirect the main focus of SE: from collecting data to experiencing change. In conclusion, I believe ESE would be better suited to address the underlying goals of people trying to change their health behaviour as well as doing it in a way that is more aligned with their need for ease and personal growth.

"The last two weeks went really well for me because it's kind of a routine now. Friday morning is the yoga morning before work."

Participant 3, SE Phase 1

(Photo source: Participant 3, SE phase 1)

04
A link to Sustainable Behaviour Change

A core aim of this project is to explore how self-experimentation can contribute to sustainable health behaviour change of individuals. This chapter will present the 13 common phenomena that resulted across participants self-experimenting with health-behaviour interventions, and the method used to obtain these results. The phenomena will be linked to existing models and theories to deduce how Explorative Self-experimentation can contribute to individuals reaching sustainable behaviour change.

4.1 Observing Self-experimenters

Before revealing what engaging in Explorative Self-experimentation can achieve, this chapter will give insights into the methodology used to obtain the results. As explained in chapter 2.2, the core activities driving the research through design process were three self-experimentation interventions, lasting four weeks each. Over the three interventions phases, a total of 14 participants self-experimented for 4 weeks and their experiences were captured through a total of 28 Interviews, one conducted 2 weeks into the experience, and one after the fourth weeks.

The main source of collecting data was through the semi-structured interviews with participants. The goal of the interviews was to capture feedback on their overall experience, reflect on the outcomes, and find out which components the participants felt were key to facilitating a successful self-experimentation experience. Interviews lasted about 30-45 minutes each and were conducted online using the platforms Zoom and Miro. For a detailed description of the interview structure, please see appendix 7.

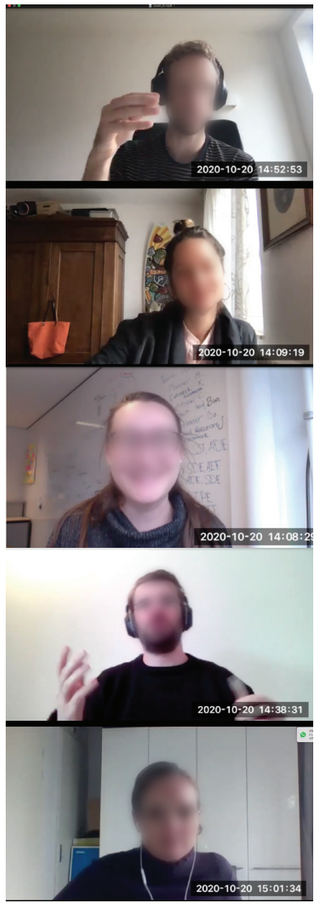


Fig. 16. Screenshots from Interviews

The data was analysed using the method of inductive thematic analysis (Braun & Clarke, 2012). This method can be used to systematically identify patterns of meaning across a qualitative data set (Braun & Clarke, 2012). By applying it to the data collected from the prototype testing, it allowed me to make sense of the commonalities found across the varying SE experiences, in order to answer the following research questions:

- What important aspects need to be considered when designing SE tools?
- What do participants find helpful? Where do participants need most support?
- What kind of questions do participants want answered with self-experimentation?
- What does SE result in?

The thematic analysis was done using MIro, an online white-board tool. I adhered to the following steps outlined by Braun & Clarke (2012):

1. Familiarization with the data: This entailed getting a thorough overview of all the collected data by re-listening to the recorded interview and reading over the audio-transcripts.
2. Generating initial codes: While going through the data, a selection of quotes were extracted and transferred to a Miro board. These were then coded to describe the content using tags and post-its. Here a latent approach (Caulfield, 2020) was taken, meaning that I was looking past the explicit content verbalized, but rather looking into the subtext underlying the data to uncover themes. For example, when participants described which elements of the prototype they felt were most helpful, deductions could be made about their underlying needs and values.
3. Generating themes: After coding the data from each interview in turn, a process of clustering ensued in which patterns were identified and overarching themes created (see figure 18).
4. Reviewing themes: After having generated themes, the results were presented to colleagues to receive peer feedback. This helped in refining clusters and defining themes more clearly.
5. Documenting results: The upcoming chapter presents part of the outcome of this analysis. Chapter 5, presents outcomes related to the facilitation of SE.

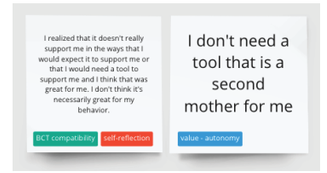


Fig. 17.

Fig. 18.

From the interviews it was possible to get insights how participants experiences self-experimentation, and to what extent they observed their behaviour to change. The data collected is therefore the result of guided introspection (Xue & Desmet, 2019). Introspection can be defined as “an ongoing process of tracking, experiencing, and reflecting on one’s own thoughts, mental images, feelings, sensations, and behaviours’. (Gould, 1995, p. 719). The interviews captured the subjective experience of self-experimenters and rendered rich data of the thoughts, emotions, values, preferences, inner conflicts, and perceived results of engaging in ESE.

VISUAL IMPRESSIONS OF INTERVENTIONS

Besides the interviews, participants sent in pictures of their interventions and interaction with the prototype. Here is a small selection to give an impression of the interventions participants chose.

Fig. 22. Participant 1, SE phase 1, sent pictures of family members joining in the yoga session.

Fig. 21. Participant 3, SE phase 2, sent pictures of her doing her scheduled 45 minute run

Fig. 20. Participant 2, SE phase 3 set up a visual trigger at her bathroom mirror to cue her device-free evenings.

Fig. 19. Participant 5, SE phase 2, printed out a seasonal calendar and placed it in the kitchen to help achieve their goal of eating more seasonal fruits and vegetables

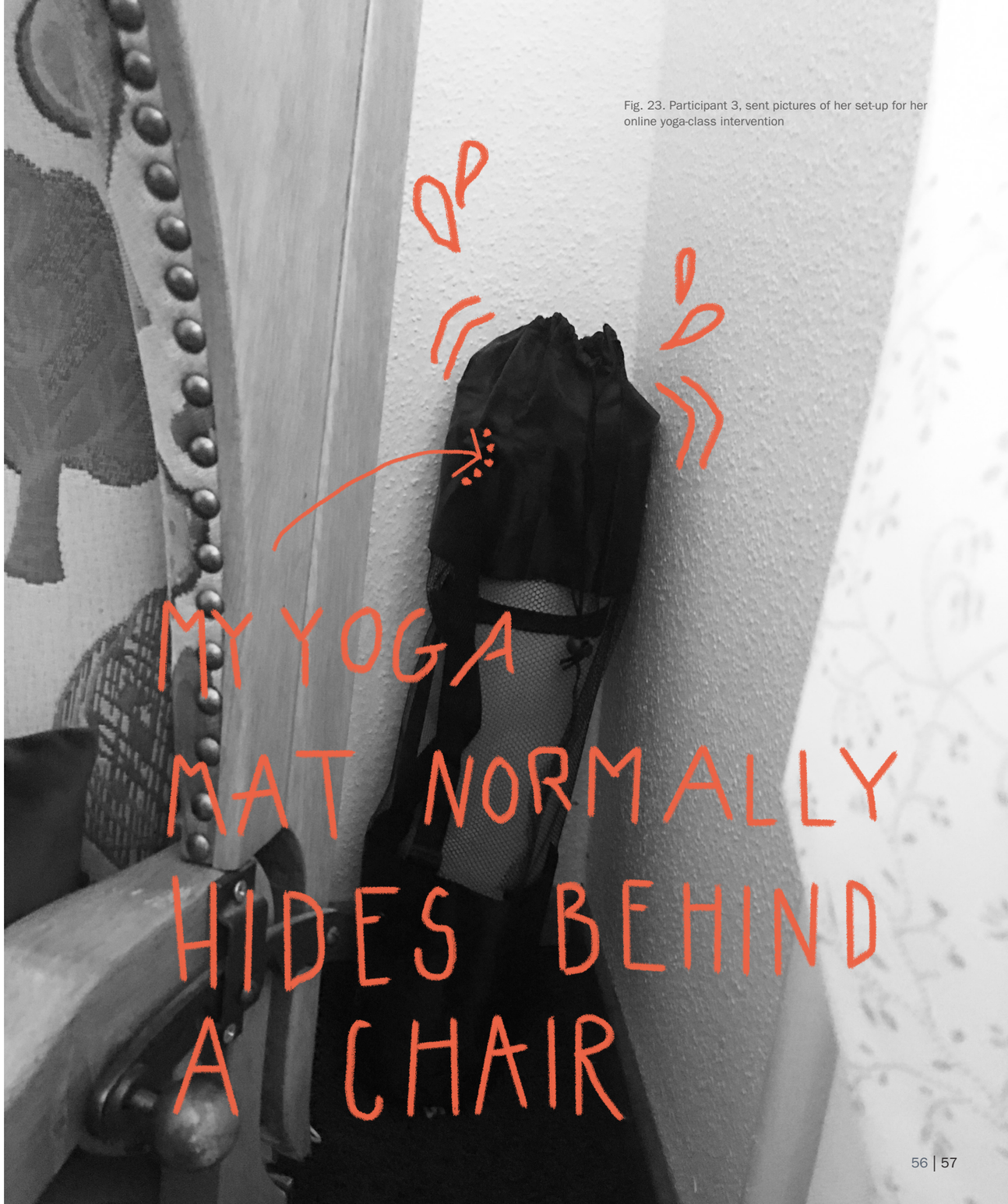


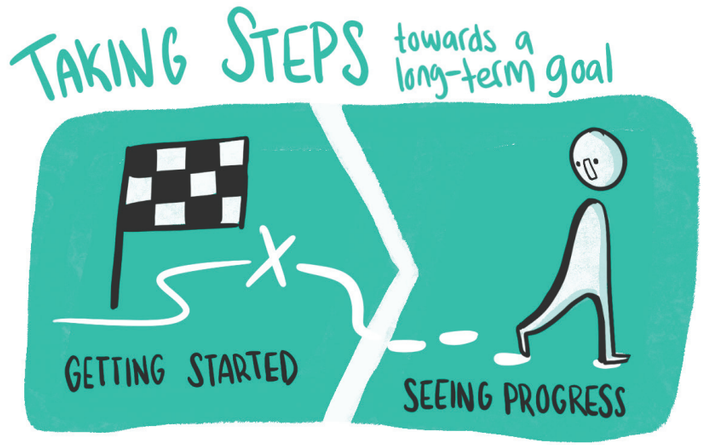
Fig. 23. Participant 3, sent pictures of her set-up for her online yoga-class intervention

4.2 What does Explorative Self-experimenting achieve?

After observing 14 participants undergo four weeks of self-experimentation, a set of phenomena were uncovered that engaging with Explorative Self-experimentation results in. Each participant had their own goal, and a highly individual experience of trying to change their behaviour. Despite this highly individual aspect of ESE, several commonalities could be observed, which are summarised here as 13 phenomena in five clusters.

The purpose of uncovering these phenomena, was to be able to lead a discussion to answer one of the core research questions of this project: How can Self-experimentation contribute to sustainable health behaviour change of individuals? For the sake of this discussion, sustainable health behaviour change will be defined as having reached the maintenance stage as described in the Transtheoretical model of health behaviour change (Prochaska & Velicer, 1997). The maintenance stage is reached when people can maintain their behaviour over a longer period of time (estimate of 6 months to 5 years), and are not as prone to relapsing (Prochaska & Velicer, 1997). As it is out of scope for this 100-day project to prove a link between SE and long-term behaviour change, the focus of the discussion is to create conjectures about how the resulting phenomena relate to potential indicators for sustainable behaviour change.

In order to strengthen the link between the 13 phenomena observed in the SE interventions and the theory from literature, a discussion will follow each presented cluster of results. I will make use of renowned theories and models frequently used to discuss behaviour change in the context of health. These include the Health Belief Model (HBM) and subsequent Integrated Behaviour Model (Ganz et al., 2008), the Transtheoretical Model of health behaviour change (TTM) (Prochaska & Velicer, 1997) (DiClement, 2007), and the COM-B framework (Michie et al., 2011). After the presentation of all clusters and the bridging concepts to behaviour change theories, a more holistic discussion ensues.



ESE results in....

TAKING INCREMENTAL STEPS TOWARDS A LONG-TERM GOAL

Phenomenon #1: Getting Started

By self-experimenting, all participants took concrete steps towards achieving a long-term health goal. Many worked on goals that they have had for several years but never took explicit measures to realize. The SE process offered participants a concrete starting point, which helped them start taking action towards their goals.

"The experience is satisfying because you're making some progress towards something that you've been thinking about for a long time"

- Participant 5, SE phase 2 Check-in

Phenomenon #2: Seeing progress

After four weeks, some participants (4/14) achieved their behaviour change goals completely and felt they had managed to change their habits. However, even those who did not feel they had reached their goal, felt they had made progress, either in partly achieving their goal, in improving their related skills, or even in improving their health. For example one participant wanted to work on her sleeping habits, with the goal to go to bed at 11:00pm instead of 2:30am (as usual); and managed to go to sleep earlier, even if not always by 11:00pm. Another participant intent on meditating three times a week, found that although he skipped some days, he already saw an improvement in his meditation skills. Participants also made comments about seeing health improvements in terms of "I noticed I am a bit less stressed" or "I am already noticing results in that I have less [back] pain". With 13/14 of participants mentioning having made some progress towards their goals, it can be concluded that self-experimentation leads to participants seeing progress, even if only in small steps.

"I actually ended up sleeping later than 11 but still I'm making progress! So previously I sleep usually after 2:30am"

- Participant 1, SE phase 3 Closing interview

"I noticed that I am a bit less stressed, and if I am stressed, I can use some of the [meditation] techniques that I learned more successfully."

- Participant 5, SE phase 3 Closing interview

DISCUSSION ON BRIDGING CONCEPTS

Engaging in self-experimentation has prompted all participants to take action on a health related behaviour goal. This means that all participants have managed to reach stage 4 “Action” in the 5 stages of change a person goes through from contemplating an action to performing it and maintaining it; according to Proshaka et al.’s Transtheoretical Model of behaviour change (DiClemente, 2007).

Self-experimentation seems to create a sense of urgency, which is a key factor in determining *when* a behaviour is executed (Wendel, 2013). This is especially impressive considering that working on health behaviour, such as exercising, is not usually an urgent matter, inviting us all to put if off for another day in favour of more pressing or compelling daily matters. Self-experimentation creates urgency to act in two ways:

1. In setting up the experiment, participants set a specific goal and time frame. This “Specificity” settles the issue of when to act and through this, helps participants perform the behaviour (Wendel, 2013). For example, setting a goal to practice yoga at 8am for 2 weeks starting Monday, is much clearer to act on than the general consideration of “I should do more yoga”.
2. In self-experimenting, participants create a commitment to themselves to attempt to change a personal behaviour. This triggers the commitment and consistency bias, which “moves the action from the domain of something that we might do sometime, to an issue of personal consistency with our word. Our desire to be consistent with our prior statements means that the right time to act is exactly when we said we’d act.” (Wendel, 2013, p.37). This is reinforced when we state our intentions to others, which was definitely the case as part of this study where participants were interviewed to share their process, but can also be an attribute of self-experimenting in other contexts.

Through these forms of urgency, self-experimentation makes the timing ripe for action, and helps participant reach step 4 or 5 in the process to maintain their intended behaviour.

The second phenomenon “seeing progress”, shows that participants were aware of having made progress, even if they fell short of achieving their goal and changing their behaviour completely. This is significant because being aware of this progress motivated participants to keep going.

“I felt more of an urge to do the thing that I already wanted to do for who knows, maybe two years already!”

- Participant 5, SE phase 2 Check-in

“That’s a major problem with many “beneficial” actions we want to take, like exercising, getting control of our finances, or planting a garden. We can always do them later. Even if we want to take the action, if our minds feel that there is something that’s like-wise desirable, but more urgent, we’re out of luck.”

(Wendel, 2013, P.36)

This phenomenon is well explained by the self-determination theory (Deci & Ryan, 2008, p. 183), which connects different degrees of self-determined motivation with three fundamental human needs: Autonomy, competence and relatedness. The phenomenon of seeing progress in one’s own quest for behaviour change would satisfy participant’s need for competence (the need to being effective in one’s activity). This in turn leads to a boost of intrinsic motivation. And as outlined by multiple models including COM-B by (Michie, van Stralen, & West, 2011) and B=MAT (Fogg, 2009), motivation is an essential factor to perform behaviour and uphold behaviour change over time.

“I didn’t completely achieve [my goal]. I just noticed that I was able to make some kind of small change, which was enough motivation than for me to try another intervention and think, look, it is possible for me to change my habits, even if it’s in a very incremental way”

- Participant 1 SE phase 2 closing interview

ESE results in....

TRIAL AND ERROR TO SUCCESS

Phenomenon #3: Trying out multiple interventions in a short period of time

Engaging in SE helps participants adapt an agile and iterative mindset for changing their health behaviours. One phenomenon that was observed in the last SE phase, is that all participants tried an average of four interventions within the four-week study. Where some participants embarked on five interventions simultaneously, others went through the testing more systematically, starting with one, and then moving on if they did not find it effective (see figure 24). Regardless of strategy, the trying out of multiple interventions in a short period of time shows an impressive agility to navigate and adapt interventions when they are not working. This phenomenon helps participants speed up the process of finding something that works for them.

"It removes some of the barriers that before it would have probably just made me stop. So setting my yoga mat out just isn't working. So, I just won't do yoga. Whereas this I was like okay, maybe that's not what works. Maybe I need to, you know, enroll in a class or whatever."

- Participant 3, SE phase 3 Check-in

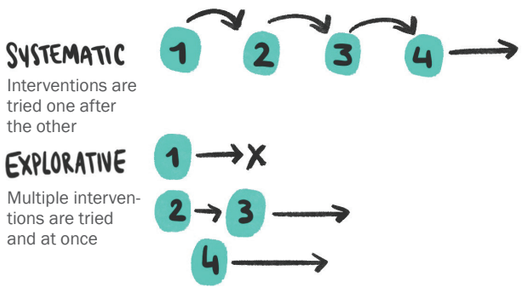


Fig. 24.

Phenomenon #4: Troubleshooting barriers

Self-experimenting led participants to take on a problem solving mentality. As part of the prototype, participants were encouraged to reflect on barriers for changing their behaviour (and later barriers for maintaining the desired behaviour). When reporting their experience, participants mentioned which barriers they had identified and how they adapted their goal or interventions to try and overcome them. For example, one participant found that the biggest hurdle to integrating meditation in their daily routine, is not having a comfortable location to do so. He then proceeded to test setting up his "meditation station" in a multiple locations to find out which works best for him. The phenomenon of participants trouble shooting barriers is significant, as it shows an incentive to overcome them rather than admit defeat when the goal is not easily reached.

Phenomenon #5: Finding something that fits

"Finding something that fits" is a primary purpose participants allocate to their self-experimentation. Not all participants managed to find an intervention deemed "fitting" within the four week study, but all participants discovered aspects of interventions that did or did not work for them. One participant found that practicing mindful food consumption worked extremely well to achieve their goal of eating less sugary foods. Another participant found that they responded extremely well to social support, and started integrating weekly check-ins with friends into their interventions. Another participant found that the fitbit, did not provide the right kind of motivation for them.

"It showed that my Fitbit maybe doesn't actually motivate me in the way that I need to be motivated... I really feel that this pushing me to walk and nudging me every 40 minutes, it doesn't really work for me. It's very inflexible, it doesn't really fit with what I want and I don't need a tool that is a second mother for me!"

- Participant 2, SE phase 2 check-in Interview

"I'm going to keep going with this mindful consumption [intervention] because I found that to have a real impact on the way I feel during my day."

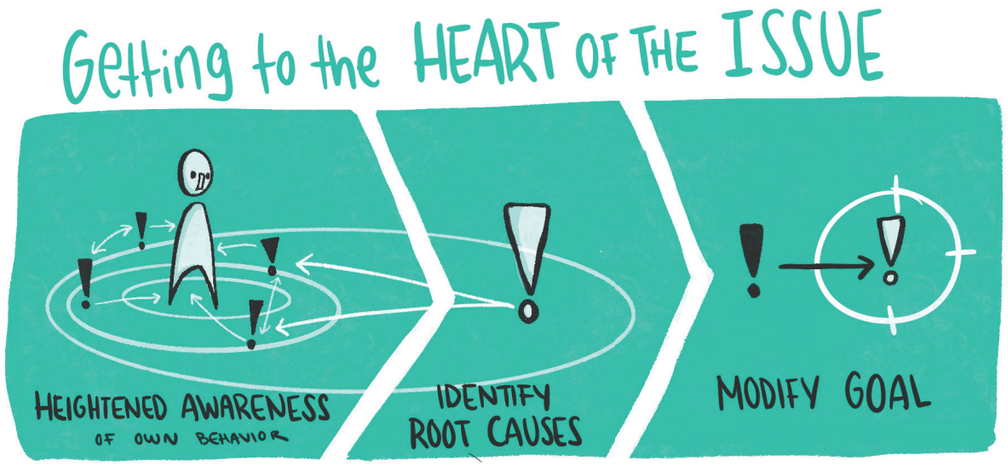
- Participant 1, SE phase 2 check-in Interview

DISCUSSION ON BRIDGING CONCEPTS

The phenomenon that participants try multiple interventions in a relatively short period of time is significant as it statistically increases the likelihood of finding a compatible intervention. As explained by Resnicow & Page (2008), behaviour change can be viewed through the lens of chaos theory and complex adaptive systems. Due to the extreme complexity through the many factors influencing behaviour and motivation, it is impossible to predict exactly how an intervention will trigger the receptors in our brain. Instead Resnicow and Page suggest to "place greater emphasis on the periodicity of intervention rather than intensity—that is, provide multiple opportunities to experience the perfect storm" (Resnicow & Page, 2008, p.1388). Self-experimentation complies with this suggestion, as it encourages exploring multiple possibilities to find a compatible intervention.

Next to trying multiple interventions, participants explicitly selected new interventions to overcome barriers uncovered in past attempts. "Problem solving" is one of the behaviour change techniques listed in Michi et. al's taxonomy (Michie et al., 2013). By analyzing factors influencing the behaviour, strategies can be selected to overcome barriers or increase facilitators. Applying problem solving is therefore a strategy to prevent relapsing into old behaviour patterns (Michie et al., 2013).

As a result of trying multiple interventions and troubleshooting barriers, participants found interventions that they deemed fitting. This indicates that SE is an effective way to address contextual problems that may inhibit the process of change. DiClemente (2007) states there is a "need to specify what are the other contextual problems that surround the behaviour change and the need to address them in order to achieve successful change" (DiClemente, 2007, p.31). Self-experimentation, in the way it makes people aware of their contextual influences, and presents an iterative frame to adjust interventions to this context, shows potential for facilitating successful behaviour change.



ESE results in....

GETTING TO THE HEART OF THE ISSUE

Phenomenon #6: Heightened Awareness

All participants reported a heightened awareness of their own behaviour during the first two weeks of self-experimenting. They became aware of what influenced their behaviour, including enablers and barriers. For example, one participant wanted to go to sleep earlier, and noticed that the problem was connected to her anxiety for the work that had to be done the next day, as well as the tendency to endlessly scroll through social media apps.

Phenomenon #7: Identifying Root Causes

The heightened awareness often lead to participants identifying root causes to their behavioural problems. They understood which issues they had to deal with first to ultimately reach their goal, or they identified what they actually wanted to achieve differed from the goal they had formulated at the outset.

Phenomenon #8: Modifying the Goal

The phenomenon of identifying root causes led participants to adjust their goal or intervention to address the "actual" issue or desired target behaviour. For example, one participant started with the goal go running regularly, and noticed that the actual aim was to go outside everyday, whether by walking or running being of second importance. Thus an unexpected outcome for many was that self-experimenting helped them get to the heart of the issue and adjust their planning accordingly.

"When I first started with this goal, I didn't really understand my problem. So I didn't understand the root cause of this, but I just set that goal. But then as I tried to reach that goal, I started to see: Okay. Actually, I have this and that problem before I can reach that"

- Participant 1. SE phase 3 Closing interview

"But that got me thinking more like 'why am I still feeling crap?' And then I realized it's because it's not just about the fact that I'm eating sugar. It's the way that I'm using it to compensate for other things in my lifestyle that are detrimental to me. i.e. not sleeping enough!"

- Participant 1, SE phase 2 closing Interview

DISCUSSION ON BRIDGING CONCEPTS

Participants gain a heightened awareness of their own behaviour as well as influencing factors. In many cases this lead to identifying root causes. The process of increasing one's awareness about the causes, consequences and cures for a problem behaviour is a change process identified by Prochaska and DiClemente as "consciousness raising" (DiClemente, 2007). This is one of 10 change processes that help individuals intentionally change their behaviour, and shows how the state of heightened awareness that results from self-experimenting can contribute to moving people towards maintaining health behaviour change.

Furthermore, the phenomenon of participants changing their goals to address the "actual" problem, signifies a change in their health beliefs. Participants may have an increased perception of relevance towards the new behaviour change target, which is outlined by the Health Belief Model (HBM)(Glanz et al., 2008) as a significant reinforcer for shaping the intention to act. Identifying and conceding a root cause of a behavioural problem links to participants believing there is a concrete benefit to addressing this problem. It places more weight on the significance to addressing a certain behaviour, which ultimately reinforces the motivation to pursue it.

ESE results in....

DISCOVERING NEW PERSPECTIVES

The process of self-experimenting leads to a significant change in attitude in the way participants viewed their own health behaviour. This shift in attitude became apparent as participants talked about a change of perspective in their own capability to change, their own liability towards making changes, and the priority they attributed to working on their health behaviours.

Phenomenon #9: New perspective on personal agency

One reoccurring phenomenon was that participants had an increase in self-efficacy, as they realised that they *can* change their own health behaviour, even if only in small incremental steps. This new perspective was often a result of having overcome one or more barriers that had been encountered in the process (see phenomenon #4). For example, one participant realized "okay yeah, it's actually all these very silly concrete things and not some big problem that I can't fix" (Participant 3, SE phase 3, check-in interview) after having written down the barriers for achieving her goal.

Phenomenon #10: New perspective on own liability

Another phenomenon in terms of attitude change involved participants gaining a new perspective on how liable they were in failing to change their own health behaviour. Engaging in self-experimentation alleviated the blame some participants were feeling for not being able to successfully change a certain behaviour. Whereas before they were thinking it is their fault, they now had a new perspective that they simply had not yet discovered the right way. The blame was shifted from the self to the incompatible intervention, making way for a new attitude of improving one's health behaviour.

"I used to criticize myself a bit about not being able to reach a certain behaviour. And now I start questioning the tools more and the support that they give me... this study really got me thinking about what I need for myself."

- Participant 2, SE phase 2 check-in Interview

Phenomenon #11: New perspective on own priorities

A third way the attitude change phenomenon appeared is when participants reevaluated how they prioritised their health. For example, one participant realised she had been neglecting her need for sleep and had been trying to compensate by overindulging in sugary and caffeinated drinks. This realisation shocked her into prioritising her health in daily situations.

"I had that kind of moment of realization of, oh, this is about much more than just my diet. It's about my attitude to my own health. I don't pay attention enough to the way my body feels and to my health. Generally I ignore it."

- Participant 1, SE phase 2 closing Interview

Phenomenon #12: Discoveries about personal tendencies

Self-discoveries also happened on another level; participants reflected on their own tendencies and responses to certain types of interventions and persuasive strategies. For example, one participant noticed they respond extremely well to external, social motivators, and set up their interventions to include this.

DISCUSSION ON BRIDGING CONCEPTS

The new perspectives formed by self-experimenters affect both how they view themselves, and how they view their health behaviour. Both can be understood as significant changes in attitudes that propel behaviour change.

First, through overcoming barriers, and seeing some progress, SE leads to a raise in self-efficacy. Self-efficacy is defined as the "confidence in one's ability to take action" (Ganz et al., 2008, p.48) and is a central aspect in numerous behaviour change models (TTM, HBM, IBM to name a few). Participants realize that they *can* change their behaviour, and this new perspective on personal agency directly influences the intention to perform the behaviour (see IBM Ganz et al., 2008). Furthermore, Prochaska et al. have identified this as self-liberation – "the belief that one can change and the commitment and recommitment to act on the belief" (Glanz et al., 2015, p.126). Self-liberation is one of the 10 identified processes of change in the Transtheoretical model of change, which are key to move along the behaviour change process to reach maintenance.

Engaging in self-experimentation can result in a change in attitude towards one's own relationship with health. The role of attitudes has been researched in correlation with predicting behaviour. In Ajzen's Theory of Planned Behaviour, attitudes are listed next to norms, and perceived control, as key influences in forming our intentions to act (Ajzen 1991). Although attitudes do not equate behaviour, they are "what puts us in the right position for behaviour" (Blythe, 2013, p. 153). This attitude formation can have several vital functions that contribute to sustainable behaviour change:

1. Attitudes can help people make decisions (Blythe, 2013). As was observed in participant 1 (SE phase 2), who recognized she wants to prioritize her health more in her daily life by allowing herself to sleep longer in order to rely less on caffeinated drinks. Her attitude shift helped her make concrete decisions in restructuring her daily life.
2. Attitudes can have an Ego-defensive function in that it "shields the individual from his/her own failings" (Blyth, 2013, p. 161). This was clearly observed in participant 2 (SE phase 2) who was first inclined to blame himself for failing to change his behaviour. Through SE he obtained a new perspective that he had simply not yet discovered the right way to change his behaviour, which alleviated the blame he placed on himself and shifted it to the incompatible intervention. In this sense, the attitude change took on an ego-defensive function by protecting him from an internal conflict. As changing a health behaviour is not always successful on the first try, the formation of a positive, optimistic attitude towards ones own health behaviour could be key in reaching sustainable health behaviour change.
3. Attitudes are fairly stable, and do not change much with varying circumstances (Blyth, 2013). This stability is a good trait for setting participants up to maintaining their quest to change their health behaviour over long periods of time.

Knowing that ESE experience can form favourable attitudes and new perspectives towards one's health behaviour, this could be seen as a predisposition to achieving sustainable behaviour change.

"I feel like this whole experience has changed my attitude towards my health. And with that in mind, my behavior will definitely change."

- Participant 1, SE phase 2 closing Interview

ESE results in....

FINDING SUPPORT

Phenomenon #13: Starting conversations with close social circle

One phenomenon that occurred with about half the participants, is that SE was a conversation started with their close social circle. Several participants found a way to integrate their partners or house-mates into their interventions, ranging from just telling them about their process in the hopes to be held accountable by them, to having partners join in the interventions completely (for example exercising together). One participant noted that the unexpected support she received from her partner was one of the most remarkable results of the experience, and would also help her maintain the intervention long-term. This phenomenon shows that although SE is inherently an individual activity, it can lead to finding social support, and even inspire others to follow.

"And then because I couldn't watch TV, he wouldn't watch TV because he wanted to support me. And now he painted the wall downstairs, something he always wanted to do. And yeah, so he started also to look and search for different things to do."

- Participant 2 had the goal to not use electronic devices (TV, phone, laptop) after 6pm, SE phase 3, check-in meeting

"Not only is [the prototype] a reminder to me, but it also moves it a little bit more into the public sphere of my house and that like now my boyfriend also knows that this is what I want to work on and Yeah, it's like a little bit more accountability and a bit of a conversation starter."

- Participant 3, SE phase 3 Check-in meeting

DISCUSSION ON BRIDGING CONCEPTS

Although SE is primarily a method designed for individual application, half the participants involved their close social circle in the process. Finding social support falls under "helping relationships", which is another one of the 10 change processes identified by Prochaska and DiClemente (DiClemente, 2007). Research shows that finding support in one's own social network can significantly impact the adherence to health behaviour change (Middleton et al., 2013).

4.3 Discussion

The 13 phenomenon that result from Explorative self-experimentation can be summarized in five statements. ESE helps people (1) take incremental steps towards a long term goal, through (2) trial and error to success. It (3) leads people to get to the heart of the issue, (4) discover new perspectives and (5) find support along the way. When comparing these results with the overarching goals self-experimenters attribute to ESE, there is a significant overlap. Participants engaging in ESE want to find something that works for them (addressed by phenomenon #5); they want to explore different possibilities to reach their goal (phenomenon #3); they want to learn about themselves in the process (phenomenon #9-12) and they want a reason to start working on a long-term goal (phenomenon #1). From this overlap it is clear that ESE can deliver what participants expect from the process.

But can Explorative self-experimentation deliver what is anticipated of it on a societal level? If ESE is to be widely promoted as a personal health intervention to help curb the rise of chronic diseases, it becomes valuable at a societal level if it can contribute to sustainable behaviour change. As outlined in the discussions following the phenomena presentation, most results can be linked to existing models and theories of behaviour change. The active linking ingredients between the phenomena and existing theories is that ESE results in:

- A sense of urgency to work on long-term goals
- It satisfies the participant's need for competence causing an intrinsic boost in motivation
- The high periodicity of interventions increases the likelihood of finding a good fit
- Engaging in problem solving helps address contextual problems that may stand in the way of successful change
- Consciousness raising helps participants be aware of potential causes of "relapsing", and thus helps avoid these
- An increase in self-efficacy, leaves people more confident in their ability to change their own behaviour, and therefore more likely to pursue it
- A positive change in attitude towards the behaviour helps shape the intention to act
- Finding social support can aid in adhering to the behaviour

These bridging concepts show in which ways ESE can contribute to sustainable behaviour change of individuals.

It should be noted that although is is easy to find a lot of overlap between the resulting phenomena of ESE and behaviour change models, it is less easy to connect the phenomena to early indicators of *sustainable* behaviour change. For example, yes the attitude plays a significant role in determining the intention to act and therefore behaviour, (IBM (Ganz et al., 2008)), but to what extent is a specific attitude linked to maintaining this behaviour? I would argue that one of the most significant results SE achieves, is in forming new attitudes towards one's own health behaviour, as well as shaping a problem-solving and explorative mindset for sustained engagement with SE. More research on early indicators of sustainable behaviour change needs to be done to revisit the significance of the presented phenomena.

One aspect that does not come across well in the current presentation of phenomena is that there are also strong correlations between phenomena across clusters. For example seeing progress and troubleshooting barriers lead to the increase in self-efficacy. Or the heightened awareness contributes to both self-discovery and the ability to identify and remove barriers. Although this chapter presented the phenomena and their link to behaviour change theory in separate chunks, when regarded as a whole, the outcome is bigger than the sum of its parts. As ESE is a drawn out process, it results in a multitude of phenomena over time. The combination of the lot present a more powerful connection to achieving sustainable behaviour change, than does regarding them as separate events.

In conclusion, ESE exhibits a multitude of resulting phenomena that can be linked to impacting behaviour change. Many of the phenomena are potential indicators of more long-term adherence to behaviour, leaving eight bridging concepts that display how ESE can contribute to sustainable behaviour change.

"Design is a way to ask questions... When Design Research is integrated into the design process, new and unexpected questions emerge directly from the act of design."

(Zimmerman, 2003)

05
Facilitating Explorative Self-Experimentation

Having established the need for Explorative self-experimentation, and the potential it holds for fostering sustainable behaviour change, the question that remains is how can we design for it? This chapter will uncover opportunities for designers to facilitate ESE, and showcase the key ingredients of the prototypes constructed as part of this study. It will also present common pitfalls of self-experimenters and end in a discussion to answer the core research question of how SE can be facilitated.

5.1 Prototyping as a means of Inquiry

Prior to disclosing the research results on how to facilitate ESE, this chapter will outline the primary methods used to uncover the presented findings.

EXPLORATIVE PROTOTYPING

In RtD, design prototypes are created and unleashed to explore the problem and gain insights feeding into the overarching research objective. During this project three sets of prototypes were created and used as a means of inquiry (Wensveen & Matthews, 2014) to better understand which aspects are important to consider for facilitating ESE. Figures 25-27 give an overview of the three prototypes created for this study. The prototype designs were built on feedback and insights gained from the preceding research phases. For a more complete overview of the design process of each of the prototypes, see appendix 2,4 and 5)

Fig. 25. Prototype 1

PROTOTYPE # 1

The first prototype consisted of several packages of cards with instructions to guide participants through self-experimenting and evaluating the success of their experiments. Cards contained prompts to help participants observe their baseline behaviour, formulate a goal, observe their progress over four weeks and evaluate how well they may be able to maintain the intervention. The main purpose of the prototype was to explore the method and uncover the right questions to ask moving forward.

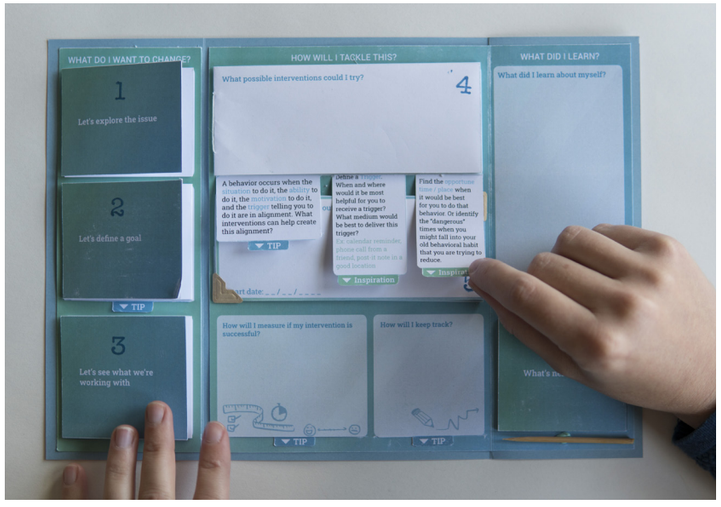


Fig. 26. Prototype 2

PROTOTYPE # 2

The second prototype presented a guide through a more structured process, whilst introducing elements of playfulness in the interaction with paper. The focus of this prototype was to facilitate self-experimentation and make room for self-discoveries on a higher level than quantitatively evaluating the success of interventions (prototype 1)

Fig. 27. Prototype 3

PROTOTYPE # 3

The final prototype built on the structured instructions from prototype 2, and introduced additional elements to facilitate the maintaining of self-experimentation over time. This included a set of inspiration cards, visual triggers, and packages for routine check-ins to track the progress. The final prototype will be presented in more detail in chapter 6.

PROTOTYPE TESTING

An identical prototype was constructed for each participant and sent to their homes for testing. Each participant received a package by mail containing the prototype, a feedback form and a small letter with instructions. The prototypes were tested in the context of use (the homes of each individual), and yielded valuable insights of how ESE is experienced in real-life (Sanders & Stappers, 2012). Unfortunately, due to the restriction during the COVID-19 pandemic, no home visits could be organized to personally observe the interaction with the prototypes. Instead participants sent photos of their interactions, and shared their experiences in interviews. A feedback form was provided to encourage participants to reflect and collect feedback throughout the testing phase (see appendix 10). As the facilitating of SE is a process that stretches over several weeks, no pilot tests were done (although the first SE intervention phase served as a pilot for the subsequent phases).

Main research question:
How might I facilitate people to self-experiment with interventions to reach their personal health-behaviour goals?

INTERVIEWING PARTICIPANTS

The 14 participants were interviewed once after two weeks and once after four weeks into the process to help answer the research questions: (1) What are important factors to consider in the process of facilitating self-experimentation? And (2) where do participants need most support? During the first SE intervention phase, the interview were conducted in group sessions, and for the second and final phase the interviews were held one-on-one.

The first “check-in” interview was conducted via Zoom, lasting about 30-45 minutes. Among other questions, participants were asked to provide feedback on the prototype by naming three things that they found helpful in the prototype, or that they particularly liked, and three things that they felt could be improved or that they dislike. This helped create a picture of what they needed and valued in the self-experimentation experience. Participants were also asked to describe the frequency with which they interacted with the prototype. The interview guide can be found in appendix 7.

After four weeks of self-experimenting, a closing interview was conducted with to capture feedback on their overall experience, reflect on the outcomes, and find out which components the participants felt were key to facilitating

Answering the question:

Where do people need most support? What did people find helpful? Did the design decisions have the desired impact?

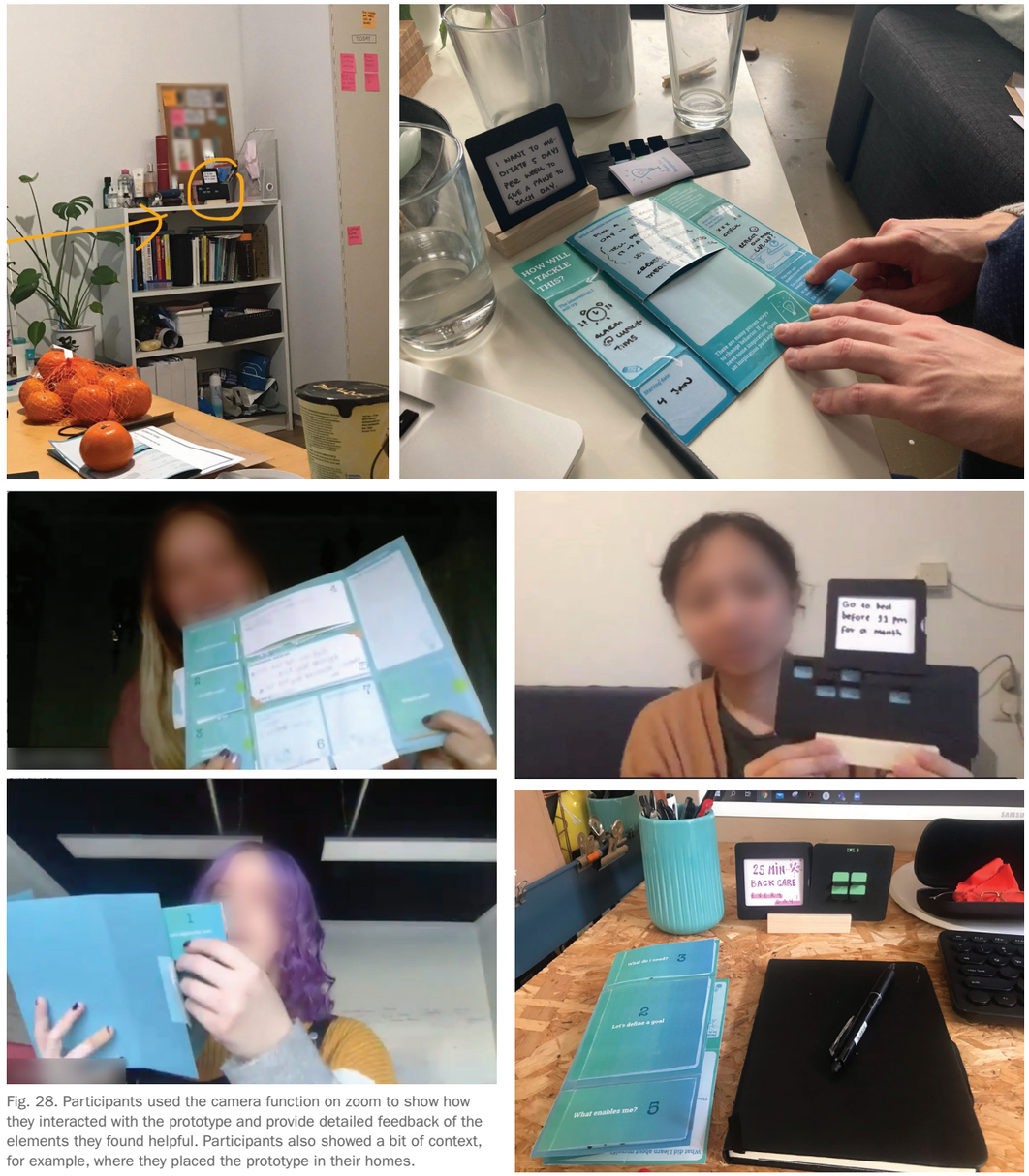


Fig. 28. Participants used the camera function on zoom to show how they interacted with the prototype and provide detailed feedback of the elements they found helpful. Participants also showed a bit of context, for example, where they placed the prototype in their homes.

a successful self-experimentation experience. The closing interviews lasted about 45 minutes each and were conducted online using the platforms Zoom and Miro. For the results presented in this chapter, the most relevant interview section was the one in which participants reflected about what core ingredients comprised their self-experimentation experience. This included mentioning what ingredients are a “must-have”, “nice-to-have” and “should-not-have”. Participants were asked to reflect on aspects of the prototype and general experience that they felt they needed or valued most. As can be seen in figure 29, a pizza metaphor was used to communicate this. Must-haves formed the base, nice-to-haves were visualized by toppings, and should-not-haves were represented by a bin. It is important to note that participants were not given a list of ingredients to rank, but were posed the open question of “What are the core ingredients to support your self-experimentation experience?”.

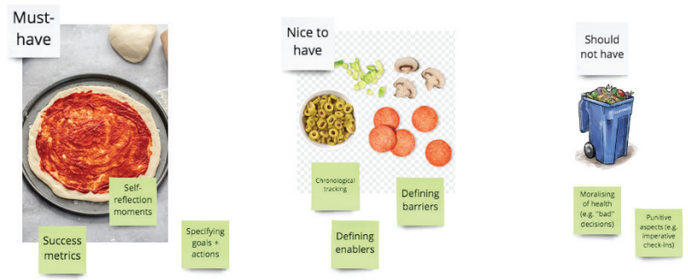


Fig. 29. screenshot of part of the Miro board used in the closing interviews

This set-up of the interview was chosen to give a starting point for conversation, to understand the facilitating factors of SE and the underlying values and needs of self-experimenters. For a complete set-up of the closing interview, see appendix 7.

DATA ANALYSIS

The interviews were analysed using the thematic analysis process outlined in chapter 4.1. The analysis resulted in 7 core values of self-experimenters and a set of key ingredients that helped cater to these values. The values were derived by inquiring into *why* participants described elements as key ingredients, which gave insights into the needs those elements fulfilled.

Each prototype element that was mentioned as a key ingredient received a visual marking in the form of a star, so that the elements with the highest frequency of mentions were clearly visually highlighted (see figure 30) in the thematic clusters that appeared.

Fig. 30.

Answering the question:

What elements do participants value in a facilitated SE experience?

“Values are what users really want: designers do not define value but talk to people about it”
(Cockton 2004).

RESULTS

Through these design activities, the question “how can design facilitate individuals to self-experiment?” can be answered. While some of the key insights came from the testing of the prototypes with users, others came from the act of designing the prototypes itself. For example, the described prototype testing procedure yielded great insights into which ingredients were perceived as key to a successful SE experience, what common pitfalls, and the underlying values and needs of self-experimenters were. The process of ideating and designing the prototypes revealed different approaches that can be used to facilitating ESE. These results are presented in the upcoming chapters.

Fig. 31. Impressions from the ideation and prototyping phase

5.2 Uncovered Design Opportunities

As part of the research through design process, there were three phases of ideation to develop concepts and prototypes that would help individuals engage in self-experimentation for behaviour change. These design phases were instrumental in bridging the abstract theory of self-experimentation with very concrete ways of applying and facilitating it. In the process of designing several prototypes, a variety of approaches and questions were uncovered that may be useful for any future endeavour to facilitate self-experimentation. These are outlined here as three lenses that can be used to approach facilitating ESE. Lens 1 is process centred, and looks at how to best facilitate the phases of the iterative ESE process. Lens 2 looks at what different scenarios ESE may be used in, each scenario requiring a different focus in facilitation. Lens 3 looks at designing for the core values and needs self-experimenters have.

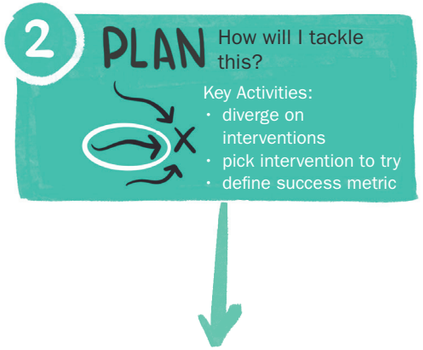
LENS 1: DESIGNING THE PROCESS

The ESE process framework introduced in chapter 2.2 shows that self-experimentation is a drawn out process consisting of four main phases. Each of these phases can be addressed with separate design solutions, yet when viewed together they form the self-experimentation process. One way of facilitating ESE is thus to consider the activities comprising each phase of the process and design different ways to guide participants through them. I present below a list of questions to consider while designing for ESE using the process lens. These questions emerged while designing the second and third prototype and can be used by other designers and researchers as part of a design process.

How to kick-start the process?

What do participants need to start self-experimenting? A specific mindset? A personal health issue they wish to address? A goal? A behaviour change plan? One way to facilitate self-experimenters is to aid in its initiation.

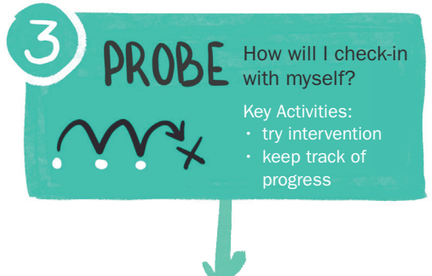
Design Opportunity:



How to explore opportune interventions?

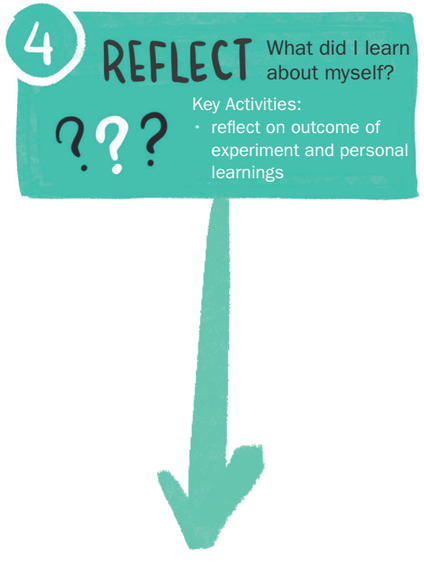
The core of self-experimenting is trying out interventions to change one's health behaviours. How can participants be facilitated in thinking of interventions? How can their curiosity be sparked to explore behaviour change techniques? Aiding participants in exploring interventions and engaging with behaviour change tactics is another approach to facilitating self-experimentation.

Design Opportunity:



How to track the headway?

How can participants keep track of their progress? How will they know if they have reached their goal? What are ways of measuring success? How can progress be made visible? How can individuals be supported to regularly check-in with themselves?

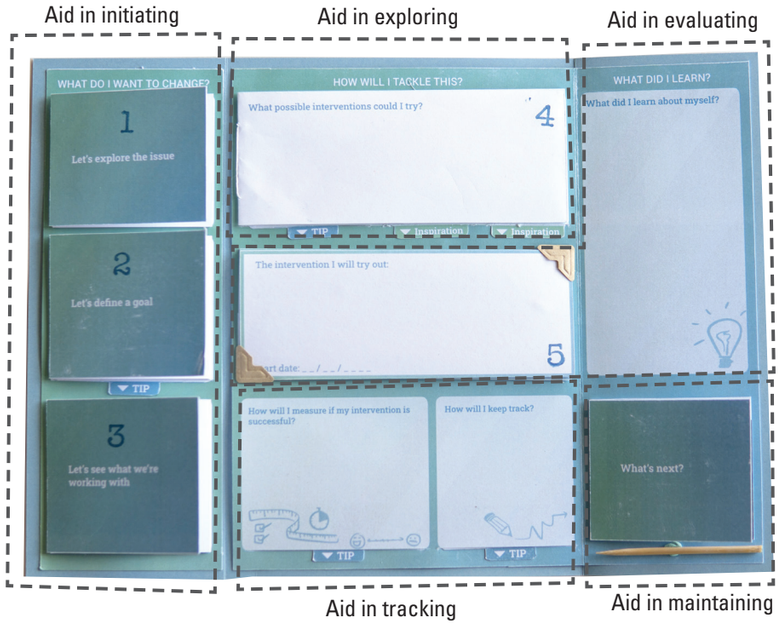


How to check if it's working?

What are ways to evaluate if an intervention works? How well it fits? Enjoyment? The ability to maintain it? Aiding in evaluating and decision making could be another way to facilitate self-experimentation.

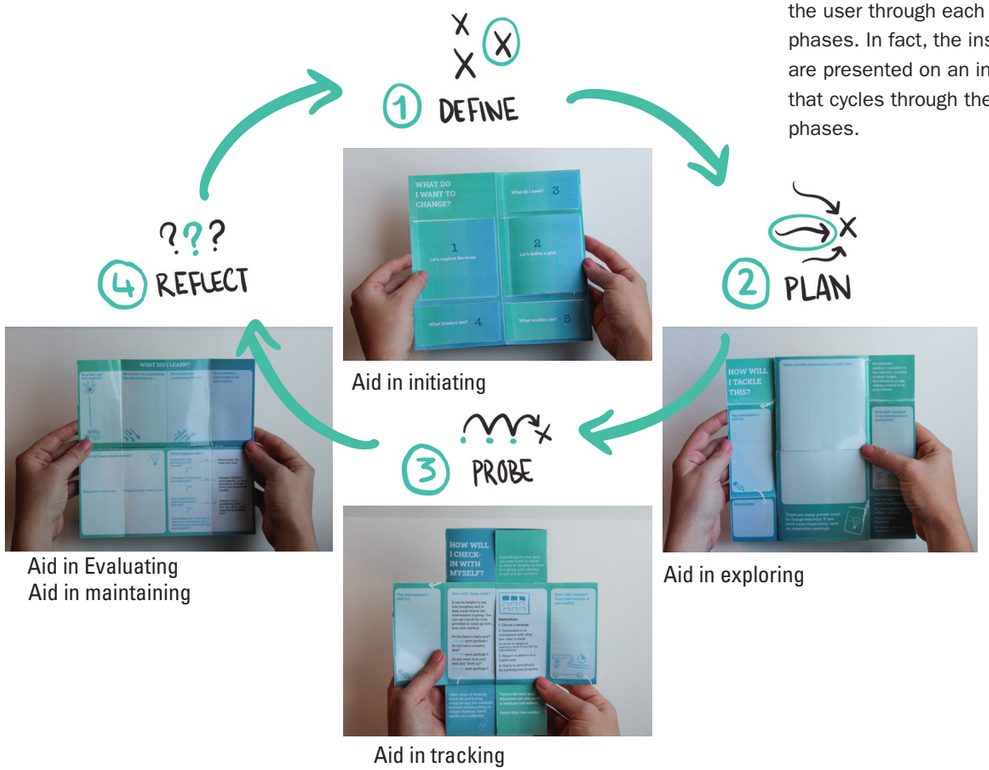
How to keep it going?

Once an intervention that works is found, maintaining it is the next challenge. How can habit formation be facilitated? Or if the intervention is disappointing, how to encourage participants to maintain the process of self-experimenting, and try again with something new?



The second prototype was designed through this lens. You can see how the different sections align with the design opportunities essentially guiding the user through the SE process.

The third prototype can also be viewed through this lens. It too contains elements that guides the user through each of the phases. In fact, the instructions are presented on an infinity flyer that cycles through the four phases.



LENS 2: DESIGNING FOR DIFFERENT SCENARIOS

Self-experimenting can play out in different scenarios, that need different tools to handle. Within each scenario SE fulfils a distinct objective, and thus can breed different design opportunities:

GETTING THE BALL ROLLING

Self-experimentation can be seen as a way of “getting the ball rolling”, in that it provides participants with a way of starting the journey to changing their health behaviour. This became explicit when participants shared their interaction over time with the prototype, highlighting that the kit was most useful in the first 2 weeks.

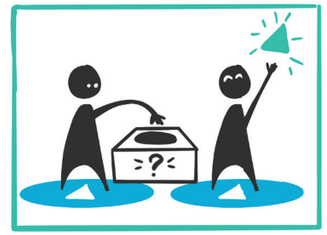
Scenario 1: Finding something that works right off-the-bat

Some participants may strike gold on the first try in finding an intervention that works. In this case, the SE toolkit mainly takes the role of kick-starting the process and becomes obsolete quickly thereafter.

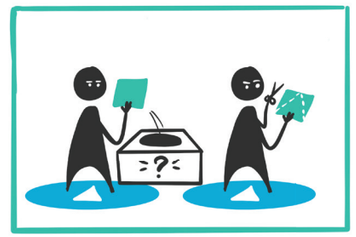
Scenario 2: Nothing’s perfect yet but a commitment is made

Even if no intervention is found that fits well within the first four weeks, when asked if participants would want to continue self-experimenting, most confirmed. Participants made a commitment to themselves by writing down a goal. In this scenario, the prototype manages to get the ball rolling through the commitment and consistency bias.

Design opportunity:
A self-experimentation toolkit with the aim of “getting the ball rolling” would focus on the initiation of the process by facilitating the start, lowering hurdles, providing easy first steps and shaping a mindset that is likely to succeed.



“It worked well for me! Definitely encouraged me to finally do yoga”
- Participant 3, First Self-Experimentation Closing interview

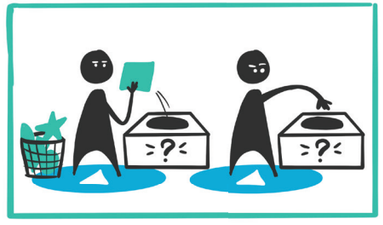


KEEPING THE BALL ROLLING

Working on improving personal health, and creating sustainable behaviour change are long-term oriented. Perhaps the strength and focus of Self-experimentation should be in “keeping the ball rolling” rather than starting it.

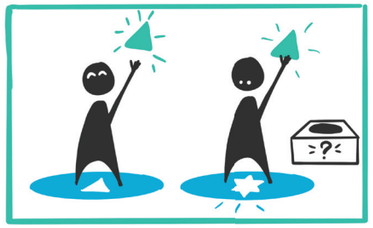
Scenario 3: A continuous struggle to find something that works

Some participants may not find an intervention that works, as participant 1 remarked “maybe the interventions were just not my style or I picked the wrong ones. And I didn’t expect that in the beginning. But yeah, that’s something I learned during the two weeks like okay, this is not gonna work”. Perhaps the focus for an SE toolkit would be to spark a new iteration when things are not working out; to quickly provide an alternative suggestion and launch the participant into a new experiment.



Scenario 4: A change in context makes prior solutions void

From the context-mapping interviews one scenario that often came up, describes that habits and routines that fit become void due to a change in context (such as moving to a new place or change in job). Even if a participant finds an intervention that fits perfectly and works, it is likely that at some point a change in context will make the intervention unmaintainable. A SE toolkit that focuses on “keeping the ball rolling” could be used at these points in life, to find ways to adapt interventions to new circumstances.

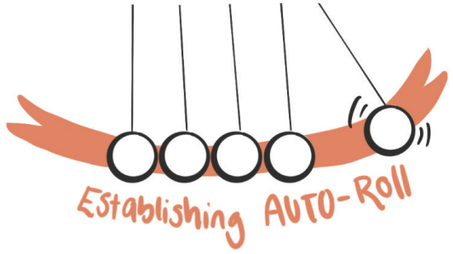


“I used to cook [...] this whole thing (established healthy eating habits) doesn’t function anymore since I live with my boyfriend because he has his lifestyle and I somehow put myself into his lifestyle.”

- Participant 2, Context mapping interview

Design opportunity:

A toolkit with the aim of “keeping the ball rolling” would focus on providing endurance to self-experimenters. This could be done by creating a circular design, that keeps people engaged in the method until a fitting intervention is found, or it could provide tools to keep motivation going over time, including novelty and variety over time to keep people intrigued, or providing was to deal with shortcomings and setbacks.



ESTABLISHING AUTO-ROLL

Ultimately the goal of finding an intervention that fits as a result of SE, is to be able to maintain it. Ideally at some point a routine or habit is formed. Therefore the final stage would be one in which the “ball” continues to roll automatically, without the need of consistent effort.

Scenario 5: Everything fits but how to make it stick?

Sooner or later participants find interventions that they deem fitting – they enjoy it, it works, it fits into their lives, etc. Some participants noted that already after a few weeks it felt like a routine was formed. A natural consecutive purpose of an SE toolkit, would be to help participants form “sticky” habits with their favoured interventions.

“the last two weeks really went well for me because it’s kind of a routine for me now”

- Participant 3, SE phase 1 closing interview

Design opportunity:

A toolkit with the aim of “establishing auto-roll” would focus on helping participants create habits out of their intervention. This would involve setting up a habit loop with cues, the routine, and reward in place.

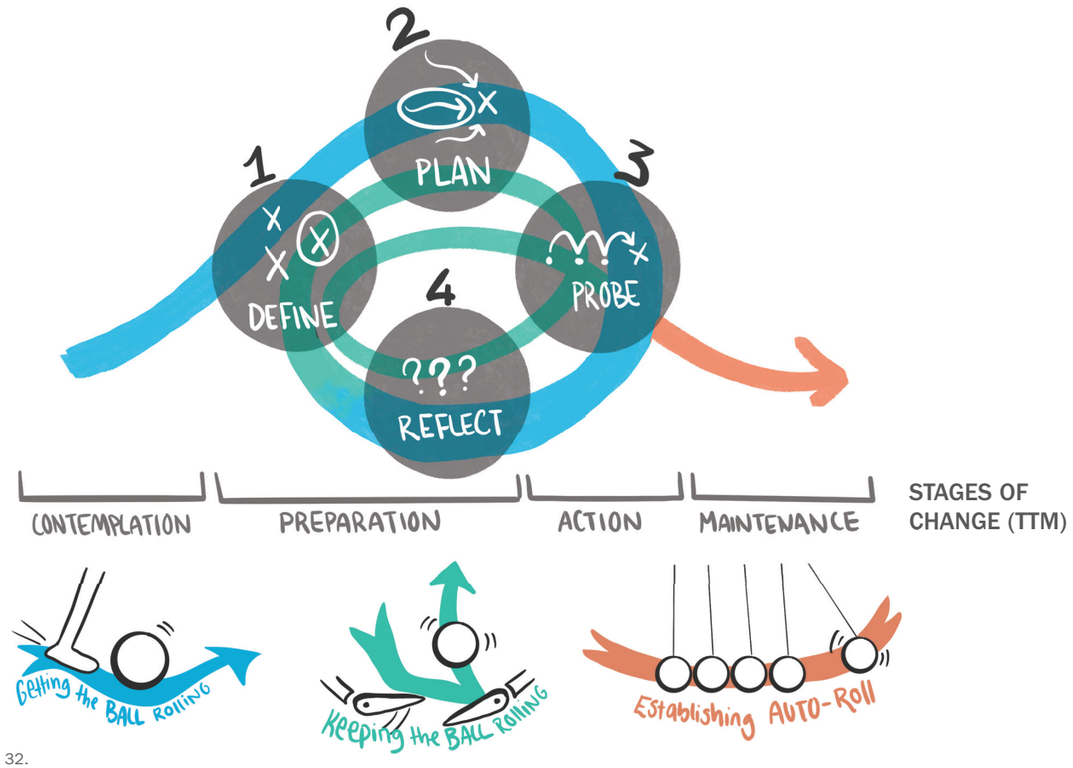


Fig. 32.

Depending on where people are in the change process, different scenarios need to be considered, which warrant different approaches. The three scenarios described – getting the ball rolling, keeping the ball rolling and establishing auto-roll – can be mapped onto the Tanstheoretical model (DiClemente, 2007) describing the stages of the change process (see figure 32). “Getting the ball rolling” essentially strives to get people from preparation to taking action, as a first but necessary step to get to maintenance. “Keeping the ball rolling” focuses on keeping people within the domain preparation and action long enough to reach maintenance without experiencing a relapse to precontemplation. And finally “establishing auto-roll” focuses on bringing people from action to the maintenance stage. Some people already know what they want to do and it is more a question of how to maintain it, others, do not know how to reach their goal yet, and are first looking to explore possibilities. Therefore, depending on where people are situated in the process of change, a different approach of SE might be needed.

LENS 3: DESIGNING FOR UNDERLYING NEEDS AND VALUES

The third lens from which to facilitate self-experimentation is designing for the underlying needs and values of people wanting to change their health behaviour. This is a human-centred approach, which will ensure that the presented design solutions are desirable and useful to participants. One of the key aspects that puts explorative SE apart from quantitative SE, is that it places these needs and values above the use of scientific rigour. User needs can be defined as “requirements that people have regarding a situation, product or service” (Sanders & Stappers, 2012, p.308). In this case the needs refer to what participants required to help them self-experiment. Values can be defined as the quality of being useful or important, or the belief of what is important in life (“Values,” n.d.). Within the results and discussion of this project, the term value refers to what participants defined as being useful or important to them when trying to change their behaviour. By addressing the values and needs of self-experimenters, designers ensure that the tools created are desirable, and increase the likelihood that participants have a successful SE experience.

“Human values play an integral role in any design that aims to improve the quality of human life.”
(Kheirandish et al., 2019)

The research through design process yielded an exposé of 7 core underlying needs/values of participants: (1) being guided through the process, (2) remaining motivated over time, (3) being inspired, (4) feeling personal growth, (5) being resilient to set-back, (6) keeping it personal and (7) being flexible. I do not see a need to distinguish between which are values, and which are needs, as addressing either will make for a better SE experience. Addressing these needs/values presents 7 new design opportunities (figure 33). These will be described in detail in the next chapter alongside a set of key ingredients that help address them.

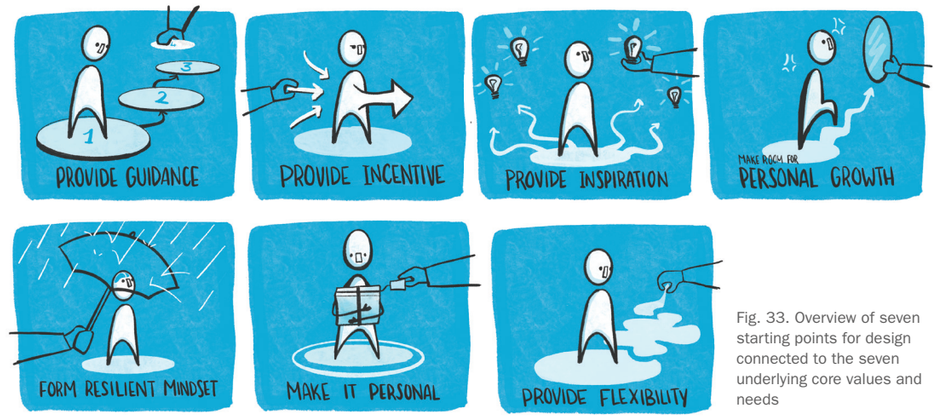


Fig. 33. Overview of seven starting points for design connected to the seven underlying core values and needs

5.3 The Seven starting points for facilitating ESE

This chapter looks to disclose concrete example of how to design for facilitating explorative self-experimentation by presenting seven starting points for designers. The seven starting points are based on the seven core underlying values and needs of home-office workers trying the change their health behaviours through self-experimentation. Each starting point is supported with a list of key ingredients from the created prototypes, that were evaluated as having a significant impact on the SE experience. This set of ingredients should not be seen as complete, but rather as a reflection of the most mentioned features in 28 participant interviews from 3 iterative phases of prototype testing. Each starting point lists a set probes for designers to inspire finding new ways of addressing the values/needs, along with observed pitfalls that may occur if the need is not met.

The seven starting points are presented in order of importance. This order was derived from the analysis process described in chapter 5.1. The key ingredients within each starting point are also listed in order of importance. It should be noted that the key ingredients are listed under the value/need they contribute most to, but often the same ingredient can fulfill multiple purposes.

Core Need/Value:

I WANT TO BE GUIDED THROUGH THE PROCESS

Having a clear starting point, and a structured process were consistently mentioned as helpful elements to embarking on a SE journey. Participants valued feeling guided and knowing what to do. Any elements that help reassure participants about what to do next, or break down the endless journey of improving one's health to concrete and actionable steps will go a long way to facilitate self-experimentation.

"I really like that there were steps so you know where to go to, instead of just figuring out yourself."

- Participant 5, SE phase 2 check-in Interview

RELATED PITFALLS:

If guidance is lacking, participants may create goals that are too big or too vague, resulting in frustration or demotivation. Not knowing what to do next can also lead to inaction, effectively ending the experiment.

"I really, really liked the structured process like, there was a certain way how I went through the prototype also and went through the questions. So I felt like the order in which the questions came into like thinking process was also very helpful."

- Participant 3, SE phase 2 check-in Interview

DESIGN PROBES:

Five core ingredients were found to help cater to the value of being guided. These include a structured process with numbered steps, laddered open questions, as well as tips and examples (see following pages). What are other ways to guide individuals through the lengthy process? What are ways to guide someone through a process that looks slightly different for each individual? How can the drawn-out process be displayed in smaller bite-size pieces? Does it need to be structured or can it be presented as a guided adventure/exploration?

Fig. 34.

Key Ingredient:
STRUCTURED PROCESS

Having a clear starting point as part of a structured process was seen as very helpful to launching the Self-experiment. Having clearly marked steps, and a laddering of questions in which answering one, sets you up for being able to answer the next, was perceived as a key facilitating factor.

"I really liked the first three steps. The laddering of that I found really helpful to get to the heart of the issue because then that made me think about what kind of interventions, I should try to target that particular behaviour. I feel like it set me up for better success."

- Participant 1, SE Phase 2 Check-in

Fig. 35.

Key Ingredient:
GUIDE TO FORMULATE GOAL

Having a guide to formulate an initial goal was mentioned as a "must-have" to setting up a successful SE process. Participants greatly appreciated the tips provided on how to set up a behavioural SMART goal (Genewick, 2020).

"Thanks to your prototype, I actually switched it into a behavioral goal because I realized, okay, having a pain free back for me, it's going to work out better if I set a concrete goal to work towards."

- Participant 3, SE Phase 3 Check-in

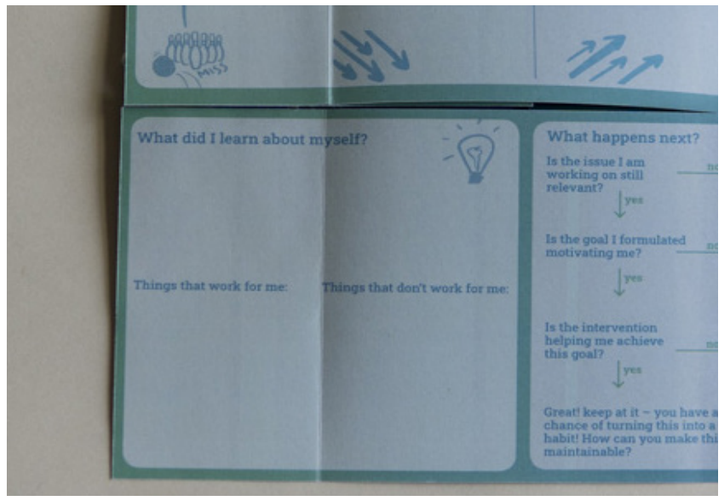


Fig. 36.

Key Ingredient:
OPEN QUESTIONS

Open questions such as "what did I learn about myself?" or "what are barriers to reaching my goal" were perceived as essential to the SE process. Participants mentioned these type of questions helped "guide me through a mental process" and that they added "a qualitative feel" to the process.

"Here it was a bit more qualitative so I could describe things with a bit more richness. So that was really nice and kind of once again forced me to think about the barriers, what was preventing me from reaching my goal..."

- Participant 2, SE phase 2 Check-in Interview

Fig. 37.

Key Ingredient:
IDENTIFYING BARRIERS

An instrumental part of the process was identifying barriers to achieving the current goal. Participants mentioned this exercise as extremely helpful in coming up with very concrete, actionable and relevant interventions to circumvent existing barriers. Participants felt more assured of their next steps, contributing greatly to the feeling of being guided.

"Writing down very like silly concrete things... and actually identifying like okay yeah it's actually that and not some big problem that I can't fix"

- Participant 3, SE phase 3 Check-in Interview

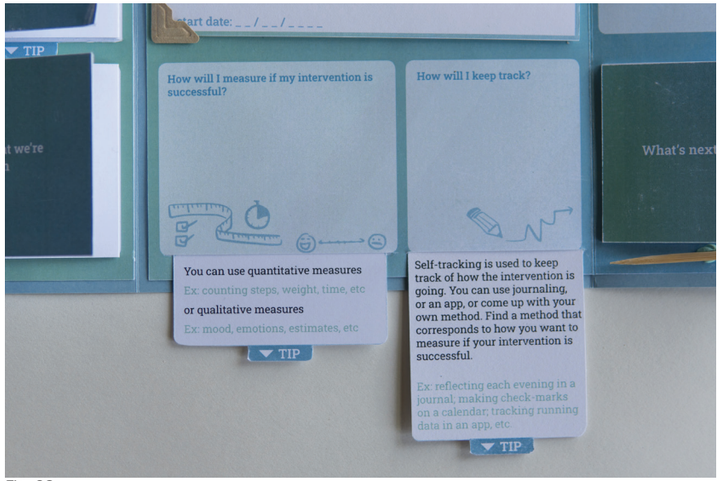


Fig. 38.

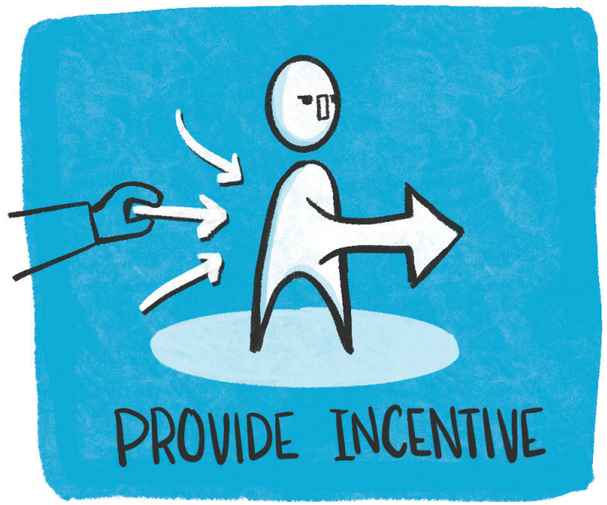
Key Ingredient:

ACTIONABLE TIPS

Any tips or guidance provided should be actionable. Participants found practical and relatable examples extremely helpful and found advice from behaviour change theory too abstract to be of use.

"[the tip] was a bit abstract... somehow I couldn't really relate to it. It felt a bit detached from the practical stuff that I was writing down. So, I wasn't sure what to do with it."

- Participant 5, SE phase 2 Check-in Interview



Core Need/Value:

I NEED TO REMAIN MOTIVATED OVER TIME

Self-experimentation is a lengthy process, and motivation is a key component to being able to change one's behaviour. Staying motivated over time is a struggle all self-experimenters faced, and anyone who has tried to change their behaviour will encounter. Participants expressed appreciation for the playful elements of the prototype that made the process fun, for visual triggers that reminded them to stay on the ball, as well as for components that helped visualize and celebrate progress – in short, anything that helped keep them motivated over time.

RELATED PITFALLS:

If motivating elements are lacking, participants may find that SE feels like work, or not worthwile to pursue. The resulting demotivated will result in inaction or a relapse to old behaviours. Another related pitfall is that participants may simply forget about their goal or intervention over time.

DESIGN PROBES:

Five core ingredients were found to help cater to the value of staying motivated. These include making progress tangible, visual triggers, playful elements and celebrating achievements (see following pages). What are other ways to provide incentives for participants? What intrinsic or extrinsic motivators can be used? How can the process be made fun? How to celebrate small achievements? How to embed rewards in the process of self-experimentation? How can progress be made visible/tangible? How to remind/trigger people in an agreeable way?

"I need external motivation, also in all the self-experimentation that I did there was always an external motivation... maybe my intrinsic motivation isn't really that much there."

- Participant 5, SE phase 3 closing Interview

"I think it would have been nice to have some more like positive or uplifting aspects to the whole thing to help me celebrate small achievements to some kind of way to remind myself that I am trying and I'm doing well."

- Participant 1, SE phase 2 closing Interview

Fig. 39.

Key Ingredient:

VISUAL TRACKING TO MARK PROGRESS

Seeing progress is a great intrinsic motivator. A simple paper tool that helped participants visually track when they completed their intervention/ goal, was perceived as a great motivator, and rated the tool with which they interacted most frequently. It helped participants "feel productive" or notice quickly when something was not working.

"I think visual tracking is very important that you can actually see how it's going... It gives you an extra push to help you just reflect also to see if it's working or not, because if you don't do something for a while, clearly it isn't working.."

- Participant 5, SE phase 3 closing Interview 2021

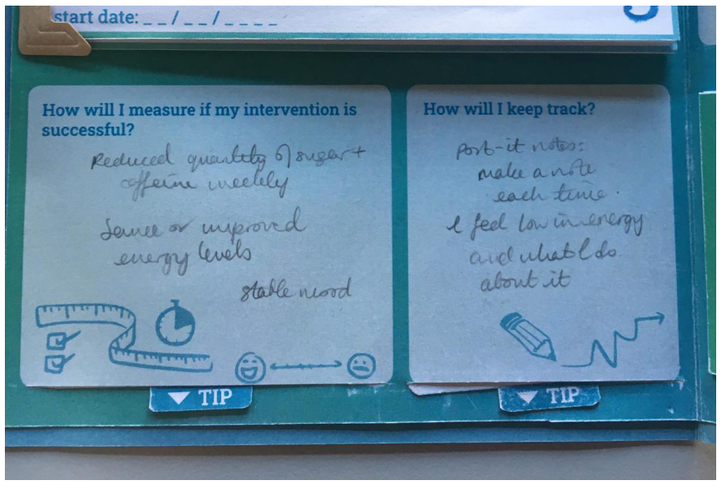


Fig. 40.

Key Ingredient:

SUCCESS METRIC

In order to be able to mark progress, participants need to clearly define what constitutes a successful intervention. By providing a tracking tool, participants automatically had to ask themselves the question of how to define/measure their success.

"Success metrics – that was really helpful for me to think, how am I actually going to know for myself that this is working or not?"

- Participant 1, SE phase 2 closing interview

Fig. 41.

Key Ingredient:

VISUAL TRIGGER

A visual trigger that reminds participant to do the intervention or check-in with themselves is helpful in maintaining SE. This can be explicit: such as presenting a written goal, but it can also be implicit, as many participants mentioned being triggered by the envelope containing the prototype or seeing the instruction set on their table.

"I put it in the bathroom so I could read it in the morning and in the evening when I was brushing my teeth."

- Participant 2, SE phase 3 check-in interview

Fig. 42.

Key Ingredient:

PLAYFUL ELEMENTS

In this prototype paper was used in various ways to create a playful interaction; unfolding or ripping paper to reveal hidden information. These small elements helped provoke curiosity, anticipation, and a feeling of play or adventure; leaving participants engaged and enjoying SE rather than perceiving it as work.

"I really like the excitement. It was like Christmas to open all these little small things and see what's inside... it was like a toy, and I think the playful feeling helps to start with it because it's easier to start if it's like a game."

- Participant 2, SE phase 3 check-in interview

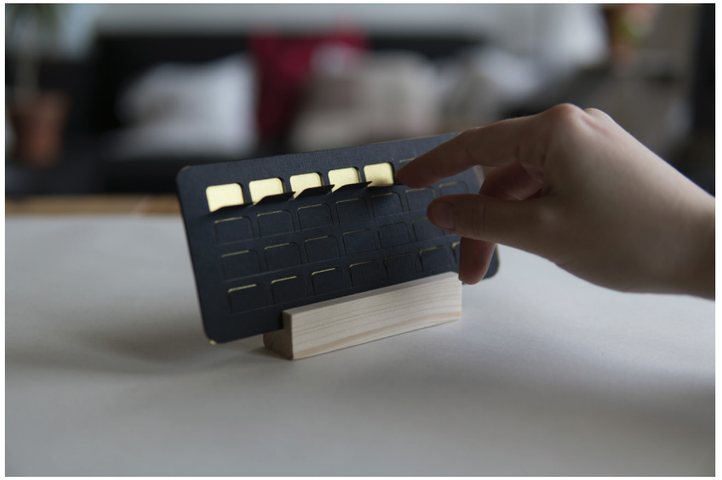


Fig. 43.

Key Ingredient:

CELEBRATING SMALL ACHIEVEMENTS

Changing a health behaviour is a journey with no finish line. Therefore, it is important to celebrate small achievements along the way. Participants mentioned that “collecting well-done days” and the sensual pleasure of folding down a flap felt like “getting a trophy or reward” that helped perpetuate motivation.

“I need to feel good about any slight improvement I made”

- Participant 1, SE phase 3 closing Interview 2021

Core Need/Value:

I WANT TO BE INSPIRED TO EXPLORE!

Self-experimentation is synonymous with exploration. There is a distinct need for inspiration to support exploration and to foster intrigue. Participants valued examples, stories and other input that helped facilitate their own creativity for coming up with suitable interventions. However, it is important that the inspiration is introduced in an actionable way, helping participants apply it to their own SE process.

RELATED PITFALLS:

If inspiration is lacking, participants may struggle to come up with new interventions to try out. This results in people sticking with the default, which is often a previously tried intervention that does not really work, or going back to doing nothing.

DESIGN PROBES:

The two core ingredients that help cater to the value of being inspired, is providing various behaviour change strategies along with examples of their application, as well as introducing novelty and variety over time (see following page). What are other ways to inspire exploration? How to inspire and intrigue people at various stages of the process? How to build curiosity?

“I really really love that there are all these tips and inspiration cards you can pull out”

- Participant 5, SE phase 2 check-in Interview

I would like to be confronted right now, but also inspired to try things that I haven’t tried... I’ve used this before hasn’t really worked in the past is not working again. And so it would be nice to see other ways of trying to change my behaviour.

- Participant 2, SE phase 2 check-in Interview

Fig. 44.

Key Ingredient:

INTERVENTION INSPIRATION

Coming up with an intervention to try out is a core part of the SE process, and can also be quite a hurdle. Many participants expressed that having inspiration for possible interventions is extremely helpful. This can come in the form of stories/examples or relatable and actionable behaviour change tactics.

"It would be nice to see what works for other people and get inspired through that"

- Participant 2, SE phase 2 Closing Interview

"I think it's a must have to have some sort of inspiration and aid in exploring – what are ways to achieve my goal or that sort of goal that I have in mind."

- Participant 3, SE phase 2 Closing Interview

Fig. 45.

Key Ingredient:

NOVELTY OVER TIME

Keeping participants intrigued, both with the process of SE and with finding a fitting intervention can be done by presenting novelty and variety over time. Be it new questions, new levels to unlock, or new intervention inspiration, novelty over time can be key in maintain self-experimenting over time.

"I think that if there is something new every time that it really helps me to keep being engaged"

- Participant 2, SE phase 1 Closing interview

Core Need/Value:

I WANT TO FEEL PERSONAL GROWTH

For many participants, the experience revealed that changing their behaviour is maybe not the main goal, but more learning about themselves in the process. Participants value feeling personal growth, through overcoming barriers, making progress on their behaviour change quest, or learning about themselves and influential factors. Having incremental check-in moments ensures that participants reflect regularly and creates a basis for experiencing growth over time.

RELATED PITFALLS:

If participants do not feel personal growth this may result in a loss of self-efficacy. Participants may think they are incapable of change and therefore stop trying. Otherwise participants may feel that the SE process is not worth the effort needed to uphold it.

DESIGN PROBES:

The two core ingredients that make room for feeling personal growth include reflection questions embedded in the process, as well as check-in meetings (see following page). What are other ways to spark self-discovery? How can participants be aided in self-reflecting and discovering root causes of the issues they are tackling? How can self-experimentation contribute to the feeling of personal growth?

"The end goal of course is improving myself... learning about myself, finding out about myself, not necessarily with an end goal of changing but learning as a first step towards being a bit more aware of what I'm doing."

- Participant 2, SE phase 2 closing Interview

It is confrontational and but at the same time, it really forces you to reflect on what you're doing and try to identify root causes and things that you can change in your life so that is nice.

- Participant 2, SE phase 2 check-in Interview

Fig. 46.

Key Ingredient:

PROMPTING REFLECTION

Prompting participants to reflect by asking questions about barriers, enablers, and personal learnings was seen as one of the most valuable aspects of the prototype. Giving participants space to note down the reflection is also important; and some participants who felt they did not have enough space to write, started journalling.

"This little section saying "What did I learn about myself?" I really liked that. And so, even if I wasn't interacting with the prototype physically, I was thinking about the question that it was asking of me."

- Participant 1, SE phase 2 Check-in Interview

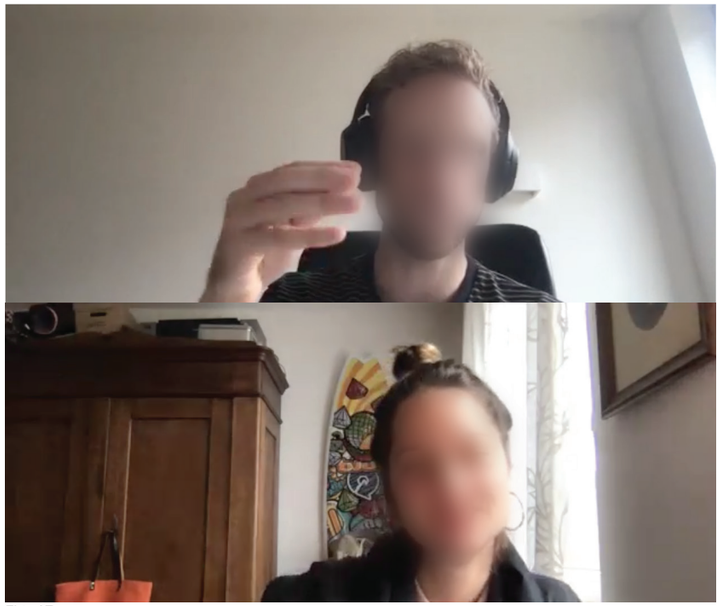


Fig. 47.

Key Ingredient:

CHECK-IN MEETINGS

The biweekly virtual check-in meetings conducted as part of the study were rated as highly influential to the SE process by participants. They helped participants articulate learnings and become aware of their own growth and progress. The standing appointment also created urgency, and helped participants follow through with the interventions.

"The meeting that we had last time was nice for me to put my thoughts out and even now, it kind of feels like you're speaking to someone that is there by your side and is kind of getting to know your thought process and what works."

- Participant 2, SE phase 2 Check-in Interview

Core Need/Value:

I NEED TO BE RESILIENT TO SET-BACKS

A natural part of self-experimenting is also coming across interventions that do not work. Participants that started the experience with a set-back, in that they struggled to change their behaviour in a desired way, naturally felt frustrated. Self-experimenters value a mindset that creates resilience to push through these frustrating experiences. Participants say that a must-have for prolonged self-experimentation is the right frame of mind to deal with set-backs along the way. They described the right mindset to be one that is "comfortable with failure" to "have the willingness to fall and get back up" and to seek "progress not perfection" (SE phase 3 analysis).

RELATED PITFALLS:

If participants are not resilient to set-backs, they may quickly become frustrated and demoralized to continue their efforts.

DESIGN PROBES:

The three core ingredients found to help foster the right mindset for SE include creating room for change and adaptation, introducing elements made to be modified, and diverging on interventions to have back-up plans (see following page). What are other ways to foster a resilient mindset? How can design celebrate failure? What are ways to fasten the transition between encountering something that does not work and trying something new?

"[A must-have is] letting yourself be comfortable with failure. you're not going to get it right the first time, but that's okay."

- Participant 3, SE phase 3 closing interview

"And there might have been a bit of frustration, let's call it, after you put so much effort and you do not see that the improvement is substantial... so I do feel that maybe I disconnected a bit more from the prototypes over time by seeing that."

- Participant 2, SE phase 2 closing Interview

Fig. 48.

Key Ingredient:

MADE TO BE MODIFIED

One element that helped people get in the right mindset for SE is that the materials were made to be modified (using whiteboard foil and dry erase markers). Being able to erase and rewrite goals, interventions, barriers indicated a space for change, and at a higher level – growth or evolution over time. Although some participants preferred not to cover up their past writing, the malleability of the prototype helped foster the mindset that it is OK to make mistakes.

"I started to notice the value of being able to erase things, so, when I reflected on something I did it more often and then, when I did I used the instruction set to make it more concrete."

- Participant 5, SE phase 3 Closing interview

Fig. 49.

Key Ingredient:

MALLEABLE GOAL

A key component to explorative SE is that the goal itself is changeable. Knowing this and reflecting on the suitability of the goal, helped participants discover their "actual" goal or issue more worthy of pursuit.

"When setting the goal, I need to know that the goal I set might not be the actual goal. I might discover other goals that are still on the same path."

- Participant 1, SE phase 3 Closing interview

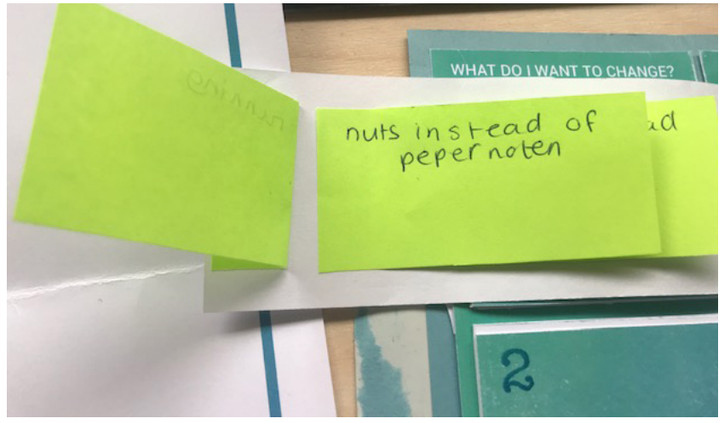


Fig. 50.

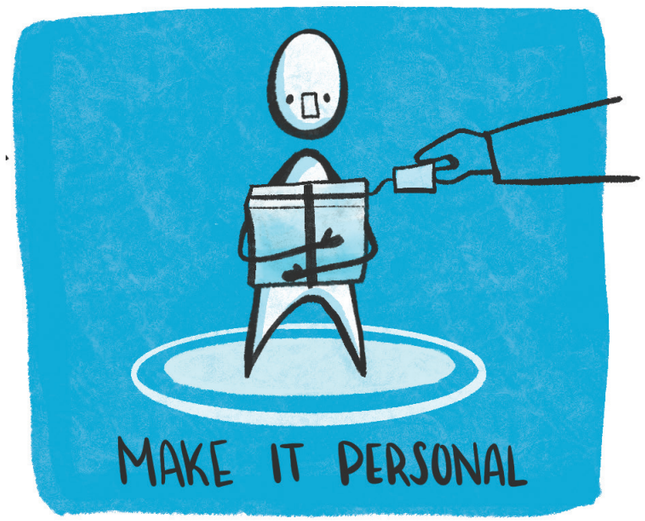
Key Ingredient:

DIVERGE ON INTERVENTIONS

Having to come up with multiple interventions at the beginning was perceived as extremely helpful, as when one intervention failed, it provided an immediate alternative. This is important for keeping up motivation and momentum, as well as shaping the mindset that there is more than one way to reach the goal.

"I think it was nice to that it sort of forced me to collect several examples for interventions that I could try. It made me look a little bit beyond the seasonal calendar."

- Participant 5, SE phase 2 Check-in Interview



Core Need/Value:

I WANT IT TO FEEL PERSONAL

Many participants valued the “personal feel” of the prototype which contributed to the overall effort they put into the self-experimentation. Having a physical prototype was important to most participants and led to forming a personal attachment with it and the process it facilitated. Personalization was highly valued in all attributes, as self-experimentation is a highly individual process. The aesthetics and personal feel of the prototype also influenced the self-worth participants placed on their behaviour change efforts.

“And then the attention to detail and the appearance of the prototype. I mean, it’s beautiful... It feels like this beautiful like scrapbook almost and it’s made, with care... I don’t feel judged by it because it feels like it’s mine. It feels like a journal or diary.”

- Participant 1, SE phase 2 Check-in Interview

RELATED PITFALLS:

If the personal feeling is lacking, participants may feel detached from their self-experimentation efforts or the tools that facilitate it. The tools may be perceived as irrelevant, and be ignored, leading to a less successful SE experience.

DESIGN PROBES:

The four core ingredients found to help create a personal feeling is having a physical, tangible tool, that is personalizable, of high fidelity and allow hand-written interaction (see following pages). Without hand-crafting each tool (as was done with these prototypes), how else can a personal feeling be conveyed? How to create room for personalization? How to make space for creativity?

Fig. 51.

Key Ingredient:

TANGIBILITY

Participants expressed excitement about having a tactile, physical prototype. The tangibility and resulting interactions helped some participants feel attached to the prototype, describing it to be “like a personal scrapbook” or “journal” they liked to engage with.

“I’ve spent a lot of time with it and writing in it and using it to have these kinds of conversations with myself. I feel attached to it. You know, like this is my little Mental Health Journal. I want to keep it. It’s mine.”

- Participant 1, SE phase 2 Check-in Interview

Fig. 52.

Key Ingredient:

PERSONALIZABLE

With SE, each participant embarks on a highly individual quest to change a personal behaviour. Therefore tools should be personalizable to cater to the variety of goals, interventions and contexts. The tracking tools, for example, were kept abstract enough to be used for a variety of interventions and each participant found their own way of utilizing and filling the empty windows.

“ I like is the fact that I can write on things and that I can make it my own. Like for example, the small drawing in the [windows].”

- Participant 5, SE phase 3 Check-in Interview

Fig. 53.

Key Ingredient:

HIGH FIDELITY

Many participants remarked upon the attention to detail in the prototype, and how it affected the personal worth they attributed to their behaviour change quest. Choosing high quality, textured paper, for example, makes participants feel a higher significance of their behaviour change efforts.

"I feel like this prototype has been crafted with care, which means that I care more about my own goals through that... the quality of the prototype goes hand in hand with how I see my efforts in a way."

- Participant 5, SE phase 3 Closing Interview

Fig. 54.

Key Ingredient:

WRITING BY HAND

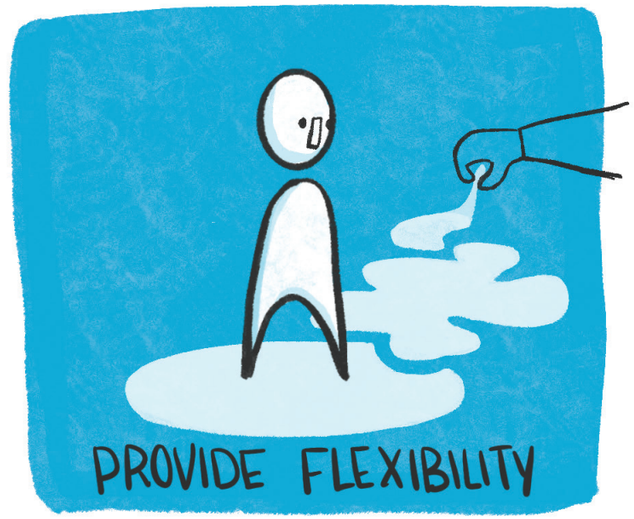
Having a physical prototype also afforded participants to write down their commitment and reflection by hand. Many later noted that the process of writing instead of typing helped them feel more attached to the commitment made, and helped structure their thought processes.

"because of writing everything down. You get a clear vision of what you want. And I think that's why this really also works for me."

- Participant 4, SE phase 2 Check-in Interview

I like to write, rather than typing So maybe it's better because when I'm writing, I structure my thoughts.

- Participant 1, SE phase 3 Closing



Core Need/Value:

I NEED TO BE FLEXIBLE

A reoccurring theme throughout the SE attempts, was participants valuing flexibility and the adaptability of interventions. If interventions or goals are not flexible to some extent, they are easily broken, or given up upon as they become incompatible with the variable day-to-day life. An SE tool that facilitates the setting up of adaptable interventions thus paves the way of compatible solutions.

RELATED PITFALLS:

If the interventions lack flexibility, participants will find it difficult to make them compatible with the variability of daily-life. Similarly, if the tool does not provide flexibility, it may be deemed less usable.

DESIGN PROBES:

The two core ingredients used to cater to the value of flexibility were a probe to help create a second, more flexible goal, and in the physicality of the prototype, keeping it portable and displayable in different contexts (see following page). This value was left quite unexplored in the prototypes. How to provide flexibility? How to facilitate the setting up of adaptable interventions or goals? How to keep an SE tool usable in a variety of scenarios?

"This week I had a yearly evaluation at work. it was a very rough week for me, very stressful... and so I feel that my tracker doesn't really understand that and it just pushes data exactly in the same way... It should be something that is understanding and is flexible towards my days."

- Participant 2, SE phase 2 closing Interview

"I actually have two time slot. So in the morning and in the evening. So if the morning one doesn't work out, then I already have a backup one planed."

- Participant 3, SE phase 3 check-in

Fig. 55.

Key Ingredient:
ROOM FOR EXCEPTIONS

For many participants it was important to create room for exceptions, or alternatives for interventions, as life often comes with a few curve-balls. A tool that helps users create adaptable interventions, or include “jokers” when needed, can help create a more realistic goal for implementation. This gives participants more flexibility and ultimately helps keep up motivation over time.

“Sometimes I was negotiating with myself. I was wishing for like something like a joker.”

- Participant 2, SE phase 3 Check-in Interview


Fig. 56.

Key Ingredient:
COMPACT & PORTABLE

Being able to track progress “on-the-go” was also noted as a desirable characteristics by some participants. Therefore, having tools that are portable and allow participants to continue with their experiments during a location change for a few days/weeks, would help maintain the behaviour change efforts in situations that require flexibility.

“I like that some of these flippable checklists are smaller – so when I was staying at a friend’s place for three days instead of bringing this card I bring the smaller one..”

- Participant 1, SE phase 3 Check-in Interview

DISCUSSION OF 7 STARTING POINTS

the seven starting points are the result of the research through design process, and build on the insights gained throughout the project.
As these starting points were determined as a result of the prototype tests, and some insights only came out in the testing of the last prototype, the starting points are still underexplored. The key ingredients displayed here represent *possible* ways of addressing the underlying needs and values of self-experimenters. They showcase which ingredients from the created set of prototypes were valuable in creating a successful SE experience. They no not represent an exhaustive list of solutions, instead, they can serve as a starting point for designers designing SE tools in future projects.

The outcome presented here are strongly linked to the prototypes created and tested, as the prototypes served as a starting point for conversations. For example, participants reacted extremely positively to being given a physical prototype, which sparked conversations about how and why they valued tangible and personalizable tools in their endeavour. It would be interesting to see to what other values and needs can be uncovered through a different approach! Would creating a digital prototype have yielded similar results?

The presentation of the 7 starting points shows that their is a strong link between the uncovered values/needs of self-experimenters and the key ingredients for design artefacts. Additionally, there is a strong correlation between the 7 core values/needs and the other two lenses described in chapter 5.2. Figure 57 illustrates how the 7 needs can be mapped onto the phases of

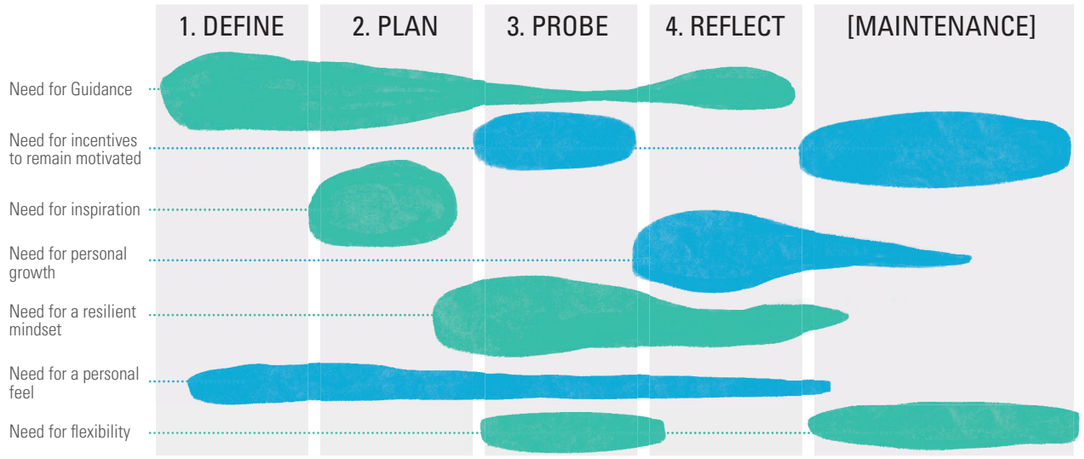


Fig. 57. Infographic of how the 7 core needs map onto the phases of the ESE process framework

the ESE process framework. This shows that some needs persist across all phases, while others are localized to a single moment in the process. Knowing how the needs are spread across the various phases can inform designers as to which starting point to use, depending on what phase they are designing. For example, if a designer is creating tools to help create a behaviour change plan, they should focus on meeting the needs of guidance and inspiration. Alternatively, if designing a tool with the goal of helping people maintain interventions over time, designers should focus on providing incentives that help keep people motivated as well as meeting the need for flexibility. Similarly, this overview can show designers where participants are most likely to experience pitfalls, if tools fail to meet their needs.

The following chapter will take a closer look at the main pitfalls participants encountered in the three phases of self-experimenting. The seven starting points already link to possible pitfalls that *may* ensue if needs are not met. However, the next chapter will indicate which pitfalls were actually observed as a result of the three self-experimentation interventions.

5.4 Pitfalls of Explorative Self-Experimentation

Through the many interviews conducted as part of this project's research and design process, several pitfalls were discovered. These pitfalls represent moments or events that cause participants to feel demotivated or unsuccessful in their efforts to change their behaviour.

Fig. 58. Pitfalls of self-experimenting

1. Lack of clear goal

When participants set themselves a behaviour-change goal that is too broad or too vague, it leads to demotivation to maintain experimenting down the line. Reasons for this can be that an unclear goal makes it difficult to measure success and see one's progress. When asked how successful their intervention was each week, participants who formulated unclear goals never indicated a high score, even if they mentioned having accomplished a lot. One participant reflected on the subject as follows: "Yeah, so the goal was really broad: improve my posture. And I think that was too broad to think of good interventions. So I just picked something I just started to do some things, but I feel that I should also have done a lot of other things because otherwise it's not going to work." (Participant 2, SE phase 1 Closing interview)

Design opportunity to avoid the pitfall: This pitfall can easily be circumvented by experimenting with different goal setting strategies. For example, by setting a behavioural goal instead of an outcome goal. Or by creating specific and realistic goals following the SMART goal method (Genewick, 2020).

2. Lack of regular trigger

As self-experimentation for behaviour change takes place over extended periods of time, it can occur that participants simply forget about their goal or intervention, and as a result fail to maintain it. This usually happened in the last two weeks of the four week studies. Participants were no longer hyper-aware of their goal or intervention, and sometimes simply forgot to do it. As participant 5 notes “I checked in with it occasionally, but not that much. And then in the second week, I started to just kind of forget about it a little bit...” (SE phase 2 Check-in interview). Another participant admitted “I never used the heart-rate monitor during an exercise, so I totally forgot about that intervention.” (Participant 1, SE phase 1 Closing Interview)

Design opportunity to avoid the pitfall: various triggers can be used to help people stay reminded of their goal and/or intervention over time, such as just-in-time notifications (Lee et al., 2017), visual cues placed in prominent place, etc.

3. Lack of Inspiration

A natural scenario in the process of self-experimenting is finding an intervention that is not a good fit, and does not have the desired effect for the participant. In this case, it can occur that participants stick with their fruitless intervention (default bias) and continue hoping that the outcome improves. When asked why, one participant mentioned not knowing what else to try. “I would like to be confronted right now but also inspired to try things that I haven’t tried. So that would be nice. I feel I’m kind of tired with this (intervention). I’ve used this (Fitbit) before. It hasn’t really worked in the past and is not working again. And so it would be nice to see other ways of trying to change my behaviour” (Participant 2, SE phase 2 Check-in interview)

Design opportunity to avoid the pitfall: It is a cognitive strain to think of new approaches in moments of demotivation from unsuccessful interventions. Providing inspiration, through creative facilitation or through concrete suggestions can be one way of tackling this hurdle.

4. Lack of actionable translation

In the process of self-experimenting, all participants reflected about their learnings, including barriers and enablers for their behaviour change quests. Although participants reported having valuable learning about personal tendencies, and what does or does not work for them, it proved very difficult to turn these learnings into actionable improvements. This can lead to frustration and demotivation as participants feel they cannot overcome the ever growing list of barriers. “I did a lot of reflection, but it wasn’t that actionable. It wasn’t that supportive. So at the end of the day it was just me experimenting and trying things that maybe didn’t necessarily work” (Participant 2, SE phase 2 Closing interview)

Design opportunity to avoid the pitfall: Perhaps one way to overcome this pitfall, is to link easily adaptable behaviour change strategies to personalities or other easily recognisable tendencies. For example, using factors of the “Susceptibility to Persuasive Strategy Scale”. Providing inspiration (as mentioned in point three) should be done in an actionable way, with concrete examples.

5. Lack of perspective

Self-experimentation, when encountered with the many difficulties of trying to change ones health behaviour, can lead to participants feeling demotivated and frustrated. As one participants explains: “There might have been a bit of frustration, let’s call it, after you put so much effort and you do not see substantial improvement... just a little bit of improvement. So I do feel that maybe I disconnected, a bit more from the prototypes over time by seeing that.” (Participant 2, SE phase 2 Closing interview)

Design opportunity to avoid the pitfall: A fluctuation in motivation is natural, however, this pitfall shows the importance of creating the right frame of mind to embark on a prolonged self-experimentation journey.

6. Lack of time or mental space

Self-experimentation requires a high cognitive workload. If one does not have the time or mental space to set-up the experiment or reflect about the outcomes, the method won’t be utilized. “If you don’t have either time or mental space for it then I guess... normally, I would be able to, but I was like working from eight until eight yeah then there’s just no time to start self experimenting.” (Participant 4, SE phase 3, closing interview)

Design opportunity to avoid the pitfall: Applying the method of SE is always going to take some time and mental space. But designers can look at how to reducing the cognitive load needed to engage in SE as much as possible through quick-guides, and high usability of tools for example.

7. Lack of appeal

As soon as self-experimenting feels too much like work, participants will disengage. The process needs to be driven, at least in part, by intrinsic motivation. Participants also noted the importance of the physicality of the tools to keep SE appealing, as they were spending a lot of time on screens and apps: “I have total app fatigue, like just the thought of opening another app. I just can’t do it.” (Participant 3, SE phase 3, Check-in interview)

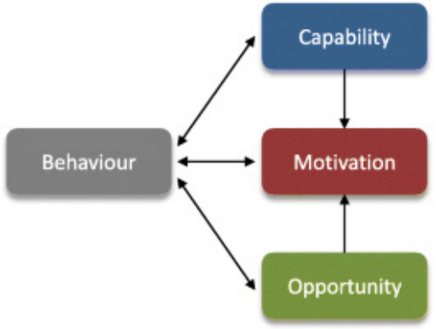
Design opportunity to avoid the pitfall: Introducing playful elements into the process or the tools can help avoid SE feeling like work. I found that choosing mediums that are not associated with work can also be extremely effective: for example, by creating a physical prototype, participants were not using the computer to engage in SE, the device home-office workers strongly associate with work.

DISCUSSION

These pitfalls do not comprise a complete list, but indicate some of the more common reasons why a participant may struggle with self-experimentation. When encountering one or more of these pitfalls, the participants described a tendency to relapse into old behaviours. For example, if a participant could not think of new interventions to try, they stuck with the old one, despite having observed that it is ineffective. Or when forgetting their intervention, participants resorted to performing their usual behaviour, in many cases doing nothing instead of their planned yoga session for instance. This tendency can be explained with the default bias, also known as the status-quo bias (Kahneman, 2012).

Essentially, the pitfalls show what may cause self-experimenters to “relapse” in the TTM stages of change (DiClemente, 2007). A correlation can also be observed between the pitfalls and the processes of change in the TTM. For example, the pitfall lack of perspective can be an indicator that “dramatic relief” is not setting in, or the pitfall lack of actionable translation shows that participants cannot come up with solutions for “self-liberation”.

One underlying theme that many of these pitfalls have in common, is the loss of motivation, a key factor in changing behaviour. This is well explained by the COM-B model (see figure 59), which states that in order for a behaviour to take place, the capability, motivation and opportunity to perform it must align (Michie et al., 2011). Pitfalls 1 and 5, lacking a clear purpose and feeling frustrated due to lack of perspective, can be associated with an inhibition of reflective motivation. The loss of motivation then leads to the non-performance of the behaviour. Pitfalls 2, lack of a trigger, falls into the “physical opportunity” category of the behaviour change wheel. Lacking a trigger, thus lacking a prompt or opportunity to perform the behaviour also leads to non-performance. And finally, pitfalls 3 and 4, having a lack of inspiration of what to do next, or a lack of knowledge how to translate learnings into actionable next steps, is a lack of psychological capability. The COM-B model thus helps explain why these pitfalls hinder the maintenance of the behaviour or the process of self-experimenting.



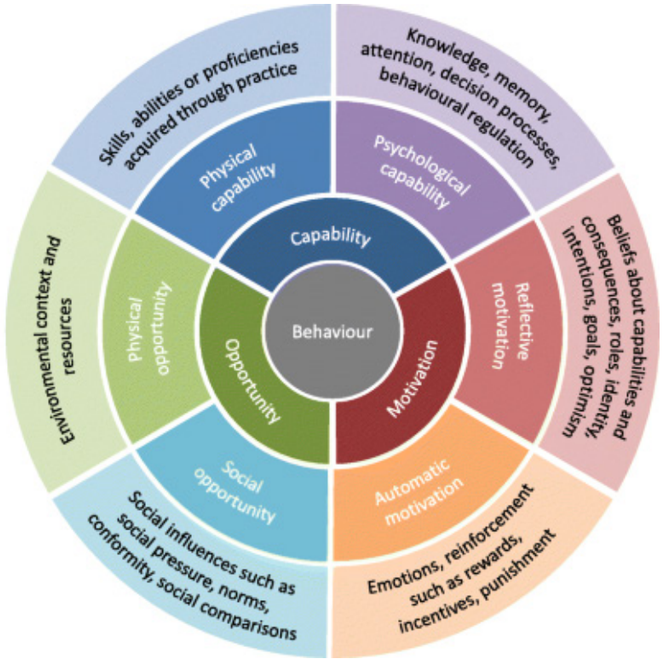


Fig. 59. COM-B model (McDonagh et al., 2018)

In conclusion, the pitfalls presented here show the prominent reasons discovered of when any why self-experimenters may fail to maintain their efforts to change their health behaviours. Being aware of these pitfalls offers designers additional starting points for designing SE tools.

5.5 **Discussion**

This chapter looked at answering one of the core research questions of this project: How can design facilitate individuals to self-experiment? The RtD process yielded both very concrete answers in the form of key ingredients found in the design prototypes that were considered helpful by participants; as well as more transcendent concepts from which to approach the challenge. These were presented as three lenses from which to tackle facilitating self-experimentation: (1) designing for the ESE process, (2) designing for different scenarios or stages of change and (3) designing for the underlying needs and values of people trying to change their health behaviours. As part of this third lens, I presented 7 concrete starting points for designers to facilitate self-experimentation, linking the underlying values and needs to key ingredients design can provide. Finally, this chapter also presented the pitfalls of self-experimenting that designers can strive to overcome.

The compilation of these five outcomes aspire to answer the research question of how design can facilitate SE: Designers can provide guidance through the process, designers can help initiate SE, help people maintain their efforts over time to find something that fits, or help turn fitting solutions into habits. Designers can cater to needs and values by providing guidance, incentives and inspiration over time, by making room for personal growth and flexibility, fostering personal attachment and by forming a resilient mindset.

In designing for SE it has become clear that a holistic approach must be taken. First, in regards to the process – SE is composed of several sub-activities. Although it would be easier to focus on facilitating one of these sub-activities, for example goal setting, tracking your process, evaluation and reflecting; only by stringing them together to they amount to self-experimentation. Also I would suggest using combination of the lenses in the design process, as for example, a tool that simply guides participants through the phases of the framework may miss out on meeting some core needs: such as providing incentive over time.

From the research and design process it became clear that there is no *one* right way to facilitate SE. First, people have different values, needs, personalities and therefore respond differently to the same stimuli. Just by testing with 14 participants, it is already clear that SE would have to be facilitated slightly different for each one: some prefer structure, others prefer a freer form of exploration; some value regarding it as a solitary process, others prefer to engage in SE in groups; some are looking to make small, incremental steps, others are looking to make big changes as quickly as possible. Although the core idea of experimenting with interventions remains, there are a multitude to ways to guide people through this process.

The following chapter will present the final prototype design, to present a concrete example of how a design artefact can incorporated these findings.

06
The final Prototype

This chapter presents the final prototype design made for the third self-experimentation intervention. It serves as a concrete example of how a design artefact can incorporated some of the main findings presented.

Presenting the final Prototype

This chapter will present the final prototype and explain the design decisions that were made. It will illustrate how behaviour change techniques can be integrated into the design of self-experimentation tools.

The main purpose of this prototype as opposed to its predecessors, was to not only present tools to initiate the process, but to help individuals maintain self-experimenting over time i.e. to keep the ball rolling until a fitting intervention is found (see design lens 2, chapter 5.2). In order to achieve this goal, the prototype focused on presenting the self-experimentation process as an iterative cycle through the design and layout of the instructions on an infinity flyer. It also included tools to provide self-experimenters with inspiration for interventions and incentive to help them remain motivated over time (see starting point 2 and 3, chapter 5.3).

The design goal

To facilitate individuals to maintain self-experimenting with health-behaviour interventions over time in a playful way

Fig. 60.

The package sent to participants included a cover letter, an envelope with a feedback form, an interactive infinity flyer with instructions, a whiteboard marker, a set of inspiration cards, packages containing a tool for visual tracking, a stand made of wood, and a package containing a visual trigger for the goal.

CYCLICAL DESIGN OF INSTRUCTIONS

The cyclical design of the instruction set in the form of an “infinity card” creates a mode of interaction that embodies the iterative and endless quest to changing ones health behaviour. The card can be unfolded infinitely and cycles through four phases of self-experimentation:
Phase 1 DEFINE: What do I want to Change?
Phase 2 PLAN: How will I tackle this?
Phase 3 PROBE: How will I check-in with myself?
Phase 4 REFLECT: What did I learn?

This set-up of the instructions should encourage participants to iterate on their experiments, and thus to maintain their efforts over time. The text fields are covered with a plastic foil, and the toolkit comes with a dry-erase marker. This affords the participant to reuse the instruction set by erasing and adjusting their entries with each cycle.

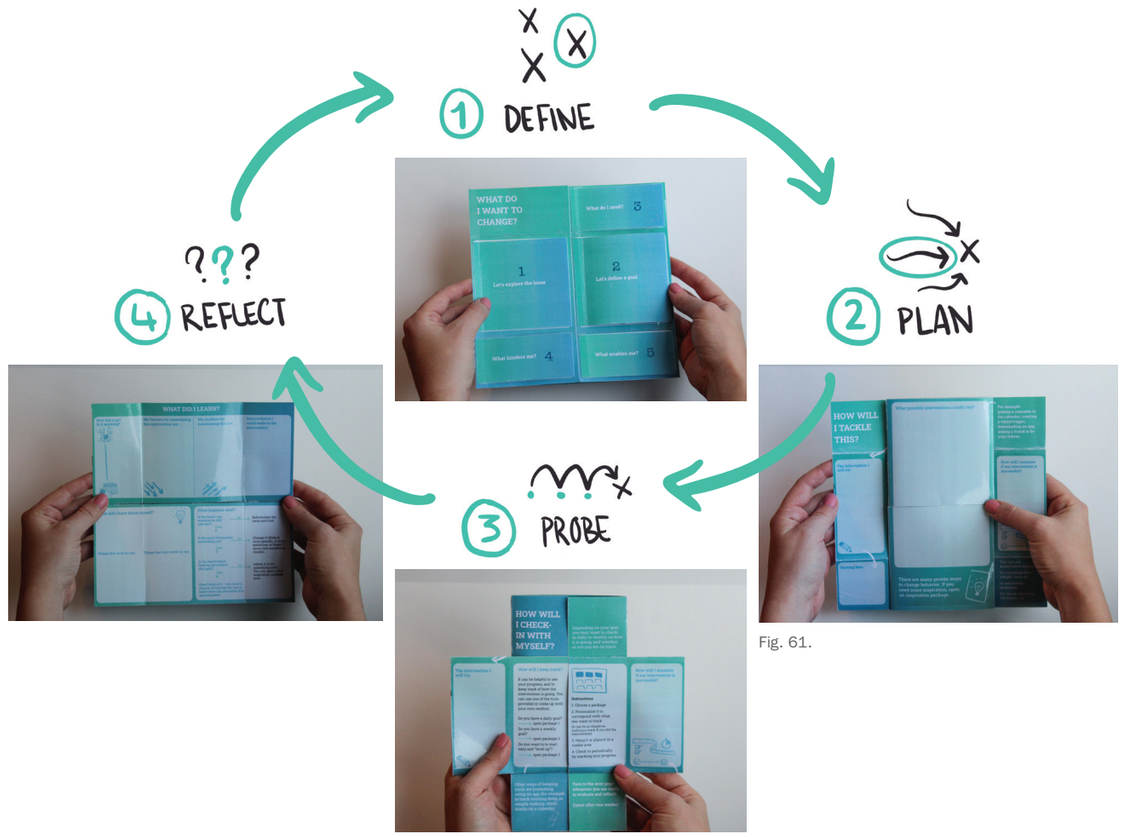


Fig. 61.

A STEP BY STEP GUIDE

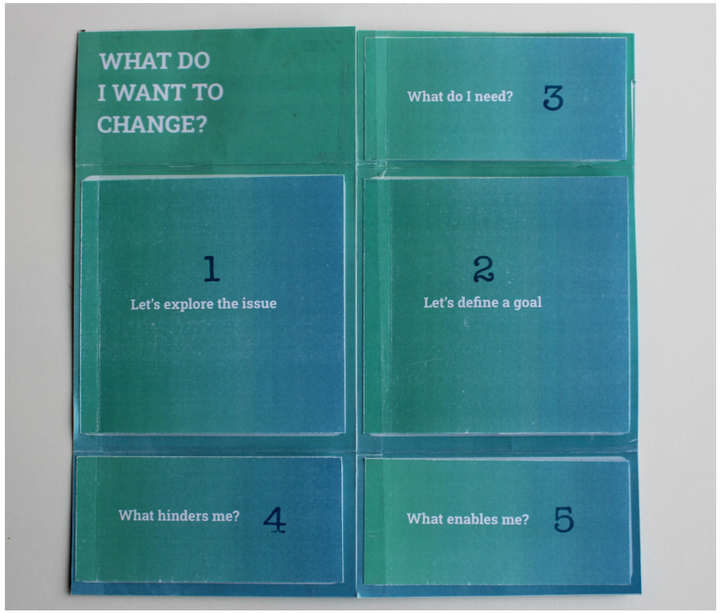


Fig. 62.

The Instruction flyer leads participants step-by-step through the Explorative Self-experimentation process. The first page is dedicated to phase 1: Defining what one wants to change. Using open questions in combination with tips and examples, participants are guided through 5 steps to reflect on the issue they wish to address with self-experimentation, to define a behavioural goal and finally, to define requirements, barriers and enablers that may hinder and help them achieve their goal. By going through these steps, participants are already exposed to proven behaviour change techniques.

Fig. 63.

Addresses the need for guidance

Behaviour change technique:
Setting behavioural goals
In phase 1, participants are encouraged to define a behavioural goal. It is the natural starting point of self-experimenting and an integral part of the process. Goal setting, specifically the setting of a behavioural goal, is a proven behaviour change technique listed under “goals and planning” of Michie et al.’s taxonomy (2013). The prototype provides instructions on how to formulate SMART goals, which are specific, measurable, actionable, realistic and timely. (Genewick, 2020)

Fig. 64.

The second page of the flyer is dedicated the phase 2: creating a plan to tackle the goal defined in phase 1. The majority of the space is given to brainstorm interventions with the help of the inspiration packages provided (figure 67)
Participants should then choose an intervention to try out, along with a starting date and how they will measure, or track their process.

Behaviour change technique:
Action planning
In completing phase 2, participants are engaging in “action planning”, another proven behaviour change technique (Michie et al., 2013).

Fig. 65.

In phase 3 participants are actively trying out their intervention and the instructions help participants define a way to regularly check-in with themselves. As tracking needs to be tailored to the intervention, goal, success metric, and possibly the participant’s personal preferences, this section offers different techniques for participants to keep track both through provided tracking packages and tips for alternative techniques.

Fig. 66.

The final page of the flyer leads participants through phase 4. It contains a series of questions to first, evaluate the last conducted experiment, and then to reflect about personal learnings and next steps. In the evaluation, participants are asked to reflect on barriers and enablers for maintaining the intervention in the future. Considering these reflections, the participant can then improve upon their intervention and start a new iteration. The final section is a decision guide to answer the questions “what happens next?”. With a series of questions, the user can determine if they should simply adjust their intervention, or go back to refining their goal and issue.

Addresses the need for guidance and personal growth

Behaviour change technique:
Problem Solving
By asking participants to reflect about barriers and enablers to maintaining their intervention/desired behaviour, participants are made aware of influencing factors and engage in “problem solving” (Michie et al., 2013), by trying to find interventions that overcome certain barriers or make use of certain facilitators.

Behaviour change technique:
Discrepancy between current behaviour and goals
By reflection on how well participants were able reach their goal they naturally identify if there is a discrepancy between their behaviour and their set goal. Drawing attention to this discrepancy is another behaviour change technique classified by Michie et al. (2013).

Fig. 67.

INSPIRATION CARDS FOR INTERVENTIONS

Three sets of inspiration cards were included, to help participants explore possible interventions to try out in phase 2 of the process. Each card has two sides. The blue side contains a quote along the lines of “what works for me is...” The purpose of the quote is to highlight individuality, and that each person needs to find what works for themselves. Furthermore it provides a very actionable example, or success story, of what someone has done. Some of the quotes were taken from past participants of SE phases 1 and 2, others were made up to capture the gist of their learnings. The backside of the each card displays a proven behaviour change technique inspired by the Cards for Change (Byrne-Davis, Bull, & Hart, 2019) including a short description as well as a prompt to get the reader thinking about how to apply it to their own behaviour change goal.

Addresses the need for inspiration

Behavioural bias/principle:
Curiosity Gap
The cards are packaged in three sets to heighten anticipation and allow participants to open one set at a time. This is a way of introducing novelty and variety over time, and provide incentive for participants to continue by engaging their curiosity.

Fig. 68.

GOAL DISPLAY

The toolkit includes a laser-cut paper frame with removable pieces of paper inside. Upon receiving it, the frame displays the instructions “write your goal here and place it somewhere visible”. The toolkit also provides a wooded stand to encourage participants to display their goal.

Addresses the need for motivation and personalization

Behaviour change technique:
Restructuring the physical environment by adding cues
This goal frame can act as a visual trigger to remind participants about their goal and intervention in daily life. By displaying it, participants are adding a cue to their physical environment, which is a proven behaviour change technique (Michie et al., 2013)

Fig. 69. How participant 5, SE phase 3 displayed their goal.

Fig. 70. Daily tracking tool

MARKING PROGRESS: A VISUAL TRACKING TOOL

The toolkit provided three versions of a tracking tool in order to cater to different tracking needs. The purpose of this tool is to keep people motivated over time by (1) making progress visible and (2) celebrating small achievement. This is done through creating a satisfying interaction with the paper that affords participants to mark progress in a tangible and visible way while creating a small reward through sensational pleasure for checking-in on the process.

Due to the highly individual needs for tracking, this tool is kept abstract, without written indication for what each mark means. Each participant can attribute their own meaning to this interaction, and even add their own markings to the paper beneath. High quality colourful paper (300g) was used to create an aesthetic impression to help persuade users to display the prototype and attach a degree of value to it.

Addresses the need for motivation and personal growth

Behaviour change technique:
Self-tracking & Monitoring of behaviour
By using this tool, participants are observing and recording their behaviour, and are engaging in the proven behaviour change technique “self-monitoring of behaviour” (Michie et al., 2013).

The first tracking tool is designed for daily goals, as it contains 28 flaps in four rows of seven (figure 70). These can be interpreted as four sets of weekdays, allowing the user to track their behaviour for four weeks. A second tool is provided for weekly goals (figure 72). It contains nine flaps to split a seemingly endless task into bite-size pieces. Provided that the participants makes a start on their goal, this tool relies on the completion bias, to nudge the user to fill in the rest of the card. The final tracking tool takes a slightly different approach by alluding to the principles of levels as known from games (see figure 71). This tool presents participants with small challenges, one harder than the last: starting very easy lvl 1 only requires doing the intervention once, Lvl 2 presents a challenge of four completions, level three increases this to 9, and level four raises it to 16. This tool tries to include a bit of novelty and variety over time by presenting the participant with different challenges, accompanied with varying colour-reveals in each level (blue, green, gold..).

Behavioural bias/principle:
Completion bias and Goal gradient effect
This tool triggers the completion bias, which compels people to complete a task once they have started it. By breaking the seemingly endless task into bite-size pieces it also triggers the goal gradient effect which increases Motivation as participants get closer to reaching their goal (i.e. completing the card)

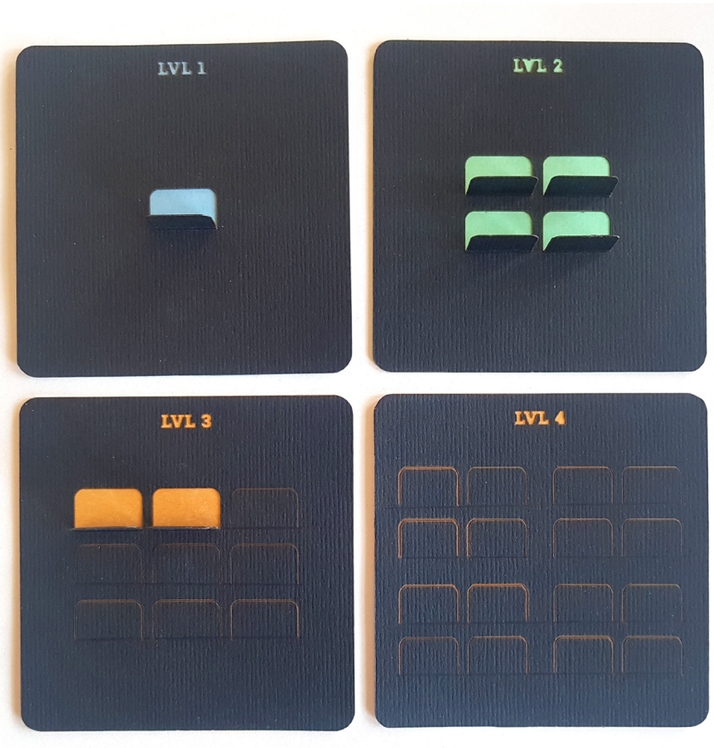


Fig. 71. Level tracking tool


Fig. 72. Tracking tool for weekly goals

CONCLUSION

The presented prototype was designed after having evaluated the second SE intervention phase. This means it embodies some, but not all insights gained and presented in chapter 5.3. The prototype nicely shows that several proven behaviour change techniques are integrated in the self-experimentation process (for example, goal setting and planning and self-monitoring of behaviour). Simply by engaging with this prototype, participants automatically are exposed to these behaviour change techniques. I hope that the elements contained in this prototype inspire future designs that hope to facilitate self-experimentation.

“I feel like this whole experience has changed my attitude towards my health. And with that in mind, my behaviour will definitely change.”

Participant 1, SE Phase 2

(Photo source: Participant 4, SE phase 1)

07
Discussion & Conclusion

This final chapter presents a discussion about what this this project can contribute through its results. It discusses possible next steps, a conclusion and personal reflections.

7.1 **Discussion**

This project worked towards closing the gap between individuals intending to change their health behaviour and actually doing it. The goal was to enable individuals who are motivated to change their behaviour, by facilitating self-experimentation with interventions. The intended effect being that individuals will find interventions that work *for them*, and through this establish a lasting effective behaviour change. The research through design project was lead by three main questions: What is self-experimentation and why is it needed? How can SE contribute to individuals achieving sustainable health behaviour change? And how can design facilitate individuals to self-experiment? This discussion will first look at what this thesis contributes to academia, design and society through the results it procured to answer these three questions, then the strengths and weaknesses of ESE will be discussed, followed by a critical assessment of the project approach and process in obtaining these results.

RESULTS AND CONTRIBUTIONS

The result of this project include the discovery of a new take on self-experimentation, one that is explorative, human-centred, and relies on intuition for evaluation over data. The need for this new approach was shaped by a context analysis, which uncovered the challenges people face who are trying to change their personal health behaviour. This novel approach to self-experimentation contributes to Academia, in that it builds on and explores limitations found in prior research on “quantitative” self-experimentation for behaviour change in the context of health by Phatak (2019a), Karkar et al. (2015), Lee et al. (2017) and Schroeder et al. (2018). This “explorative” take on SE differs fundamentally from the existing “quantitative” method in that it omits the key ingredient of a data-driven scientifically rigorous objective evaluation of the effectiveness of interventions, and instead harnesses the intuitive evaluation formed by a user’s lived experience. This explorative approach shows potential for overcoming some of the key limitations of quantitative SE, as it places user needs in front of the hitherto need for scientific rigour, and brings reflection of “what works” for individuals to new levels of self-discovery as evaluation is no longer tied to data collection. The results offer a new perspective on the importance of “objective evaluation through numbers” but forth by the QS movement (Wilson, 2012) to circumvent the human fallibility of subjective biases. Instead ESE supports the notion that the subjective experiences can be instrumental in making decision in the process of finding compatible interventions for changing one’s own health behaviours. We live in a world with rapidly evolving technological advancements, and in the information age it is possible to track almost anything from REM sleep to steps while running. As designers we are often encouraged to push technology as far as it will go, and find new innovative uses. I feel that in doing so, we often forget to ask if it is *necessary* and if technology *should* be applied. By taking a human-centred approach to look at the underlying needs and values of people trying to change their behaviour, a solution was found that caters to the same purpose as QSE: that of self-discovery, yet offers participants more meaningful outcomes.

Just because we now have the ability to track data on every aspect of our lives, should we?

Through observing 14 participants engage in Explorative self-experimentation over four week intervals, many insights were gained on what ESE can achieve. A set of 13 phenomena were observed that engaging in ESE effectuates, which were linked to existing theories and frameworks to show how ESE can contribute to helping individuals change and maintain their health behaviours. By using prominent theories in the field of behaviour change as bridging concepts, this thesis contributes to research in the public health sector. It presents first conjectures of how applying ESE could lead to individuals changing personal health behaviours, and as a result, how applying this method can have a positive impact, at both an individual and a societal level. For society this project helps bridge the intention-action gap countless people face when trying to change their personal health behaviour. When looking at Tromp and Hekkert’s model mapping the conflicting concern for social design (2019) (figure 73), this projects looks at resolving the conflict at an individual level, in order to reach the societal goal of improving population health. Explorative SE can contribute to preventing chronic diseases by helping individuals achieve their long-term health behaviour goals.

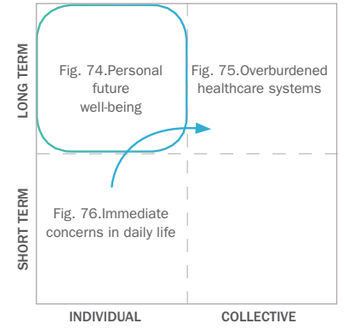


Fig. 73. Adapted model of Tromp and Hekkert’s (2019) conflicting concerns for social design model

The final results of this thesis include insights for how to facilitate explorative self-experimentation which came through an iterative process of designing self-experimentation tools and testing them with volunteers. Three lenses from which to approach facilitating ESE were derived including a presentation of seven starting points for designers based on insights gained on the underlying needs and values of self-experimenters. These starting points and uncovered design opportunities can contribute as inspiration to future design projects in the field of health behaviour change. The uncovered core aims, values and needs of self-experimenters can inform the designs of any intervention targeting individuals trying to change their health behaviours. Perhaps even future quantitative self-experimentation studies can make their process more user-friendly by adhering to the underlying needs and values. In addition, a process framework developed describing the key phases and activities involved in ESE can serve as a baseline for designers looking to facilitate self-experimentation.

STRENGTHS AND LIMITATIONS OF ESE

Explorative self-experimentation as a method offers individuals support to advance in the TTM stages of change from preparation to action and maintenance. It offers users a strategy to find interventions that work for them, that fit their personal preferences and context. It gives users an incentive to start working on a long-term goal and explore different possibilities of reaching it. And, perhaps most significantly, it contributes to self-discoveries. The ESE method therefore has very practical contributions to any individual who wishes to apply it.

A core strength of ESE is that it is a meta-strategy. Considering the complexity of behaviour change, in which every individual may respond differently to the same health-behaviour intervention, it is clear that there is no one solution that works for everyone. Applying ESE omits the need to design interventions that are suitable for everyone, as it essentially helps individuals find and adapts interventions that already exist.

A second strength of ESE is that in engaging in the process once, it shapes a mindset that can be applied over and over to change other behaviours. Participants who applied ESE to try and change one behaviour, reflected they would like to continue self-experimenting after the study is done to work on other behaviours: “There’s a lot of other different things that I would like to use self- experimentation with, like for eating one fruit a day or just taking a short walk or like there’s a lot of little things that I was thinking of.” (Participant 5, SE phase 3, Closing interview). It was also observed that participants engaged with the instruction materials very frequently in the first week, but then felt they had internalised the process enough to continue self-experimenting without it. When asked why, participants noted they did not need the instructions anymore, the process is easy to grasp. It appears that ESE can be quickly learned, and shapes a way of thinking that individuals can easily apply to subsequent behaviour change goals. This needs to be confirmed in future studies with a duration longer than four weeks.

Although self-experimentation shows great potential as a method to help individuals change their health behaviours, it also has it’s limitations: An overarching limitation of self-experimentation is that it is difficult to facilitate, as each individual is working on a personal goal, in a unique context, with varying opportunities, motivations and capabilities. Design solutions for facilitating self-experimentation must thus become generic! Provided tools can look at how to inspire easy-to-personalise behaviour change interventions, provide guidance and decision making tools to overcome aforementioned psychological capability barriers, motivate participants on a higher lever through framing of mindsets, facilitating the creation of motivating goals, or including general applicable rewards throughout the process. And although the physical environment differs for each participant, design solutions can include visual triggers, either physically or digitally, that are easy to place and adaptable to a large variety of contexts.

A second ever-present limitation of self-experimentation for behaviour change, is that it requires a high-cognitive work load. As psychologist Daniel Kahneman explains in “Thinking, fast and slow”, our minds operate using two systems: System 1 is our auto-pilot and operates automatically, quickly, and intuitively. System 2, on the other hand, is rational, requires effortful mental activities and can perform complex computations (Kahneman, 2012). These rational thought processes function much like a muscle in that they can wear out and become increasingly tired and non-functional over sustained use (Muraven & Baumeister, 2000). As self-experimentation relies on these processes, the high cognitive load can lead to exhaustion and risk for non-performance. As one participant remarked: “If you ask me why I won’t try something new or why I won’t continue to self experiment... I feel that there is too much weight that is put on me. Weight in terms of having to come up with anything.” (Participant 2, SE phase 2 closing interview). Another participant confirmed this saying “over time, I feel that there’s a lot of demand that it puts on me. So I have to come up with all these plans and I have to think about what works for me...” (Participant 2, SE phase 1 closing interview). What are ways providing the benefits of self-experimenting while reducing the cognitive work load?

LIMITATIONS OF PROJECT APPROACH AND PROCESS

One of the core limitations of this project, is that although it strives to examine the utility of self-experimentation in fostering long-term behaviour change in individuals, it was structured to encompass only one-month studies with participants. It is therefore difficult to draw conclusions on the matter, results may vary greatly over longer periods of self-experimentation. A follow-up study set-up over several months would go a long way to testing some of the conjectures procured through this thesis, and to come to more conclusive results.

Another limitation of this project is that the findings are based heavily on guided introspection (Xue & Desmet, 2019). Using introspection has many advantages in collecting rich data on the personal experience participants made in their four weeks of self-experimenting. However, with no other means of observing and collecting data, the limitations of introspection became more pronounced. Due to this study taking place in the isolated context of the COVID-19 pandemic, all of the user-research took place online, with interviews over zoom, and no chance for contextual visits. This means that nuances were lost, as I was relying heavily on the verbal accounts, with little means of personally observing the participants interacting with the prototypes.

7.2 **Next steps**

Throughout this Research and Design process, I saw numerous opportunities for further exploration. These are outlined here as possible next steps:

1. Diving deep into uncovered design opportunities

One of the main outcomes of this project was a compilation of design opportunities for facilitating Self-experimentation. This project managed to create a broad overview of different ways design can facilitate ESE, ranging from facilitating key activities of the process (for example aid in tracking the process, or aid in evaluating), to catering to core values and needs (provide guidance, provide flexibility, etc). A logical next step would be to dive deeper into these opportunities to further explore how to guide individuals through a fruitful ESE process. A personal recommendation would be to look at designing fun visual tracking tools, as these had a significant impact for self-experimenters and addressed multiple needs at once. They were also the element of all the prototypes that were interacted with most frequently, and some participants continued to use after the end of the study.

2. A toolkit for easy adaptation of proven behaviour change techniques

The final toolkit provided inspiration cards containing proven behaviour change techniques and examples of how to apply them. A next step would be to provide a toolkit that helps individuals apply and adapt these behaviour change techniques to their own goal and context. For example, one technique is to define a trigger; the final prototype delivered a frame that could be personalized and used as a visual trigger. By providing tools that help apply the techniques, participants have one less cognitive strain in the process of self-experimenting with interventions. Such a toolkit could include worksheets, guiding examples, and physical tools to use in one's context.

Fig. 77.

3. Taking a closer look at evaluating ESE effects on behaviour change

This study focused on the facilitation of ESE, but future studies could look at evaluating the effect of applying the method on individual behaviour. It would be interesting to gather data to be able to compare and contrast the subjective experience of SE with an objective measurement to better understand if intuition coincides with actual events. Although it is clear that evaluation happens intuitively, another question entirely is how correct this intuition is?

4. Looking at ESE in the long-term

To overcome one of the main limitations of this study, it would be good to follow up with a study that observes participant over longer periods of time (for example 6 months - 1 year) This would helps understand how ESE effects behaviour change in the long-run, and how pose new questions for the tools involved in facilitating such a drawn-out process.

5. Applying Explorative Self-experimentation to other areas

This study looked at using ESE to change personal health behaviours, but there are clear indications that ESE can be used to address other behaviours unrelated to health. For example, ESE could be applied to help individuals change behaviour to be more sustainable. A key factor to consider though, is that ESE relies heavily on intrinsic motivation, and so the behaviour change must clearly be in the personal interest of the individual.

6. Integrating ESE into public health systems

For ESE to ultimately help prevent the rise of chronic diseases at a societal level, it needs to be widely implemented. A next step would be to work with health professionals to uncover potential deployments of the methods. Where can the method best be integrated in public health systems? Where are possible touch points in which individuals are told they must change their health behaviour, and need more support to do so? By taking a system approach, potential touchpoints for introducing ESE could be derived.

7.3 Conclusion

This project set out to explore self-experimentation as a method for helping individuals change their personal health behaviours. A research through design approach was used to iteratively design and test tools that facilitate individuals to self-experiment with interventions. These activities lead to the discovery of a new take on self-experimentation, one that addresses the limitation of existing approaches and caters to the needs of people trying to change their health behaviours. This new approach was labelled “Explorative Self-experimentation” and differs fundamentally from the existing “quantitative” method in that it omits the key ingredient of a data-driven scientifically rigorous objective evaluation of the effectiveness of interventions, and instead harnesses the intuitive evaluation formed by a user’s lived experience.

From the results obtained, it can be concluded that Explorative Self-experimentation can contribute to individuals reaching sustainable behaviour change as it helps people take incremental steps towards a long term goal, through trial and error to find interventions that fit. It leads people to get to the heart of the issue, discover new perspectives, acquire new attitudes towards their own health and find support along the way.

Finally this research looked at how ESE can be facilitated and presents concrete starting points for designers. Designers can provide guidance through the process, designers can help initiate SE, help people maintain their efforts over time to find something that fits, or help turn fitting solutions into habits. Designers can cater to needs and values by providing guidance, incentives and inspiration over time, by making room for personal growth and flexibility, fostering personal attachment and by forming a resilient mindset.

There are still many aspects of ESE left to explore, and I hope that this project provides a solid starting point from which to launch these explorations.

7.4 Reflecting on the project

This final chapters will offer a reflection on my personal learnings and how well I achieved my academic goals.

HOW WELL DID I ACHIEVE MY ACADEMIC GOALS?

One main motivation behind starting this graduation project, was to learn more about how I can influence behaviour through design. Since all design is inherently persuasive (Tromp and Hekkert, 2019) I want to be more conscientious and deliberate in how I apply it. Through this project I was able to dive deeply into the subject of behaviour change, learn from existing models and frameworks and apply them directly to my project. In doing so, I was able to compile a personal toolkit for designing for behaviour change, including key literature resources, design for intent tools, behaviour change techniques, and an assortment of cognitive biases and principles useful to consider for persuasive design. I am grateful for attaining this new perspective and look forward to be able to apply it in future design projects.

Another personal ambition was to apply some of the methodological approaches I learned during my studies. I was able to practice a multitude of user-centric research and design methods, from context mapping, through creative facilitation, to prototyping and interviewing. Due to the COVID-19 pandemic, I learned how to adjust these methods to an online context, and now feel I have a better grasp on their application and limitations. I feel that I was able to surpass this academic goal, by adding a new approach to my methodological repertoire: the research through design approach. Prior to this project I had not engaged with this method, and would consider myself someone who thinks things all the way through before launching into “doing” or prototyping. So RtD felt extremely uncomfortable for me in the first weeks of the project, yet I quickly saw how effective it can be in yielding insights. In fact, it provided me with a lifeboat to navigate an unknown and complex field of behaviour change, and I have come to trust the method as a result.

Tips for other students:

When you are stuck in the abstract levels of a project, the act of designing can be extremely mobilizing!

Another ambition was to hone my analysis skills and practice zooming in and zooming out. This skill was especially important for this project to provide direction and meaning. Even though I struggled a bit at the beginning, I feel that I was able to achieve this goal. I managed to dealing with complexity of my topic, making sense of it and communicate the complex research finding effectively. Along the way, I learned a new analysis technique: the inductive thematic analysis, which I managed to apply in my final phases. Eventhough I feel that I achieved my goal of honing my analysis skills, the process made me realize the value of applying these techniques in a team, and the difference it makes to my confidence in the results.

PERSONAL LEARNING:

One thing this process has taught me is to embrace chaos and adjust my planning along the way. The uncertainty of the COVID-19 meant that plans had to be frequently adjusted, and I felt I improved my agile working style as a result.

Tips for other students:

Do not spend too much time planning things all the way through – the plan will have to change along the way.

One personal ambition that I had was to lose my fear of prototyping "imperfectly". I have to admit I still tried to keep my prototypes to a high standard, but I learned something interesting along the way: I learned more from the parts of the prototype that I had not thought all the way through, as imperfections and missing elements sparked important discussions on what was needed, or missing, and why it mattered. Going forward I will consider adding deliberate imperfections to spark discussions.

Tips for other students:

Create deliberate imperfections in your prototypes – it can spark discussions and reveal key insights!

One thing that I did not expect from this project, but that was a delightful surprise, is that I managed to change three of my personal health behaviours by applying the method of self-experimentation. From the interviews with participants I got inspired by some of the interventions that were tried out, and applied them to myself. I can proudly say that since two months I am now doing yoga 5 times a week, together with two friends via zoom. The simple intervention of making an online commitment to friends has helped me achieve a health goal I have failed to adhere to for years.

Another learning I would like to present is one that I have come to in the final weeks of the projects. One of the most difficult thing is not finding themes and patterns in research, but going back and un-learning those patterns. It is truly challenging to un-see certain patterns, but doing so can be rewarding in bringing findings together in improved ways. However, it is a fine line between going back and critically reflecting about assumptions that were made and second-guessing all decisions.

One last thing: I want to work in a team moving forward. For me, my passion for design is strongly linked to a collaborative working atmosphere, and I sorely missed this in the last months.

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09 Appendix

Appendix 1 **Exploring the Problem: process documentation**

In order to explore the topic of changing health behaviour through self-experimentation, I wanted to start by gaining a deep understanding of the problem. How do individuals perceive the challenge of changing their health behaviour?

MAPPING THE CONTEXT

A good way of getting a deep understanding of a context is through the method of context mapping (Visser et al., 2005). Although this method is usually applied to explore the context around a product use, its activities can be adapted to elicit important factors influencing any interaction or behaviour.

The main purpose of doing context mapping is to explore the problem space in order to understand the target group, their environment, their needs, wishes and experiences. The outcome of applying this methodology should help empathise with the target group, inform about key influencing factors, and inspire the direction of the impending design activities. (Visser et al., 2005)

For mapping the context, first a generative workshop was held with three participants with past experience in self-experimenting with health interventions. Second, a creative session with 20 students was conducted and finally, five interviews were conducted with target users. All three context mapping activities were guided by the following research questions:

- What are enablers and barriers for individuals motivated to change their health behaviours?
- What factors are important to consider when designing for individuals trying to change their health behaviour?
- What are the underlying values, needs and concerns of individuals trying to change their health behaviour?

This chapter summarizes the core context mapping activities that were conducted, and ends in a presentation of the key insights gained.

THE SELF-EXPERIMENTERS WORKSHOP

A 1.5 hour workshop was held with three members of the Pride and Prejudice consortium who each had prior experience with self-experimenting with health interventions. As this project is part of the Pride and Prejudice research efforts, these members represented a key stakeholder of the project, and presented a valuable opportunity to gain insights into past efforts with self-experimentation, as well as providing clarity for expectations and decisions that lead to the initiation of this project.

The workshop was set up to capture the participants past experience with self-experimentation as well as capturing the internal process that lead to the set-up of this project. In order to reach more tacit and latent levels of insights, Sanders and Stappers' layering of knowledge levels framework was applied (Sanders & Stappers, 2012). As can be seen in figure 78, the participants first shared what happened (layer of facts) and then marked highpoints and low points in this along this process (layer of valence). Finally participants were asked to explain why these high and low points were marked, to get insights into their needs and values.

Fig. 78. A screenshot of the online process map that was created by the three workshop participant

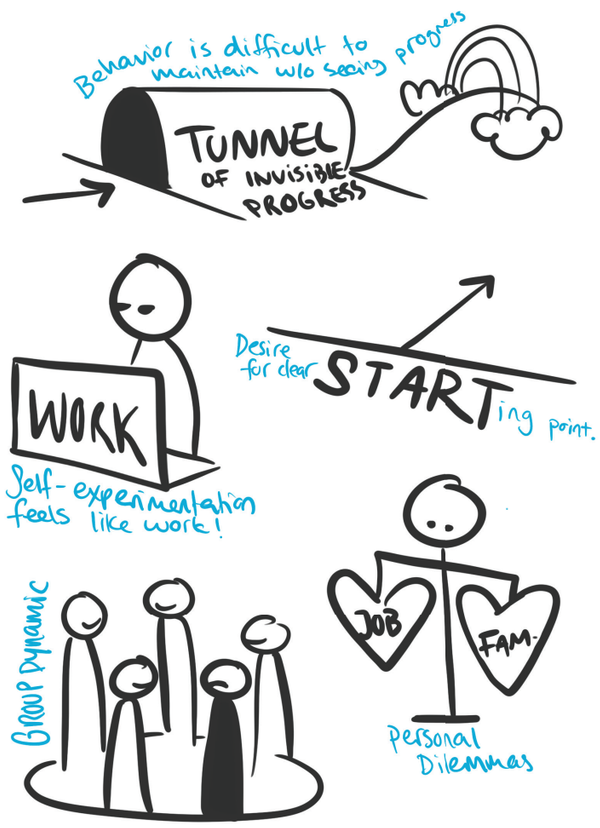


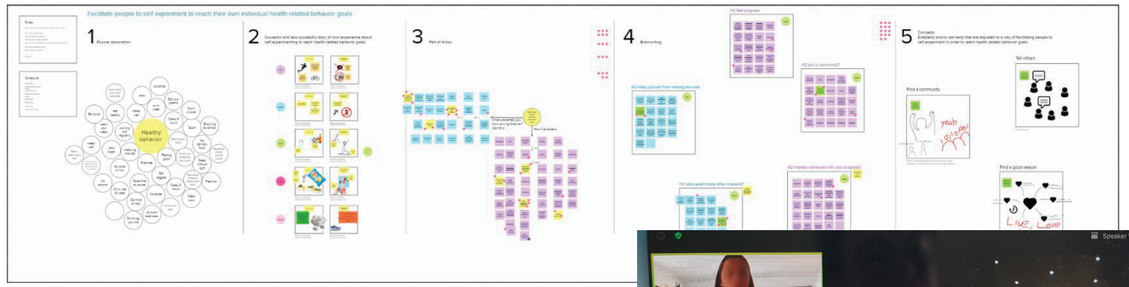
Fig. 79. Visual summary of main insights

Some of the key insights that resulted from this workshop are visualized in figure 79. The three top insights were: (1) participants expressed that behaviour is difficult to maintain especially at the beginning when one does not see progress or personal improvement. (2) Self-experimentation can feel like work, which is demotivating and can result in inaction. This was attributed to the fact that the tools used to facilitate this SE study included a word document with instructions and an Excel sheet to be filled out with data collected. (3) A great influencing factor was also group dynamic, as some participants thrived when experimenting in a group setting, while others were put out due to not wanting to share such a personal journey with others.

AN ONLINE CREATIVE SESSION WITH 20 STUDENTS

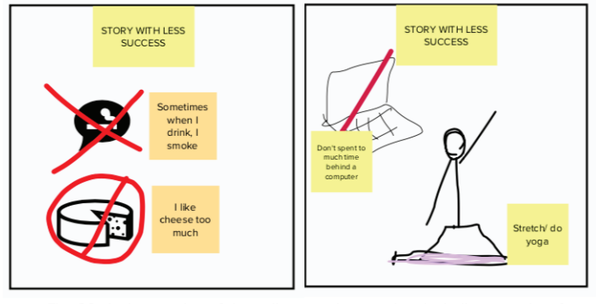
In order to explore the problem space further, an online creative session was organized with 20 TU Delft students and four creative facilitators (also TU Delft students who were briefed by me). These sessions were executed as part of an elective course "Creative Facilitation" in which students learn how to facilitate workshops for creative problem solving. The students were given the following problem statement: "How to facilitate people to self-experiment in order to reach their individual health-behaviour goals?" The facilitators were briefed that the primary purpose of the session is to understand the participants' personal experiences or failed attempts to change their health-behaviour. As the problem owner of these sessions, I could spectate the discussions and get inspired by how the participants framed the problem and the generated concept directions.

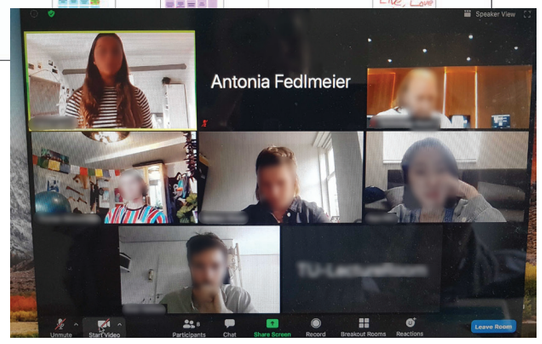
The outcome of the 2-hour creative sessions were 11 concepts presented by the four student groups. Furthermore, the generative process of getting to these concepts lent great insights into the barriers and enablers encountered by the attending students in achieving their own behaviour goals. As can be seen in figure 80, the participants relayed personal success stories, as well as less successful experiences of changing health behaviours. They used various creative methods, including flower associations, personal analogies, “How-to” questions and brainwriting to explore the problem, collect barriers and enablers, and come to three design concepts.



Success stories

Less successful stories





What prevented you from solving it earlier? (barriers)

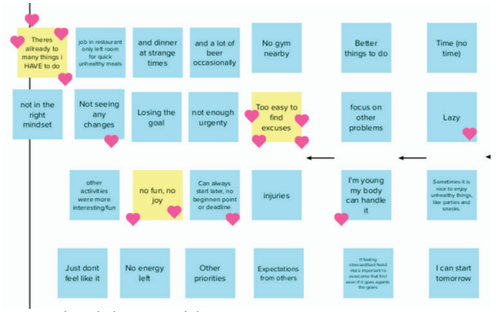


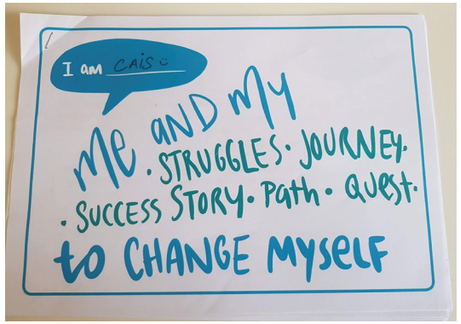
Fig. 80. An impression of the online creative session, including out-takes from the generated workshop materials

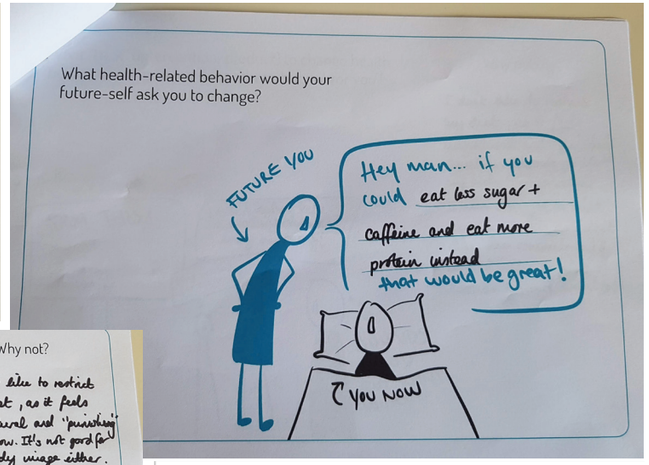
WHAT DO (HOME) OFFICE WORKERS SAY?

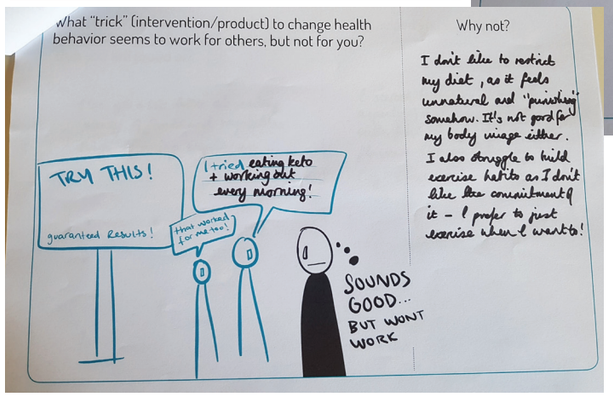
To gain insights into how my target group perceives the challenge of changing their own health-behaviour, I contacted 6 (home) office workers. The participants were between 25 and 43 years of age and practiced various professions out of home office (due to the Covid-19 Pandemic). They were recruited from my personal network through email requests. The individuals were given a sensitizing booklet, to encourage them to observe themselves and reflect on their own experience with changing their health behaviours. Behaviours chosen ranged from “eating less sugar” to “exercising more” and “having less screen-time”. After one week, a 40-min semi-structured interview was held with each participant to discuss their current struggles, past experiences and future aspirations regarding their health behaviour.

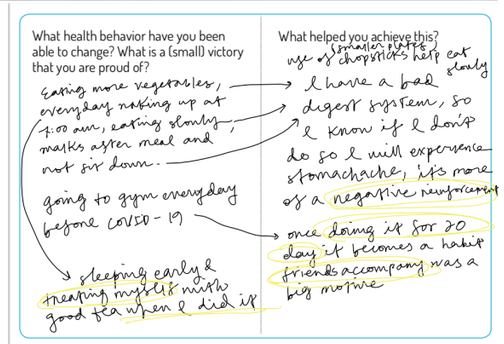
In order to answer the research questions guiding (see 2.1), a deep understanding of the target group is needed, yet people do not easily talk about abstract qualities such as needs and values directly. Instead, they come out when attached to situations or stories. In an attempt to reach these deeper levels of knowledge, I made use of Sanders and Stappers’ (2012) “Path of Expression”. This framework suggests that by guiding participants through a process of describing their current experiences, then reflecting on memories of past experiences, underlying layers can be uncovered in order to move towards exploring aspirations for future experiences (Sanders and Stappers, 2012). I made use of this framework in designing the sensitizing materials and structuring the interviews in an attempt to help participants connect to what is meaningful in their past and present experiences. Figure 80 shows some questions from the interview and how they guide the participants through the path of expression. An impression of the sensitizing booklet and how it was used can be seen in figure 81.

Fig. 81. Adapted figure of Sanders and Stappers’ Path of Expression









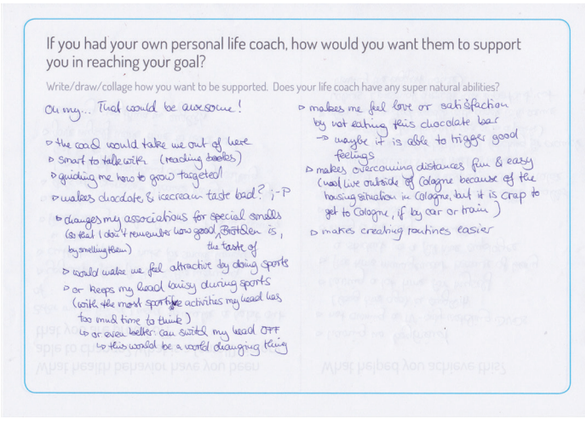


Fig. 82. Example pages from filled out sensitizing booklets by three of the participants.

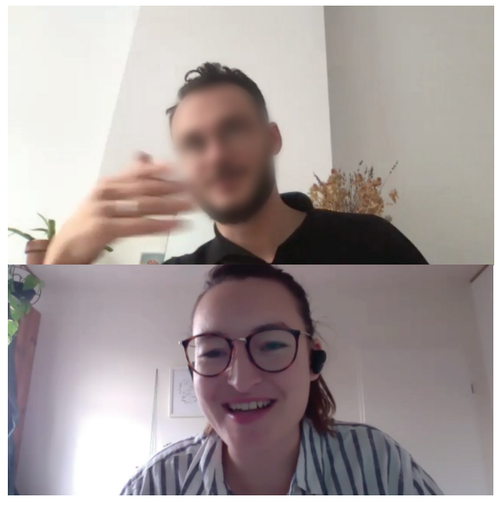


Fig. 83. Screenshot from one of the online interviews

CONTEXT MAPPING ANALYSIS

After conducting the interviews with the target group, a qualitative analysis of the data was done using a light on-the-wall analysis method (Sanders & Stappers, 2012). The goal of the analysis was to make sense of the raw data collected, and to communicate it in a visual and concise manner.

The data was analysed following this procedure:

1. All interviews were first transcribed (manually and using the online platform Otter.ai).
2. Key stand-alone quotes were selected from each participant and transferred to statement cards. The statement cards consisted each of a key quote, an interpretation of the meaning of this quote and a colour to indicate from which interview/participant it originated. The purpose of the statement cards was to help interpret the content, and move up the ladder of understanding from data to knowledge. Furthermore, the quotes in form of statement cards are now separate entities that can be moved around, grouped and connected in new ways to better understand important factors related to the problem and context.
3. An on-the-wall analysis was conducted using the online whiteboard tool “Mural”. Here the statement cards were clustered and categorized, as well as connections made in order to spot emerging themes. In order to ensure a degree of triangulation to raise the reliability of the results (Sanders & Stappers, 2012), this process was repeated three times in a span of three days.

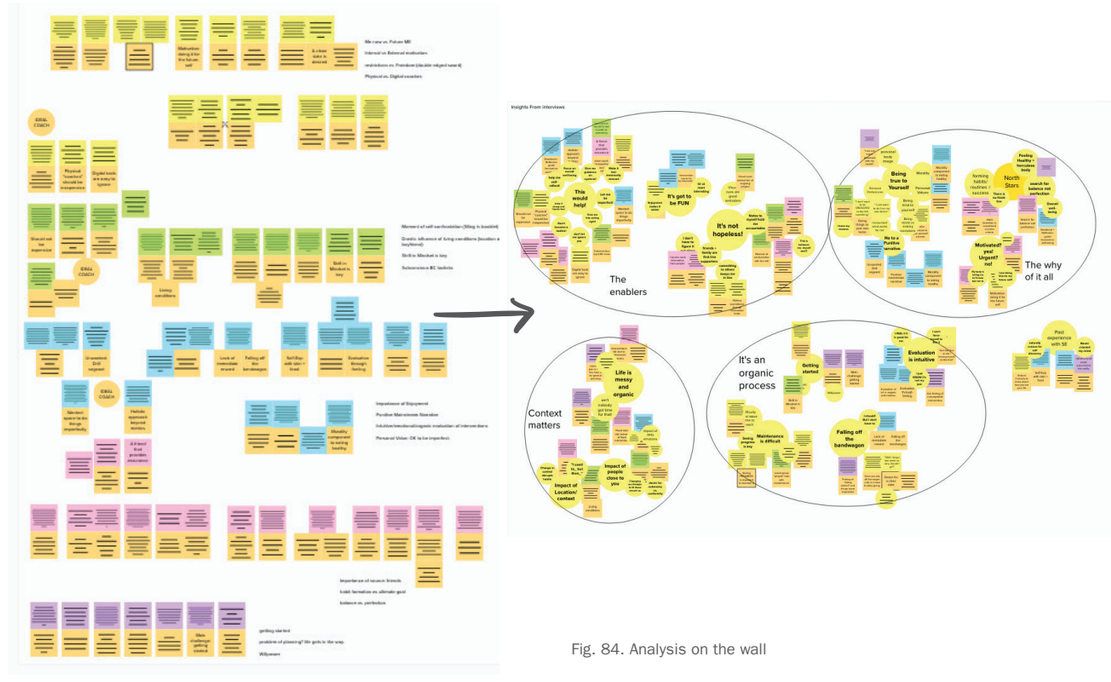


Fig. 84. Analysis on the wall

Appendix 2
SE Intervention Phase 1 Process Documentation

In RtD, design prototypes are created and unleashed to explore the problem and gain insights feeding into the overarching research objective. Here the prototype can be understood as a means of inquiry in order to better understand the utility of self-experimentation as a method to achieve sustainable behaviour change, a first prototype was created to launch a self-experimentation intervention. (Wensveen & Matthews, 2014)

GOAL OF THE INTERVENTION

This first prototype can be understood as an extension of the problem exploration phase. This prototype was designed and created in the second week of the project, and thus represents a starting point rather than an artefact that expresses accumulated insights and design criteria. The goal of the prototype was to facilitate people to self-experiment with an intervention to reach a personal health goal.

Main research question:
How might I facilitate people to self-experiment with interventions to reach their personal health-behaviour goals?

Through the process of designing and testing a prototype, I hoped to attain insights to help answer the following research questions:

- What are important things to consider in the process of facilitating self-experimentation?
- How can self-experimentation contribute to sustainable health behaviour change of individuals?

A secondary purpose of going through designing this intervention is to help uncover which questions are important for me to ask in the first place.

METHOD

An instruction set to help people self-experiment was designed based on insights gained from the first context mapping activity – a workshop with 3 participants that relayed their past experience with self-experimenting. Four prototypes of this instructions set were produced and sent to four participants for testing. The four participants were volunteers from the research consortium Pride and Prejudice, which is directly tied to the creation of this study.

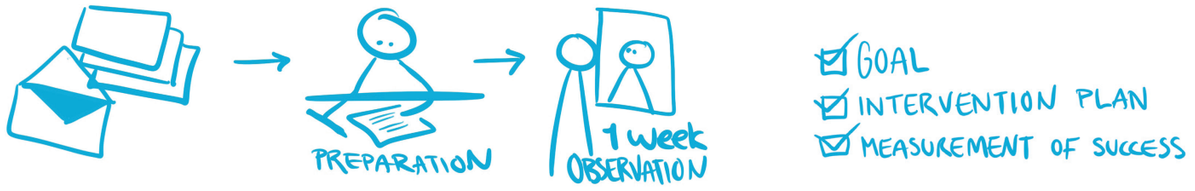


Fig. 85. The preparation kit was sent to participants via mail and helped then create a self-experimentation plan centred around a personal goal, as well as initiate a week of baseline observation

The instruction set was comprised of two packages: the first containing questions and instructions to prepare for self experimenting and conduct a one week observation of the “baseline” condition. The second kit included materials to aid in observation through the upcoming 4 weeks of self-experimenting as well as questions to aid in reflection and evaluation.

Three meetings were scheduled with the participants. One prior to receiving the first package - introducing participants to the study and explaining what they can expect. The second group meeting took place after the first week in which participants received the preparation kit to make sure everyone is ready to self-experiment. The third group meeting was scheduled two weeks into self-experimentation phase, to check-in on the process and collect feedback on the interaction with the prototype. The final meeting closed the study, and collected feedback about the experience as a whole.

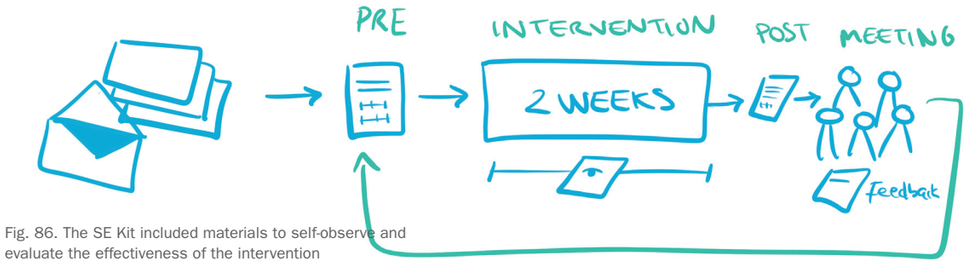


Fig. 86. The SE Kit included materials to self-observe and evaluate the effectiveness of the intervention

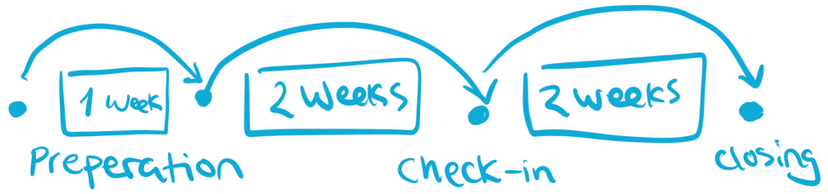


Fig. 87. The intervention lasted 5 weeks: one week of preparation, and two sets of two-weeks of self-experimenting, with meetings taking place at the indicated points

PROTOTYPE DESIGN

The following two pages illustrate the design features and decisions that went into constructing the prototype in the form of an annotated portfolio.

Personal Note to thank participants for their time and contribution

Analogue instructions to foster a moment of mindful reflection while filling it in. Also to attempt to make the interaction feel less like “work” in a period where most work is done digitally from home.

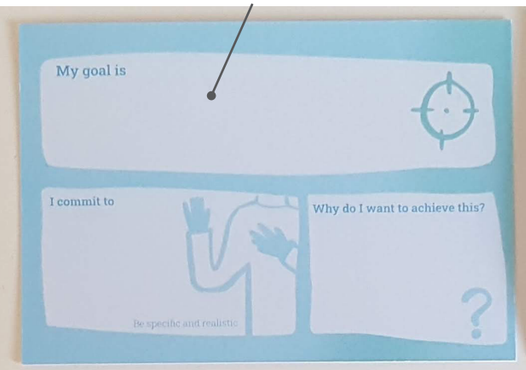
Instructions arrive by mail to participants

Physical cards and envelope can act as visual cue/reminder of self-experiment

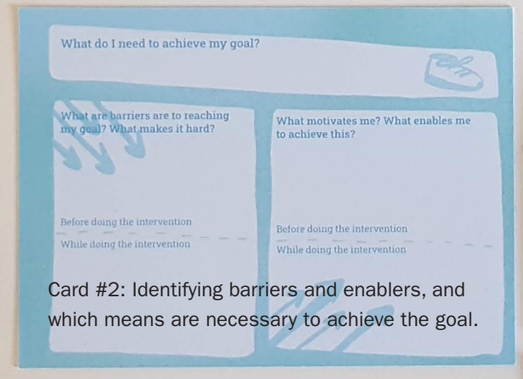
Irregular borders and hand drawn elements to compliment the act of filling in cards by hand. Illustrations can also help convey the purpose of a field through visual associations.

300g paper and attention to aesthetic design to increase subjective value of cards and encourage safekeeping over disposal

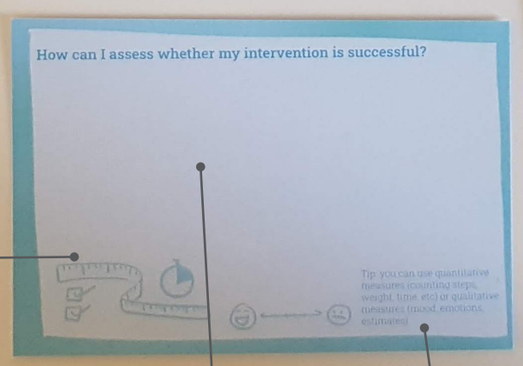
Card #1: Three fields to write down a personal goal, the commitment one is now making to work towards this goal as well as a reflection why one is trying to reach this goal.



Card #2: Identifying barriers and enablers, and which means are necessary to achieve the goal.

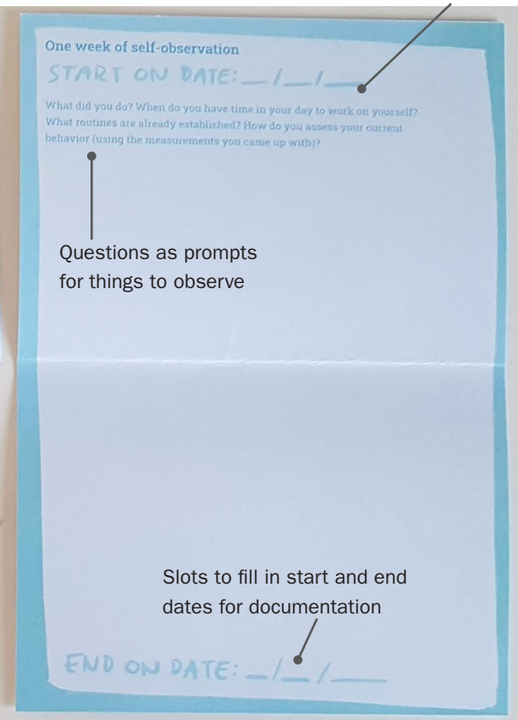


Card #4: Selecting appropriate measures to help user evaluate if the intervention is successful or not



A few tips to help users think of own metrics

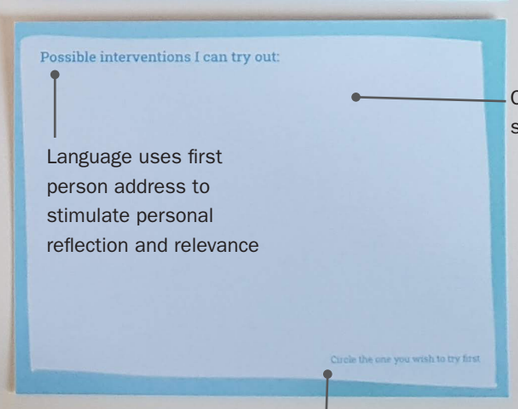
Card #5: A space to make personal base-line observations for 1 week. Minimalistic structure to allow for variety of observations



Questions as prompts for things to observe

Slots to fill in start and end dates for documentation

Card #3: Space to brain-storm interventions.



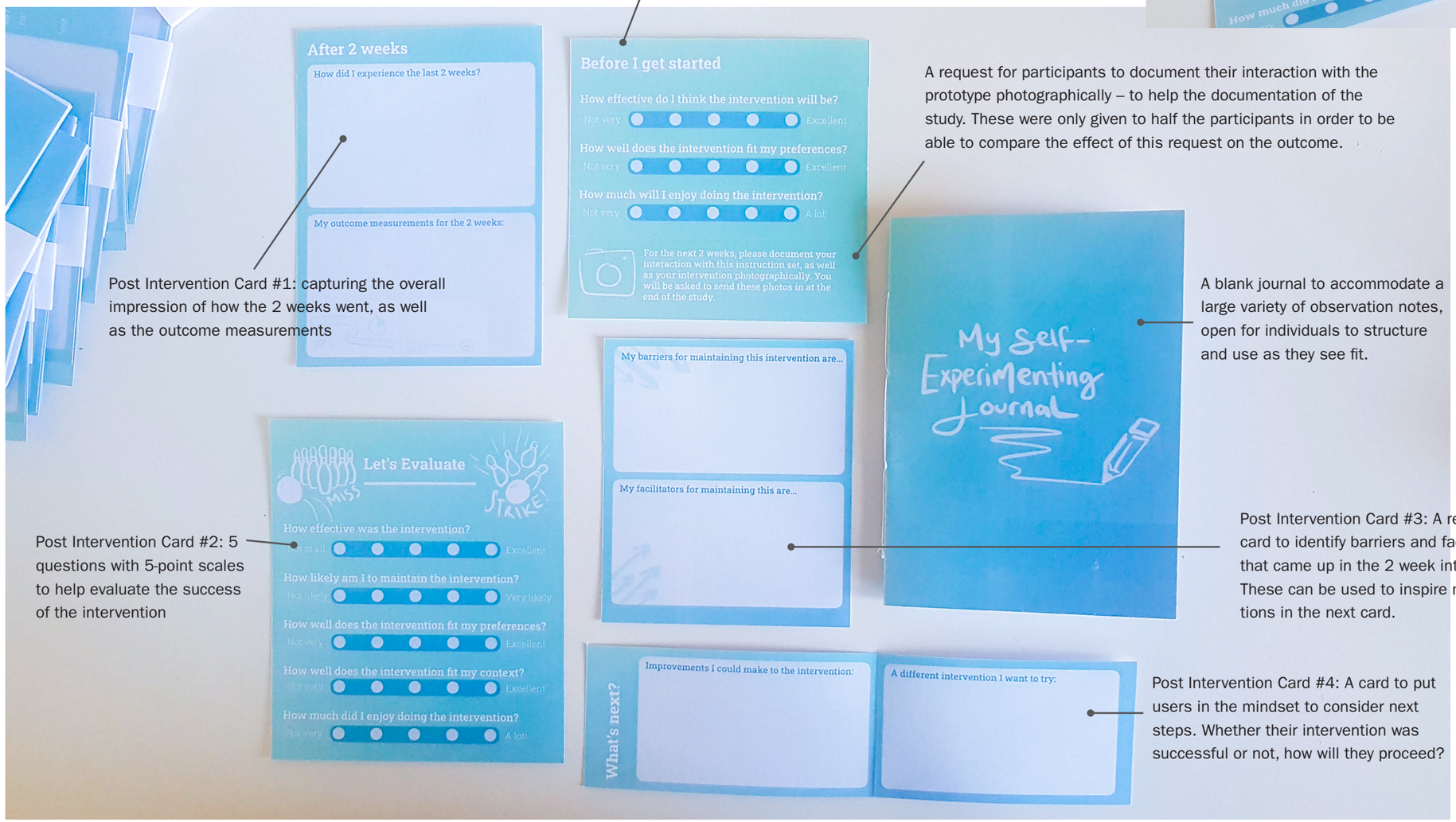
Language uses first person address to stimulate personal reflection and relevance

Prompt to circle one intervention to converge on a decision of how to start

Packages are labelled with numbers to clarify the order of opening. (1) is to be opened before starting (2) is to be used throughout the intervention to note down observations. (3) is to evaluate and reflect after two weeks of intervention.

Pre-intervention: three scales to fill out before starting, asking participants to predict the effectiveness of the intervention

A request for participants to document their interaction with the prototype photographically – to help the documentation of the study. These were only given to half the participants in order to be able to compare the effect of this request on the outcome.



Post Intervention Card #1: capturing the overall impression of how the 2 weeks went, as well as the outcome measurements

Post Intervention Card #2: 5 questions with 5-point scales to help evaluate the success of the intervention

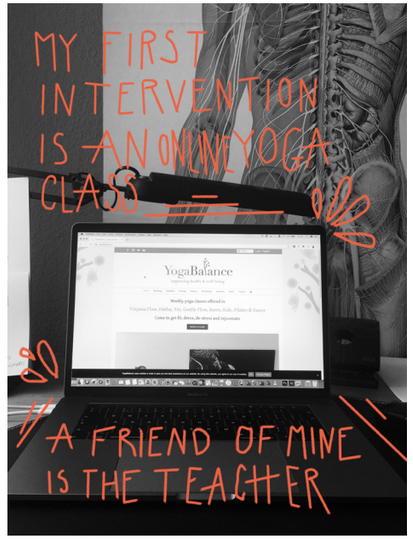
A blank journal to accommodate a large variety of observation notes, open for individuals to structure and use as they see fit.

Post Intervention Card #3: A reflection card to identify barriers and facilitators that came up in the 2 week intervention. These can be used to inspire modifications in the next card.

Post Intervention Card #4: A card to put users in the mindset to consider next steps. Whether their intervention was successful or not, how will they proceed?

IMPRESSIONS FROM THE S.E. INTERVENTION

Participants sent in pictures of their interaction with the instruction kit, as well as the resulting interventions they experimented with.



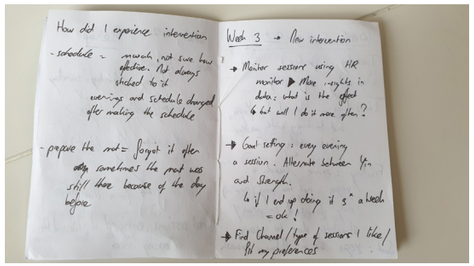


Fig. 88. Impressions from participants during SE intervention phase 1

FEEDBACK FROM THE CHECK-IN MEETING

After two weeks of letting the participants Self-experiment with the instruction set prototype, a feedback and reflection workshop was held. The goal of the meeting was to capture the participant's experience with self-experimentation so far as well as capturing feedback on their interaction with the instruction set prototype. The collected feedback was used to launch a second iteration on developing a subsequent prototype.

All four participants of the first focus group joined an online workshop using the platforms Zoom and Miro. In a one hour session participants were asked to:
1. relate their experience of the past two weeks, including their health behaviour goal, how they experienced self-experimenting and their outcome so far.
2. reflect on the meaning of self-experimentation for them by completing the prompts "for me Self-experimentation feels like..." and "for me the purpose of Self-experimenting is..."
3. provide feedback on their interaction with the prototype through the means of first placing virtual post-its on pictures of the prototype and then explaining the feedback verbally. Two different colored post-its were provided to encourage reflection on positive/helpful aspects as well as critical feedback.
4. provide an impression of how the interaction with the prototype felt by placing stickers on 3 scales.

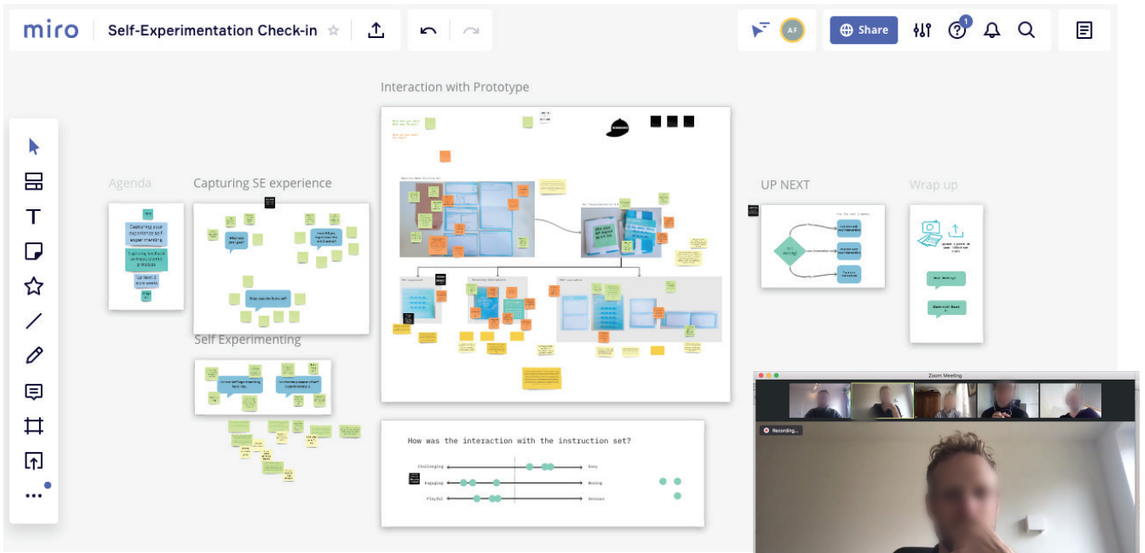


Fig. 89. Miro board set up for the Check-in Interview

OUTCOME: SELF-EXPERIMENTATION IMPRESSIONS

In the meeting participants were asked how they viewed self-experimentation, both in terms of how it feels and its purpose. The three main themes that emerged based on the analysis of the feedback received were:

Self-experimentation as an exploration to try out things, discover root causes, and learn about oneself in the process.

Self-experimentation as an incentive to finally get started working towards a goal with short-term deadlines or check-in points, but also as an incentive to procrastinate from doing the "actual work".

Self-experimentation as a strategy to figure out what fits in order to reach a personal goal.

Out of the discussion it became clear that SE can lead to self-discoveries in various forms. One side-effect of the self-experimentation process was a heightened awareness that lead some participants to discover potential root causes of the habits they were trying to change. Other participants became aware of their own tendencies and ways to overcome them. Two participants discovered that the interventions they chose did not work for them, contrary to their expectations, and were able to list possible reasons why.

"So for me, it feels like a kick in the butt to actually start doing something... Because I have a deadline."
- Participant 3, SE phase 1 Check-in

"I wrote down it feels like really exploring, like a tool, to find interventions to reach my goals that fit my preferences."
- Participant 1, SE phase 1 Check-in

"It is not just about achieving the health goal, but about learning something"
- Participant 4, SE phase 1 Check-in

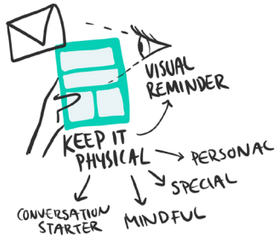
"I noticed that I work at two screens, which is not good, because I sit twisted a lot. And then I noticed that there's actually a lot of things going on that actually make it difficult to have a good posture."
- Participant 2, SE phase 1 Check-in

"I Noticed I always have to sign up at least a day or two before (to the yoga class). otherwise I am not doing it."
- Participant 3, SE phase 1 Check-in

"I wasn't really as happy with the scheduled thing. I thought I would like that a lot but [...] I forgot what the schedule was, or my own activities in the evening changed so it didn't fit my schedule anymore."
- Participant 1, SE phase 1 Check-in

OUTCOME: INTERACTION WITH PROTOTYPE

The feedback provided by participants regarding their interaction with the prototype has been summarized in 6 key take-aways for the subsequent prototype development:



1. The physical nature of the prototype can be an asset as it doubles as a visual reminder of the ongoing SE intervention. Receiving it by mail made participants feel special, like receiving a personal gift. Furthermore, filling in the materials by hand was described as “mindful”. And a surprising bonus: the package can act as a conversation started between the participants and those living with them.

2. The prototype’s many pieces were easily lost. There is a need to reduce and simplify the number of components and how they are arranged.

3. Some aspects required more guidance, as some materials were not self-explanatory. Participants respond well to examples, or structures that give indications of how to use the instructions and what to fill in.

However, a balance needs to be found between making the instructions specific and structured, thereby making them irrelevant for some goals, and keeping them open and abstract, yet less suggestive for specific interventions.

4. The prototype sparked anticipation, excitement and curiosity, both in the way it was delivered and in having elements packaged separately waiting to be unpacked along the way. These emotions can be instrumental in both propelling self-experimentation and the interaction with the artefact.

“For me, it worked really well, because it was on my desk, like, lying there all the time... so seeing that, I was reminded I should actually start doing my intervention.”
- Participant 3, SE phase 1, Check-in

“It was really great to have this physical thing really made me feel special”
- Participant 4, SE phase 1 Check-in

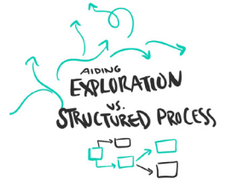
“It feels like a gift. It feels personal.”
- Participant 2, SE phase 1 Check-in

1. How might the prototype encourage prominent placement at home?
2. How to provide a frame for the consecutive instruction material?
3. How to provide guidance without restricting personal goals and reflections?
4. How to encourage playfulness and curiousity over weeks of SE?

Waiting for that moment was like anticipation. Like you cannot open it yet. So now you’re curious to see what is there.”
- Participant 4, SE phase 1 Check-in

5. Self-experimentation sparks self-discovery, sometimes on a higher level than in correlation with the behavioural goal. The observation and evaluation forms could make room for self-discovery or even encourage it!

“It would probably help me if you are triggered to find out these root causes during the process yourself.”
- Participant 2, SE Phase 1 Check-in



6. There seems to be two different directions of facilitating self-experimentation, one in which users are given structure and are guided through a process, using instructions and decision making aids; and another which helps users explore as much as possible on their own terms. In hindsight, first prototype attempted at structuring the process but did neither very well.

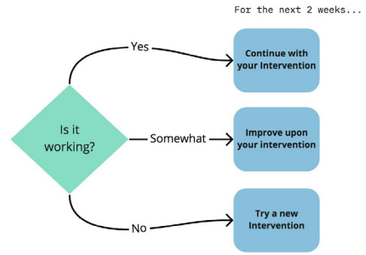
REFLECTION

A general impression I got form this feedback meeting was that the first package including preparation instructions was more useful than the second.

The prototype did not allot space for participants to formulate a research question or goal of their own for the upcoming weeks in terms of the purpose of self-experimenting. This became clear when I tried to design the evaluation section and did not know what questions the participants would want to have answered.

One question that emerged in the process of designing the feedback meeting is how to proceed for the remaining two weeks of self-experimentation? Should participants be encouraged to try new interventions, to improve upon their current ones with gained insights or, if the intervention is working well, continue without changes? Does facilitating self-experimentation mean encouraging exploration of numerous interventions? How might I enhance the feeling of exploration? How to capture the results of each experiment in a way that clearly outlines the next step?

“I like the form where you write down what could be possible interventions. I really did some like, brainstorming... I made a list of like, Okay, what do I prefer most? what I’m gonna start with and how can I maybe combine certain interventions.
- Participant 1, SE phase 1 Check-in



“I wasn’t really sure if I was going to want to improve the intervention or whether I wanted to pick another intervention. And the questions weren’t really helping me pick one of those..”
- Participant 4, SE phase 1 Check-in

OUTCOME OF THE FIRST SELF-EXPERIMENTING INTERVENTION

After four weeks of self-experimenting, a closing meeting was held in a group setting with the participants. The goal was to capture feedback on their overall experience, and have a discussion over various aspects of self-experimenting. As one of the research questions behind this design intervention was to find what important factors need to be taken into consideration when designing SE-tools, the discussion prompts were formulated in an open way, to encourage even unthought-of topics to arise.

All four participants of the first focus group joined an online workshop using the platforms Zoom and Miro. In a one hour session participants were asked to:
1. Relate what changes they made in the last two weeks in terms of the interventions they tested and why
2. Map how frequently they interacted with the instructions set across the five week study
3. Map how well they reached their personal health behaviour goals in each week
4. Discuss what they learned about themselves in the four weeks, how they experiences self-experimenting, what questions they may have tried to answer and anything that surprised them in the process
5. Reflect on how they would continue now that the study has ended, and how well they can maintain their last tested intervention.

The key findings from this session but also impressions from the entire 5-week experimentation phase are summarized on the following pages.

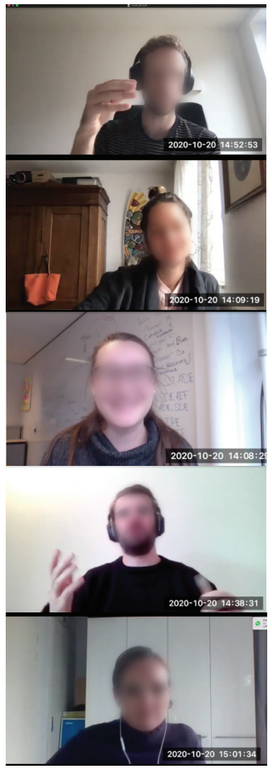
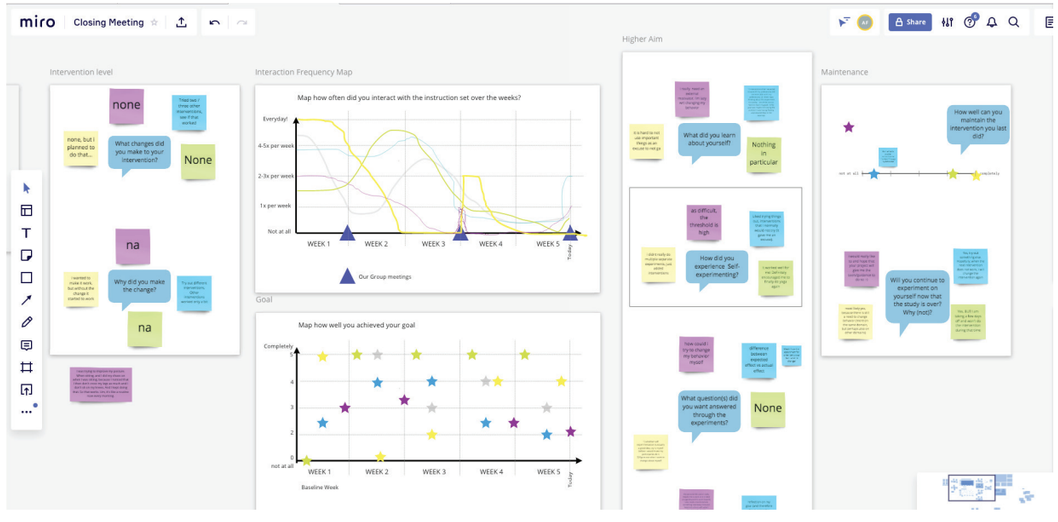


Fig. 90.Closing meeting Miro board and Participant screenshots



THE CORE INGREDIENTS TO SELF-EXPERIMENTING

Different people found different aspects of the prototype helpful. There are different core ingredients that are needed to successfully self-experiment for different people. Some of these "ingredients" were identified due to being represented in the prototype, while others because of an explicit lack-thereof. For example, one participants found the reflective questions to be the most helpful, to reflect about the underlying problem when defining their goal. Another participant mentioned needing ideas for interventions, a service that the prototype did not provide. Core Ingredients:

"This reflection on the underlying problem was super helpful. It made me think about what the goal should be"

- Participant 1, First Self-Experimentation Closing interview

1. A structured guided process

A structured process with clear instructions and helpful examples that guides the user through a process of self-experimenting is strongly desired by some. This became evident through feedback from participants pointing out when they felt unsure of how to proceed and asking for more examples, or decision-making tools, indicating a distinct lack of guidance they wished to change.

2. Guided Reflection

For some participants the cards that helped guide reflection were seen as the most helpful and important part of the experience (in hindsight). These cards presented questions to encourage the participants to think about why they wanted to achieve a their goal. Other reflective cards asked about how the intervention is going, and what barriers and enablers could influence the success of the intervention. Facilitating reflection seems to be another core ingredient a self-experimentation toolkit could provide.

3. Intervention inspiration

A core part of self-experimenting with behaviour-change interventions is finding interventions to try out (i.e. experiment with). A core ingredient for a toolkit to facilitate self-experimentation therefore is providing inspiration for easily-adaptable interventions.

"With regard to the intervention itself, I need rules or guidance instead of freedom, because I don't know what interventions I should do."

- Participant 2, First Self-Experimentation Closing interview

4. Group discussions for progress

In the study, three group meetings with the participants were held spaced two weeks apart. These meetings inspired group discussions which were mentioned as having significant influence and effect on the SE experience. They were seen as instrumental for self-reflection but also provided incentive to interact with the prototype material.

5. Incentive to start, with check-in points to work towards

This self-experimentation set-up provided participants with a clear time-frame to start working towards their goals, with 2-week check-in points. It seems that a set-up that provides a clear incentive to start and agenda points to work towards can be seen as instrumental for changing behaviour.

"I needed an agenda point to work towards"

- Participant 2, First Self-Experimentation Closing interview

SELF-EXPERIMENTER TYPES

From the discussions it became clear that there is not one right way to self-experiment that suits everyone. Much like finding the right intervention to changing a health behaviour, finding the right process to find that interventions is also susceptible to different personalities. One point that made this very clear is the discussion on the degree of structure provided.

Structured vs. explorative approach

While some participants needed more structure than the prototype provided to self-experiment, others found it too rigid. One participant mentioned preferring a more explorative approach in which interventions could be puzzled together and tweaked, rather than testing one after the other.

Personal Motivation

Different people approach self-experimentation with different expectations and motivations. For some, the purpose of self-experimenting is to "reach my goals", for others its to find out "what approach would really, really work for me? And what doesn't work for me?" or it is more about self-discovery and "understanding myself", to answer questions such as "what do I actually want?"

These different personal preferences and motivations will naturally have an effect on how self-experimentation is perceived, and which approach will lead to "success" for which people. This poses the question of what different roles or personas are important to consider when designing tools to facilitate self-experimentation?

"It's too structured. So it's too rigid to actually make it work for the type of person that I am... So I find that actually, I don't do separate experiments, if I do them myself, but I just kind of altered the intervention or add components to it. And then try to like, tweak it so that it starts working."

- Participant 4, First Self-Experimentation Closing interview

"My goal was to start running. But actually, that was not really the goal. The goal was to get outside with fresh air and be in nature and move more. And that is what I'm accomplishing without actually running. So in that way, it's more explorative "What do I want?""

- Participant 4, First Self-Experimentation Closing interview

SELF-EXPERIMENTING SCENARIOS

Self-experimenting can play out in different scenarios, that may need different tools to handle.

GETTING THE BALL ROLLING

Self-experimentation can be seen as a way of "getting the ball rolling", in that it provides participants with a way of starting the journey to changing their health behaviour. This became explicit when participants shared their interaction over time with the prototype, highlighting that the kit was most useful in the first 2 weeks.

Scenario 1: Finding something that works right off-the-bat

Some participants may strike gold on the first try in finding an intervention that works (as did participant 3). In this case, the SE toolkit mainly takes the role of kick-starting the process and becomes obsolete quickly thereafter. Three of the four participant mentioned their intervention already feeling like a routine after week four, two of which stuck to their first intervention: "the first two weeks were a bit more tricky for me because I needed to really get myself going. But the last two weeks really went well for me because it's kind of a routine for me now". Interestingly, participant 2 found that the intervention is working and said that "it's like a routine now every morning", but was still unhappy with the intervention, feeling that it did not suffice to reach her goal. This raises the question of whether a SE toolkit should encourage participants to explore more even if the first intervention works?

"It worked well for me! Definitely encouraged me to finally do yoga"

- Participant 3, First Self-Experimentation Closing interview

"In the first two weeks, I was really aware of that we were doing this"

- Participant 1, First Self-Experimentation Closing interview

"For me, I think in the first two weeks, it was more like an external motivator, like a reminder that I should actually sign up for {yoga classes]"

- Participant 3, First Self-Experimentation Closing interview

Scenario 2: Nothing's perfect yet but a commitment is made

Even if no intervention is found that fits well within the first four weeks, when asked if participants would want to continue self-experimenting, they all confirmed. Although this may be influenced by social pressure, all participants made a commitment to themselves by writing down a goal. In this scenario, the prototype manages to get the ball rolling through the commitment and consistency bias. A self-experimentation toolkit needs not facilitate self-experimenting over a long period of time, but can help start the process, and shape a mindset that is likely to succeed in the future.

KEEPING THE BALL ROLLING

Working on improving personal health, and creating sustainable behaviour change are long-term oriented. Perhaps the strength and focus of Self-experimentation should be in "keeping the ball rolling" rather than starting it.

Scenario 3: A continuous struggle to find something that works

Some participants may not find and intervention that works, as participant 1 remarked "maybe the interventions were just not my style or I picked the wrong ones. And I didn't expect that in the beginning. But yeah, that's something I learned during the two weeks like okay, this is not gonna work". Perhaps the focus for an SE toolkit would be to spark a new iteration when things are not working out; to quickly provide an alternative suggestion and launch the participant into a new experiment.

Scenario 4: A change in context makes prior solutions void

From the context-mapping interviews one scenario that often came up, is that habits and routines that fit become void due to a change in context (such as moving to a new place or change in job). Even if a participant finds an intervention that fits perfectly and works, it is likely that at some point a change in context will make the intervention unmaintainable. An SE toolkit that focuses on "keeping the ball rolling" could be used at these points in life, to find ways to adapt interventions to new circumstances.

"I already discussed it with my wife, like, okay, we're gonna need to do something else. This is not working."

- Participant 1, First Self-Experimentation Closing interview

"So I think that it's not really the end, because this is inherently an ongoing process."

- Participant 4, First Self-Experimentation Closing interview

"So there was nothing really new in there. So that was, I think, why it didn't trigger me to use it again... I think that if there is something new every time that it really helps me to keep being engaged"

- Participant 2, First Self-Experimentation Closing interview

"It was clear that maybe this is the interventions that I picked, were not the right ones for long term change."

- Participant 1, First Self-Experimentation Closing interview

"It got a bit out of sight... I forgot what my interventions were. And that's on one of the forms, but I don't know which one exactly it is"

- Participant 1, First Self-Experimentation Closing interview

"I used to cook [...] this whole thing (established healthy eating habits) doesn't function anymore since I live with my boyfriend because he has his lifestyle and I somehow put myself into his lifestyle."

- Participant 2, Context mapping interview

Appendix 3 **Design Brief**

Design goal

To facilitate individuals to self-experiment with health-behaviour interventions in a playful way

INTERACTION VISION

The interaction should lead to a constructive dealing with set-backs, in which “failures” to adhere to self-set health-behaviour goals are turned into self-discoveries and new experiments. The interaction should be playful, encouraging and forgiving of imperfections.

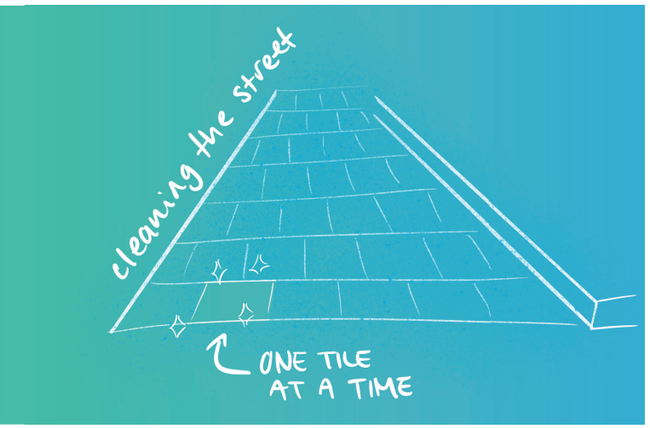


Fig. 91. Interaction vision

To sweep the streets one tile at a time, and bit by bit it will get clean. All without running out of breath. (Analogy to Momo by Michael Ende)

Qualities of the interaction: Not getting overwhelmed by the size of the task. Focusing on the next step. Finding fun in the process!

Appendix 4
SE Intervention Phase 2 Process Documentation

GOAL OF THE INTERVENTION

With the insights gained from the context mapping as well as feedback collected from participants testing the first prototype, a successive prototype was designed. In line with the design goal, this prototype aims to facilitate individuals to self-experiment with health-behaviour interventions in a playful way.

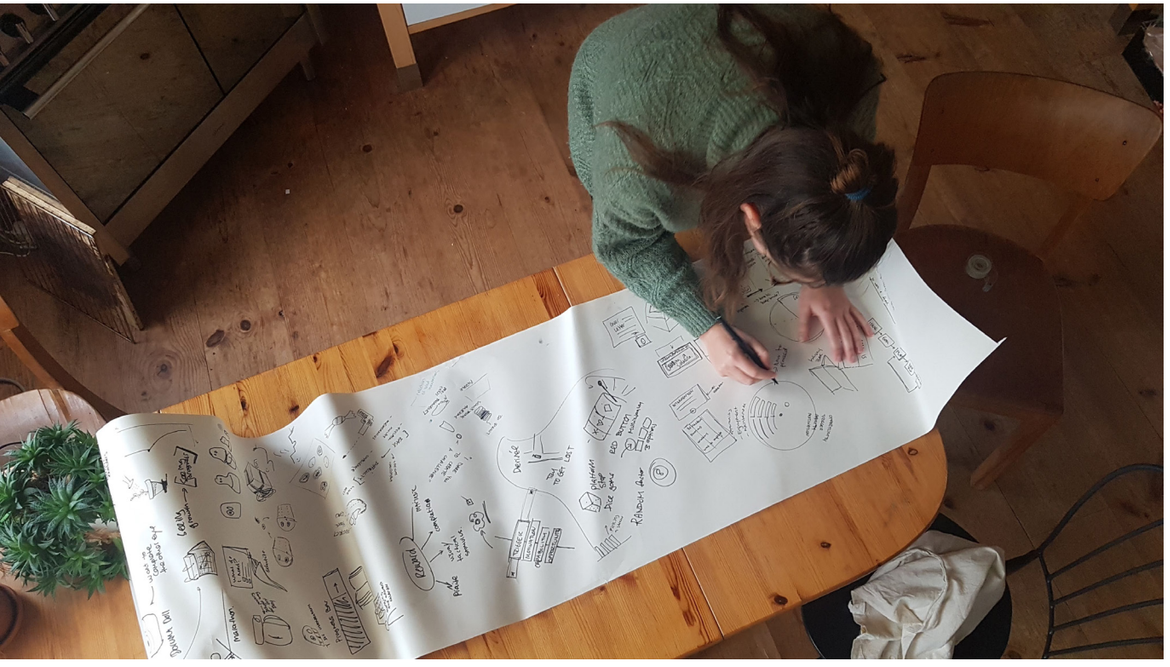
Guiding this intervention phase were the following research questions:
What important aspects need to be considered when designing SE tools? What do participants find helpful? Where do participants need most support?
What kind of questions do participants want answered with self-experimentation?
What phenomena does SE result in? Can participants be lead through SE using the design process?

Design goal:
To facilitate individuals to self-experiment with health-behaviour interventions in a playful way

One remark that was made by participants in the first intervention, is that it was hard to tell if they knew what to do due to the instructions provided by the kit, or partly due to being briefed before hand. For this second prototype I wanted to challenge myself to create a stand-alone prototype, meaning I would send it to recruited volunteers, without providing a brief of what they should do in a meeting beforehand.

METHOD

This 1-week long prototyping phase started with an ideation phase, to come up with ideas that would fit the design goal and incorporate the main insights from the first prototype feedback session. Five identical prototypes were made of the resulting concept that were sent to five (new) volunteers. The five participants were recruited using an information flyer sent out through the Pride and Prejudice network. Volunteers had to be (1) home-office workers between 25 and 50 years of age, (2) regarded changing their health behaviour as “not an urgent matter” (i.e. not pregnant, or other recent diagnosis that makes changing their health behaviour a sudden #1 priority) and (3) be motivated to experiment on themselves for 4 weeks. This time, the prototype consisted of a single package. The intervention was planned to last 4 weeks, with two interviews scheduled to collect feedback and discuss process spaced two weeks apart.



MAIN CHANGES FROM THE LAST PROTOTYPE:

Although the second prototype is a new concept altogether, it evolve in part form the first prototype tested. There are some of the main differences to the first prototype:

- The baseline week was removed and there was no longer a separation between a “preparation” and “self-experimentation” kit. The prototype is presented in a collective folder. The baseline week was removed from the study as the focus shifted to the facilitation of SE rather than evaluating the impact on baseline measurements.
- More focus on guiding participants in each step through tips and examples, as participants expressed a need for more guidance.
- Making space for self-discoveries by adding a “what did I learn about myself” section to cater to this newly identified higher aim.
- Playful interaction through paper design in order to make the process fun and intriguing
- No tools were given for observation (i.e. Journal), instead tips and instructions were given to let participants choose their own mode of observation. This was done because the Journal was perceived as either highly useful or not useful at all, and I wanted to observe how participants prefer to observe their behaviour if no tool is provided.
- Adding an incentive and structure to encourage iteration of interventions.

Some of the main similarities to the first prototype intervention include:

- The visual style in terms of colour, graphics and language was kept the same as they received good feedback.
- A physical prototype was sent to participants through the mail
- Guidance was provided mainly through questions and instructions on paper
- Some of the content remained the same including: sections about a goal, enablers, barriers, way of measuring success, and brainstorming interventions

PROTOTYPE DESIGN

The following two pages illustrate the design features and decisions that went into constructing the prototype in the form of an annotated portfolio.

3/4th of the prototype is designated to help users initiate the SE process

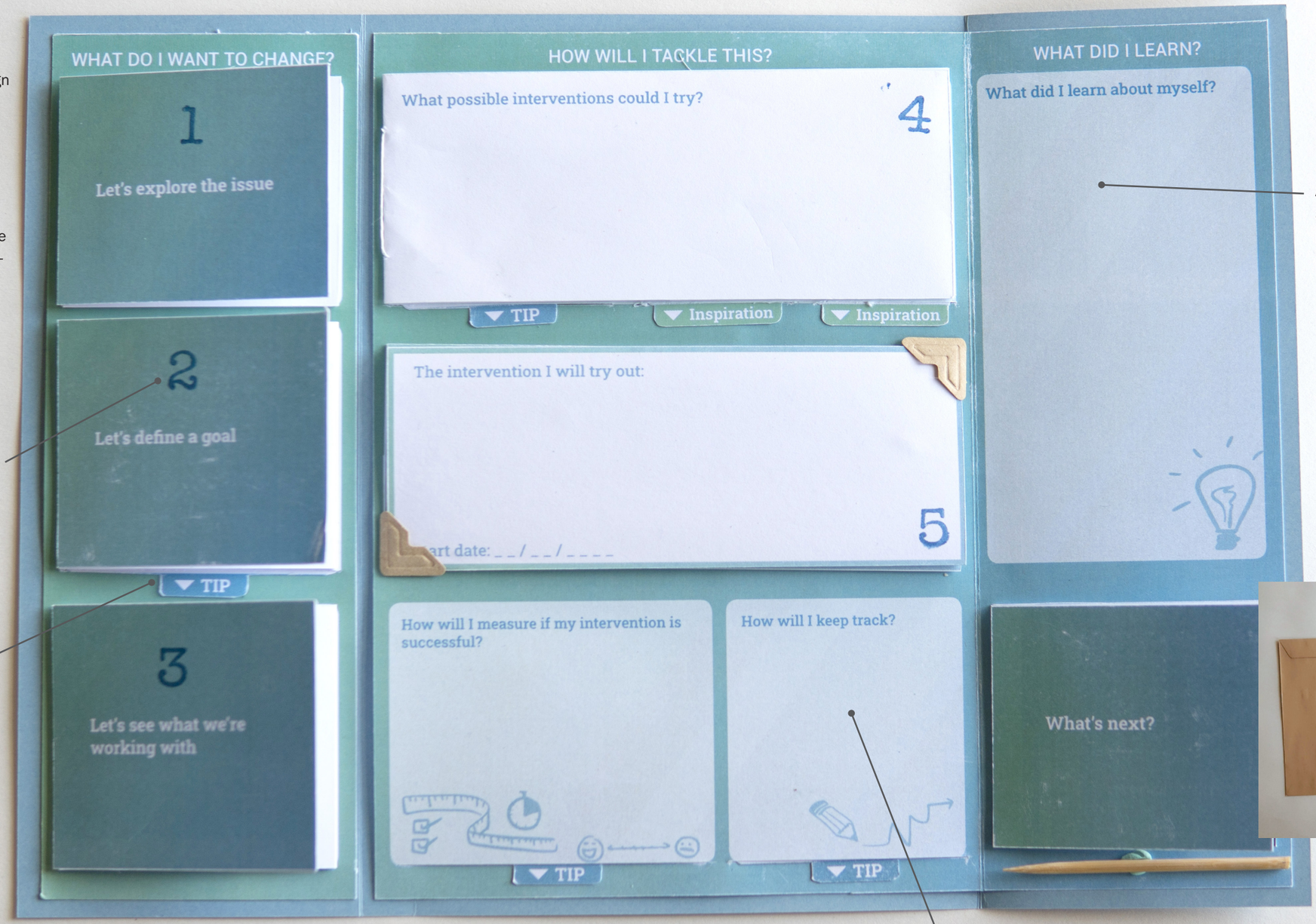
1/4th of the prototype is designated to stimulate reflection and encourage iterations to maintain the process of SE

An A4 compact folder that guides the user through the Self experimentation process. The process bares resemblance with the design process.

The user is guided through a set of questions, tips and examples, as well as space allocated to write down responses, ideas and reflections.

Consecutive steps are numbered (1-5) to clarify the order.

A playful interaction with the prototype is encouraged through paper flaps that can be unfolded, tips that can be pulled-out with latches, and a score board that can be scratched into.



A place is dedicated to note down self-discoveries that are made as a result of the self-experimentation.

The prototype is delivered by post. Attached to the prototype is a note thanking participants for their participation and informing them to fill out the feedback form prior to the next meeting.

This time no journal was provided, but instead participants were asked to think of their own method of keeping track of process.

In response to feedback from the first session, a step of “exploring the issue” was added before defining a goal for the self-experimentation. This helps users pick a goal that is rooted in an issue they are experiencing in their daily life. It can make the goal feel more relevant, and if users are unhappy with the goal they can pick another goal to approach the same issue from a different angle.

Participants were given 4 sheets to brainstorm possible interventions to try out. To facilitate this a tip was added “A behaviour occurs when the situation to do it, the ability to do it, the motivation to do it, and the trigger telling you to do it are in alignment” (Lee, 2016) as well as two behaviour change techniques “defining a trigger” and “finding the opportune time/ place”

More guidance is provided for the goal setting. First through encouraging participants to choose a behavioural goal (rather than an outcome goal) and second, by providing instructions and examples of how to set a SMART goal “Specific, Measurable, Actionable, Realistic and Timely”.

The card used to write down which intervention will be tried, can be opened after 2 weeks to reflect upon it. Rather than providing a set of scales, the participant is asked to give an intuitive rating between “miss” and “strike”. Following this, the participant can reflect on barriers and enablers for maintaining this intervention, as well as think of possible improvements

After setting the goal, participants are asked three questions to encourage reflection on barriers and enablers they may face in reaching this goal. This can help them think of interventions to try. (The same questions were also included in prototype 1)

After choosing an intervention to try, participants are asked how they will measure whether or not their intervention is successful, as well as how they will keep track.

Finally participants are encouraged to try new interventions if they feel like the current one is ineffective. A scratch-away score board is provided to keep track and encourage multiple interventions to be tried.

IMPRESSIONS FROM SE INTERVENTIONS

At the end of the four weeks, participants sent photos of their interventions and prototypes. Here is a small selection to give an impression:

Fig. 93.Fig x. The prototype as filled out by Participant 1

Fig. 94.Fig x. Participant 3 sent pictures of her doing her scheduled 45 minute run

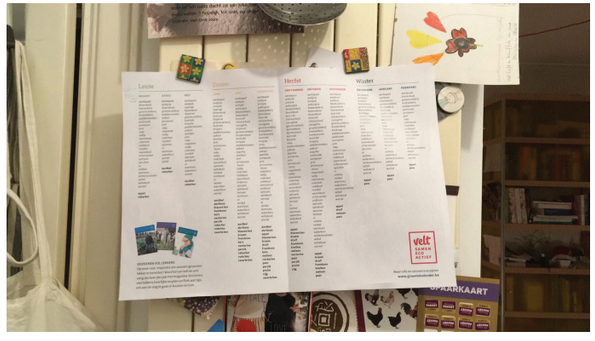


Fig. 92.Fig x. Participant 5 printed out a seasonal calendar and placed it in the kitchen to help achieve their goal of eating more seasonal fruits and vegetables

ANALYSIS OF RESULTS

This self-experimentation phase resulted in qualitative data from 10 interviews with five participants who tested the prototype. The data was analysed using the method of inductive thematic analysis (Braun & Clarke, 2012). This method can be used to systematically identify patterns of meaning across a qualitative data set (Braun & Clarke, 2012). By applying it to the data collected from the prototype testing, it allowed me to make sense of the commonalities found across the varying SE experiences, in order to answer the following research questions:

- What important aspects need to be considered when designing SE tools?
- What do participants find helpful? Where do participants need most support?
- What kind of questions do participants want answered with self-experimentation?
- What Phenomena does SE result in?

The thematic analysis was done using MIro, an onine white-board tool. I adhered to the following steps outlined by Braun & Clarke (2012):

1. Familiarization with the data: This entailed getting a thorough overview of all the collected data by re-listening to the recorded interview and reading over the audio-transcripts.
2. Generating initial codes: While going through the data, a selection of quotes were extracted and transferred to a Miro board. These were then coded to describe the content using tags and post-its. Here a latent approach (Caulfield, 2020) was taken, meaning that I was looking past the explicit content verbalized, but rather looking into the subtext underlying the data to uncover themes. For example, when participants described which elements of the prototype they felt were most helpful, deductions could be made about their underlying needs and values.
3. Generating themes: After coding the data from each interview in turn, a process of clustering ensued in which patterns were identified and overarching themes created (see figure 95).
4. Reviewing themes: After having generated themes, the results were presented to colleagues to receive peer feedback. This helped in refining clusters and defining themes more clearly.
5. Documenting results: The results are presented as part of the main report

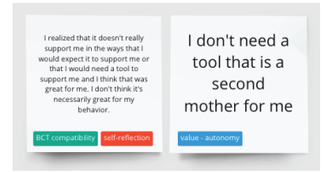


Fig. 95. Thematic clustering (not final clusters)

PHASE 2 CONCLUSION

The testing of the second prototype resulted in an abundance of insights. From the themes that emerged, a first attempt was made to answer the leading research questions.

At this point in the process the question of 'where to go from here?' was raised. There are two main observations that helped determine the direction of the project from here: First, participants noted that the prototype was very effective in initiating self-experimentation, yet they interacted with the prototype very little beyond the second week, and found little support to help them follow

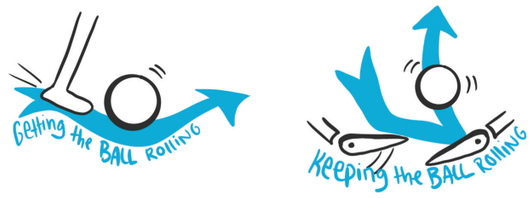
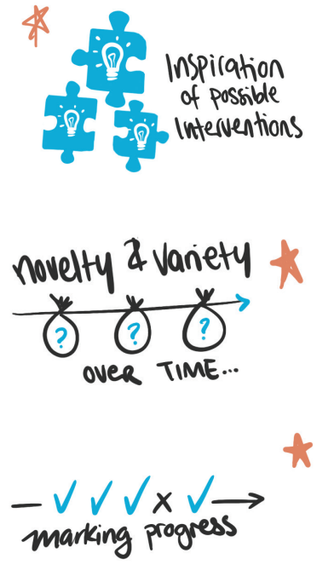


Fig. 96. Two scenarios

through over longer periods of time. Looking at the two scenarios illustrated in figure 96, it can be concluded that currently the prototype manages to "get the ball rolling" yet is still insufficient at "keeping the ball rolling". Participants need more support to help iterate and self-experiment over longer periods of time to find something that works for them. So a logical next step for a consecutive prototype would be to look at how to facilitate "keeping the ball rolling".

Furthermore, when analysing the "key ingredients" needed for self-experimentation, there were three key aspects that participants noted were currently missing. These aspects include (1) inspiration for what interventions to try, (2) the introduction of novelty and variety over time to keep the process intriguing, and (3) a tool to help mark progress to help them check-in regularly over time. These three ingredients, if provided, may help participants follow through with self-experimenting over longer periods of time, and could become the focus of the next prototype iteration.



Appendix 5
SE Intervention Phase 3 Process Documentation

GOAL OF THE INTERVENTION

With the insights gained from the participants testing the second prototype, a successive prototype was designed. The main focus of the third prototype is to test some of the main opportunities discovered in the first two prototypes, in order to explore the potential use of self-experimentation for maintaining behaviour change.

Focusing on the need to keep participants motivated over time. This prototype strives to achieve this through:

- Placing Focus on the iterative cycle of SE. How to help people keep going if the first intervention does not work?
- Providing inspiration for interventions (novelty over time)
- Making progress visible and aiding in tracking through creating small check-in moments over time

By doing this, the prototype hopes to help participants overcome the pitfalls:

- lacking a clear measurable goal
- forgetting about the goal/intervention
- unable to think of what else to try

Guiding this intervention phase where the following research questions:
Can some the discovered design opportunities be validated?
Can tracking visually be an effective substitute for tracking data?
How is it possible to “keep the goal rolling”? How can SE be maintained over time?

Design goal:

To facilitate individuals to maintain self-experimenting with health-behaviour interventions in a playful way

METHOD

This prototyping phase started with an ideation phase, to come up with ideas that would fit the design goal and incorporate the main insights from the first two prototype feedback sessions. Five prototypes were made of the resulting concept that were sent to five (new) volunteers. The method used for interviews and analysis were identical to that described in phase 2.

MAIN CHANGES FROM THE LAST PROTOTYPE:

Some of the main differences to the second prototype include:

- Adding inspiration cards to help participants come up with new interventions. This was done to meet the uncovered need for inspiration
- Adding a visual check-in tool to track how the intervention is going. This was added due to the uncovered need to check-in over time or see progress in order to remain motivated.
- Restructuring the paper instructions set to communicate the iterative process
- Creating four main phases: deciding what to change. How to change it. Checking-in over time and Reflection.
- Adding an incentive and structure to encourage iteration of interventions

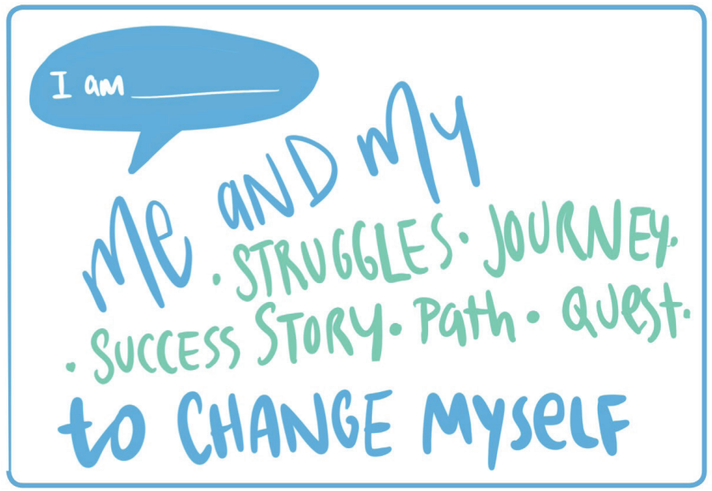
Some of the main similarities to the second prototype include:

- Playful interaction through paper design
- The visual style in terms of colour, graphics and language was kept the same
- A physical prototype was sent to participants through the mail
- Guidance was provided mainly through questions and instructions on paper
- The sections deemed most helpful by participants were kept in the prototype including: Defining the issue, goal, enablers, barriers, way of measuring success, brainstorming interventions, and reflection questions about learning
- Focus on guiding participants in each step through tips and examples

PROTOTYPE DESIGN

The prototype design is explained in chapter 6 of the main report

Appendix 6 **Sensitizing booklet**



Feel free to print this and fill it in manually!

Hello!

Are you eating more than you think you should? Should I even ask how exercising is going? Making changes to your health behavior is never easy. And although we have access to information, and there are many interventions/solutions out there, somehow finding what works for you, in your context and fitting to your values, is a challenge on its own.

For my master thesis I am looking at how to design for closing the gap between intending to change your health behavior and actually doing it. Help me understand the problem by filling out this booklet, and having a chat with me!

Antonia,
Design for Interaction student at TU Delft

Please send the filled-out booklet to a.fedlmeier@student.tudelft.nl before September 14th, and then let's schedule an interview!

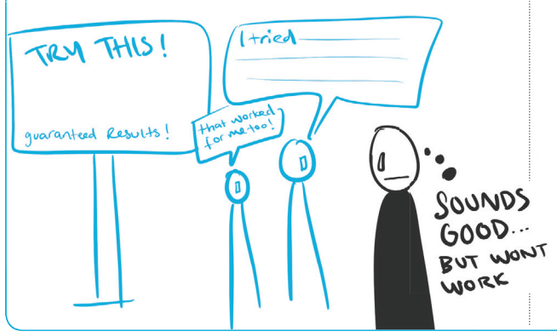
What health-related behavior would your future-self ask you to change?

What health behavior have you been able to change? What is a (small) victory that you are proud of?

What helped you achieve this?

What "trick" (intervention/product) to change health behavior seems to work for others, but not for you?

Why not?



If you had your own personal life coach, how would you want them to support you in reaching your goal?

Write/draw/collage how you want to be supported. Does your life coach have any super natural abilities?

Appendix 7 **Interview Guides**

Check-in Meeting Interview Guide

Introduction

- The purpose of this meeting is to capture how your experience with self-experimenting is going so far and to collect feedback on the prototype.
- You can say nothing wrong. let me know what you didn't use at all. I can learn the most from things that didn't work out.
- I expect it to take about 30 minutes.
- do you have any questions before we begin?
- Can I record?

Documenting Experience

- So how did it go?
  - What issue are you working on?
  - What is your goal?
  - What intervention are you trying out?
  - how did you check-in with yourself?
- Would you say it is working?
  - Can you maintain it?
- baseline? What were you doing before?
- How did reflecting go? Did you lean anything about yourself? What is the most important (best) thing that has come out of this experience for you?

Self-experimenting

- What were you expecting?
- For me Self-Experimenting feels like....
- For me the purpose of Self-Experimenting is....

Interaction with prototype

- Do you have the prototype with you?
- Three things about the prototype that you found helpful/that you liked:
  - What was the post helpful part of the process?
- Three things about the prototype that could be improved/left out:
  - Was there any aspect that you felt you needed more support with?
  - What do you wish?
    - What features are missing?
    - What was unclear or confusing?
    - What could be left out to make it simpler?
    - Was there anything you didn't use? Why?
- did you use the inspiration cards?
- Did you use any of the tracking packages?
- **How was it having a physical set of instructions/materials?**
- How often did you interact with the set? Write/ see them?

What next?

- will you keep working on the same intervention? Why(not)?
- Will you try something new? What will you try next?

Wrap up

- Can you send me pictures of your prototype and how you used it?
- meeting in 2 weeks

Closing meeting Interview Guide

Introduction

- The purpose of this meeting is to reflect together on your experience in trying to change a health behavior, and the method of self-experimenting
- Expected duration 30 min -45 min
- Can I record?
- I would like to use MIRO as a visual help

Ice breaker - 3 min

- using images, memes, emojies
- how did it go? how was your experience trying to change your health behavior through self-experimenting?

Documenting Experience - 15 min

- remind me - what was your goal?
- What changed for you over the last two weeks?
  - What changes did you make to the intervention or goal?
  - Why did you make the,
- Would you say it is working?
  - Can you maintain it?
- what worked for you and what didnt?

Map frequency + goal 10 min

- How well did you achieve your goal over the weeks?
  - How well do you think you will be able to maintain your intervention?
- how much did you interact with the instruction set over the weeks?

Core ingredients 15 min 10:35

- Pizza metaphor - ironically
- I am interested to know what were the core ingredients for your self experimentation experience?
  - What were the things you really needed/valued, and if you were to do this again - you would consider them a must-have?
  - What were the things that were nice to have?
  - What don't you want/need?
  - These can be aspects of the prototype, or things that you noticed over the weeks were particularly helpful or missing.

Discussion 10:50

- Anything that surprised your?
- **What was the most significant result for you from engaging in self-experimentation?**
- Will you continue to self-experiment? why not?
  - what are reasons not to continue?
- Did you add anything else to the feedback form? Do you have any new feedback for the prototype?
- What's going to happen to the prototype now?

Wrap up

- Can you send me pictures of your prototype and how you used it?
- Super short survey in one month - just to check-in what happened after the study
- Thank you so much for participating! And if there is anything I can ever do for you let me know!

Appendix 8 **Graduation Project Brief**

DESIGN FOR our future

TU Delft

IDE Master Graduation

Project team, Procedural checks and personal Project brief

This document contains the agreements made between student and supervisory team about the student's IDE Master Graduation Project. This document can also include the involvement of an external organisation, however, it does not cover any legal employment relationship that the student and the client (might) agree upon. Next to that, this document facilitates the required procedural checks. In this document:

- The student defines the team, what he/she is going to do/deliver and how that will come about.
- SSC E&SA (Shared Service Center, Education & Student Affairs) reports on the student's registration and study progress.
- IDE's Board of Examiners confirms if the student is allowed to start the Graduation Project.

USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT
Download again and reopen in case you tried other software, such as Preview (Mac) or a webbrowser.

STUDENT DATA & MASTER PROGRAMME
Save this form according the format "IDE Master Graduation Project Brief_familyname_firstname_studentnumber_dd-mm-yyyy".
Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1 !

family name: Fedlmeier 4362
initials: AF given name: Antonia

[redacted]

Your master programme (only select the options that apply to you):
IDE master(s): ( ) IPD (★) DfI ( ) SPD
2nd non-IDE master:
individual programme: - - (give date of approval)
honours programme: ( ) Honours Programme Master
specialisation / annotation: ( ) Medisign ( ) Tech. in Sustainable Design ( ) Entrepeneurship

SUPERVISORY TEAM **
Fill in the required data for the supervisory team members. Please check the instructions on the right !

** chair: Jos Kraal dept. / section: HCD / AED
** mentor: Marina Bos de Vos dept. / section: DOS / MOD
2nd mentor:
organisation:
city: country:

Chair should request the IDE Board of Examiners for approval of a non-IDE mentor, including a motivation letter and c.v..

Second mentor only applies in case the assignment is hosted by an external organisation.

comments (optional): Merijn Bruijnes and Mailin Lemke from the TU Delft Pride and Prejudice group are also part of the supervisory team. They will partake in key meetings, oversee the project and advise in the evaluation and grading.

Ensure a heterogeneous team. In case you wish to include two team members from the same section, please explain why.

Procedural Checks - IDE Master Graduation

TU Delft

APPROVAL PROJECT BRIEF

To be filled in by the chair of the supervisory team.

chair Jos Kraal date 27 - 08 - 2020 signature

CHECK STUDY PROGRESS

To be filled in by the SSC E&SA (Shared Service Center, Education & Student Affairs), after approval of the project brief by the Chair.
The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total: 30 EC

Of which, taking the conditional requirements into account, can be part of the exam programme 30 EC

List of electives obtained before the third semester without approval of the BoE

★ YES all 1st year master courses passed

NO missing 1st year master courses are:

name J. J. de Bruin, SPA-IO date 31 - 08 - 2020 signature

J. J. de Bruin, SPA Digitally signed by J. J. de Bruin, SPA Date: 2020.08.31 12:21:02 +02'00'

FORMAL APPROVAL GRADUATION PROJECT

To be filled in by the Board of Examiners of IDE TU Delft. Please check the supervisory team and study the parts of the brief marked **.
Next, please assess, (dis)approve and sign this Project Brief, by using the criteria below.

- Does the project fit within the (MSc)-programme of the student (taking into account, if described, the activities done next to the obligatory MSc specific courses)?
- Is the level of the project challenging enough for a MSc IDE graduating student?
- Is the project expected to be doable within 100 working days/20 weeks ?
- Does the composition of the supervisory team comply with the regulations and fit the assignment ?

Content: ★ APPROVED NOT APPROVED

Procedure: ★ APPROVED NOT APPROVED

Only one company mentor is allowed. The title is not descriptive, please adapt the title.

comments

name A. Huwae date 15 - 09 - 2020 signature

A. Huwae Digitally signed by A. Huwae Date: 2020.09.16 08:32:42 +02'00'

Personal Project Brief - IDE Master Graduation

TU Delft

Health-behavior change through self-experimentation project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date 27 - 08 - 2020 26 - 02 - 2021 end date

INTRODUCTION **

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

Worldwide healthcare systems are burdened by global trends of aging populations and increases in chronic diseases. In The Netherlands, it is predicted that by 2040, 62% of adults will be overweight and 9.8 million people will have at least one chronic disease (Dutch National Institute for Public Health and Environment, 2018). By far the three leading causes of this burden of disease are smoking, overweight, and problematic consumption of alcohol (The National Prevention Agreement, 2019).

Individual health choices and behavior not only have far reaching effects on a societal level, but also directly impact a person's vitality and quality of life. Awareness of the importance of leading a healthy lifestyle is starting to seep in, yet there is much evidence that highlights a gap between what individuals intend to do vs. what they actually do (Sheeran, 2002). "In modern affluent societies where food is abundant and available 24/7, and where people are constantly seduced by companies' marketing efforts, it is extremely challenging to stick to a healthy diet combined with regular physical activity, and many people are unable to change their habits." (Pride and Prejudice)
Moreover, improving health and well-being relies on a sustained engagement with these behaviors (Lee et. al, 2017). Healthy eating, more exercise, better sleep; new year resolutions are common, but how often do they result in a structural change in behavior? Even with a large number of apps and interventions available, individuals often struggle with initiating and sustaining health behaviors (Lee et al, 2017).

Interventions aimed at changing our behavior should fit our goal, our preferences and values, and therefore require a high level of personalization to be effective. Many existing behavior change technologies provide the "solution" to a problem, yet no one solution will be effective for everyone (Hekler, 2013). An alternative approach that holds much potential, would be to give individuals the tools to self-experiment with interventions and through this develop their own, personalized and effective behavior change plan (Lee et al, 2017). This self-experimentation approach is linked to the Quantified Self (QS) movement, where individuals work to better understand themselves through self-tracking/self-study. Within QS, "the goal of self-experimentation is not to find generalizable knowledge, but to find meaningful self- knowledge that matters to individuals" (choe et al., 2014). Through self-experimenting with various behavior change techniques, for example self-monitoring, social support or just-in-time reminders, individuals embark on a process of self-discovery that may lead to the desired sustainable change. This project focuses on self-experimentation as a method for people willing to change their health behavior, such as their diet, physical exercises or stress.

The project will be carried out together with the Pride and Prejudice consortium, which is a group of researchers from TU Delft, Wageningen University, TU Eindhoven and Twente University. Together, they aim to develop lifestyle interventions for the prevention of chronic diseases, with a focus on healthy nutrition and physical activity promotion. The program aims to generate new scientific knowledge and innovative technology, including new frameworks for behaviour change, systems to monitor remotely health parameters and behaviour, and design approaches to help people adopt a healthier lifestyle. Researchers from the Pride and Prejudice consortium will be consulted for their in-depth knowledge on the subject from various disciplines and perspectives.
Other stakeholders in the project will be a set of people motivated to change their health behavior and myself.

space available for images / figures on next page

introduction (continued): space for images

image / figure 1: New years resolutions often embody the desire for health behavior change, yet are notorious for faili

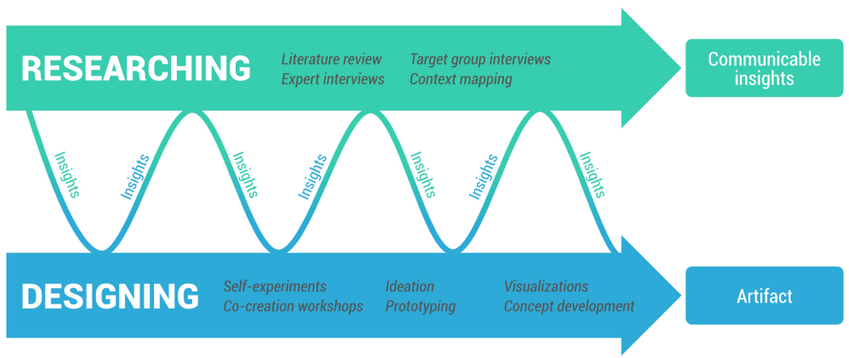


image / figure 2: Research through design process for this project

PROBLEM DEFINITION **
Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

This project will work towards closing the gap between intending to change one's health behavior and actually doing it. The goal is to enable individuals who are motivated to change their behavior, to follow through by facilitating self-experimentation with interventions. The intended effect is that individuals will find interventions that best fit their goal, personal values, as well as socio-cultural context, and through this establish a lasting effective behavior change. Therefore, this project is not aiming to change a specific health behavior, nor to find out which behavior change techniques are most effective for a given behavior, but instead is looking at a method that helps individuals explore various approaches and find their own effective intervention.

The target group for this project are people that are already aware that they should change their health behavior and are motivated to do so (creating this awareness/motivation is out of scope). On the transtheoretical model of behavior change, this project targets people who are in stage (3) preparation or (4) action, with the goal to help them reach stage (5) maintenance (Prochaska, 2009). As a starting point I will be working with office workers, including members of the Pride and Prejudice consortium, who have already agreed to undergo behavior change experiments for the duration of this project, however, this project aims to refrain from being tailored to one specific group.

I will draw on existing research and frameworks on designing for behavior change, behavior change techniques and self-experimentation.
Although this projects aims towards enabling sustainable behavior change, it is not possible within the 100 day scope of this project to test and validate if long-term behavior change has occurred. Instead, a set of parameters that surmise this goal will be defined through literature research and expert opinion and tested. The results of this project should be presented in such a ways that the Pride and Prejudice consortium can continue to work with them, perhaps scaling to encompass long-term experiments and a wider target group.

ASSIGNMENT **
State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, ... In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

I will design and evaluate a framework/toolkit/protocol that facilitates individuals to change their health behavior (and maintain it) through self-experimentation.

I will explore the field of self-experimentation as a method for changing health behavior, and develop and evaluate a protocol for self-experimentation on health interventions. Through primary and secondary research I will identify significant parameters for helping individuals achieve sustainable behavior change and through iterations of conceptualizing and testing with a focus group, I will evaluate the effectiveness of my designed intervention.

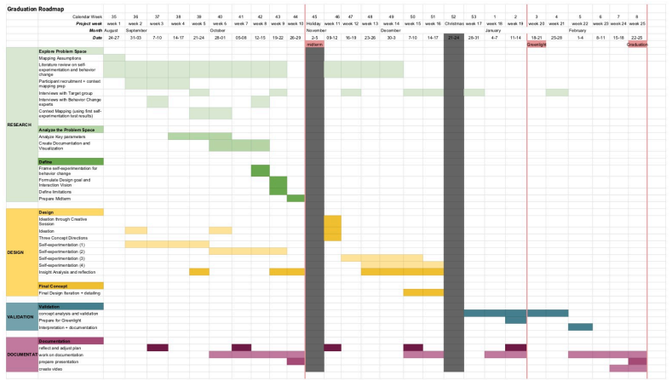
Important to note is that this project aims to be a research through design project (Stappers and Giaccardi, 2017) (Zimmerman, 2007). Design will help in conducting research through interventions and analysis of their effects, and the final design will serve as a way to communicate the findings of the literature research and research through design interventions. The core goal is to answer the question "how could self-experimentation contribute to sustainable health behavior change of individuals?" As a result, the design outcome is strongly linked to the research. Intended deliverables for this project are:
- A toolkit/ generic intervention that helps individual users engage in self-experimentation for health-behavior change
- a framework /universal principles outlining the findings of this project to communicate to researchers

In order give back any novel knowledge gained to the academic community, I intend to report the empirical results of this self-experimentation study in the form of a research paper after the completion of the graduation project.

PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.

start date 27 - 8 - 2020 26 - 2 - 2021 end date



As the core of this project is helping people achieve long-term health behavior change, the project has been structured to allow for five iterations of behavior change observations lasting four weeks each. Throughout this project I will be conducting research through design (see figure 2), in which insights from research propell design interventions, and insights from these design activities are used to answer research questions and conduct better research. I will be gaining insights from the ever-running design interventions (through self-experimentation, prototyping and testing, as well as co-creation sessions). Parallel to this, I will be conducting both primary and secondary research through literature review on self-experimentation/ design for behavior change and interviews with the target group and behavior change experts. By the midterm, I will have conducted an analysis of the problem space which ends in a clear definition of the project goal, interaction vision and framing of self-experimentation for health behavior change. After the Midterm I will launch my ideation phase through a creative session, with 2-4 concept directions that are then prototyped and tested in two four-week design interventions. The insights gained from these tests will be evaluated and detailed to a final concept to be validated in the final phase of this project.

Important dates (to be confirmed by the supervisory team)
- Kick off: 27.08.2020
- Midterm: 02.11.2020
- Greenlight: 18.01.2021
- Graduation: 26.02.2021

I will be working on the Graduation project 4 days a week (total 25 weeks). Reason for this is that I am also doing a student assistant job and freelancing one day a week to sustain myself financially throughout this period.

MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, ... Stick to no more than five ambitions.

One reason that I chose to study at the TU Delft is because of its renowned methodological approach to design. I felt that learning how to apply these methods and reflect on them would complement my prior studies well, and open my perspectives as a designer. I feel that throughout my studies I have indeed learned of a more academic way to design and I look forward to applying my new-learned methodological approaches in my graduation project. In addition, the project will allow me to prove my abilities to lead a design process tackling a wicked problem, manage multi-disciplinary stakeholders, as well as to present and communicate complex research finding and concepts.

Through this graduation project I hope to learn more about how I can influence behavior through design. Since all design is inherently persuasive (Tromp and Hekkert, 2019) I want to be more conscientious and deliberate in how I apply it. This graduation project presents the opportunity for me to concern myself in depth with design for behavior change.

I greatly enjoy diving deeply into complex topics/contexts with a qualitative human-centered approach. I see this project as an opportunity to:
- enhance my interviewing skills
- hone my analysis skills
- practice zooming in and zooming out (very important for this design brief!)
- lose my fear of prototyping "imperfectly"

Finally, as I am considering to pursue a career in academia, I see this project as an opportunity to experience identifying/developing universal principles that can be used across similar other projects. I hope to find out for myself whether I am suited for this career path, and if so, I see a great benefit in networking with a consortium of four renowned Dutch universities.

FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.

Appendix 9 **Ethics Application**

Self-Experimentation for Behaviour change Consent Form

About the Study
This project focuses on self-experimentation as a method for individuals willing to change their health behaviour, such as their diet, physical exercises or stress. The goal is to enable individuals who are motivated to change their behaviour, to follow through by facilitating self-experimentation with interventions. The intended effect is that individuals will find interventions that best fit their goal, personal values, as well as socio-cultural context, and through this establish a lasting effective behaviour change.

What you will do
You will follow a protocol to experiment on yourself in order to reach a personal goal related to changing personal health behaviour for at least four weeks. You get to choose your own goal and intervention, giving you control of what behaviour you wish to change, the sort of interventions you wish to try and as a result, how much time you spend on this study in the next four weeks. You will share your experience through interviews and filling out a provided worksheet.
The benefits of participating include potentially reaching personal health goals by changing your behaviour towards a healthier lifestyle. You will learn about yourself by seeing what behaviour change interventions do or not work on you.

What we will do
The information collected during this study will be used to design an artefact to facilitate individuals to self-experiment for behaviour change. Interviews will be audio-recorded, and transcribed. Any sensitive personal data will be deleted. Any written or visual documentation of your self-experimentation process will be anonymised before being stored on a secure platform. The Irish Qualitative Data Archive (IQDA) 'Anonymisation Guidelines' will be used to remove any identifiable data from the data set. The guidelines outline the best practice to archive qualitative data. The approach comprises the following steps:

- Remove major identifying data (real names, place and company names)
- Remove all identifying details (names, street-names, real names, occupational details)
- Replace with descriptions that reflect the significance of the original text within the context of the transcript
- Keep a tracking table to record all changes and to link real names with pseudonyms. The tracking table will just be used within the research team.

Some of the (anonymised) data you provide may be used in the publication of the Master thesis or a scientific paper reporting the insights and results.

Your rights
You have the right to stop participating at any time without giving a reason. You can indicate this verbally during an interview, or in writing to the provided email address on page 2. You can also indicate that (parts of) information you provide should be deleted. This information will then be destroyed. This is also possible after the end of the four-week participation period. You can also request access to the information you have provided after the focus group. The information will be retained until the end of the study, after which it will be completely anonymised and no longer possible to identify your data for removal. This will be around February 2021.

Please tick the appropriate boxes	**Yes**	**No**
Taking part in the study		
I have read and understood the study or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	□	□
I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	□	□
I understand that taking part in the study involves testing a protocol for self-experimentation, attempting to change a personal chosen health-behaviour for four weeks, and sharing my experience about it.	□	□
Use of the information in the study		
I understand that information I provide will be used for developing a design to facilitate individuals to self-experiment for health-behaviour change. Parts of the information provided may be used in publications.	□	□
I understand that personal information collected about me that can identify me, such as [e.g. my name or where I live], will not be shared beyond the study team.	□	□
I agree that my information can be quoted in research outputs	□	□
I agree to joint copyright of written data provided on worksheets to Antonia Fedlmeier	□	□
I give permission to make photos and videos during interviews.	□	□
Future use and reuse of the information by others		
I give permission for the worksheets and interview recordings that I provide to be archived in the 4TU data repository so it can be used for future research and learning. This data will by anonymised by changing your name and destroying any sensitive personal data.	□	□

Contact details of Researcher **Contact details of Institution**

[redacted]

Signatures

_____	_____	_____
Name of participant [printed]	Signature	Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

_____	_____	_____
Researcher name [printed]	Signature	Date

Delft University of Technology
ETHICS REVIEW CHECKLIST FOR HUMAN RESEARCH
(Version 18.06.2020)

This checklist should be completed for every research study that involves human participants and should be submitted before potential participants are approached to take part in your research study. This also applies for students doing their Master-thesis.

In this checklist we will ask for additional information if need be. Please attach this as an Annex to the application.

The data steward of your faculty can help you with any issues related to the protection of personal data. Please note that research related to medical questions/health may require special attention. See also the website of the CCMO.

Please upload the documents (go to this page for instructions).

Thank you and please check our website for guidelines, forms, best practices, meeting dates of the HREC, etc.

I. Basic Data

Project title:	**Health-behavior change through self-experimentation**
Name(s) of researcher(s):	**Antonia Fedlmeier**
Research period (planning)	**Sept 2020 – Feb 2021**
E-mail contact person	**a.fedlmeier@student.tudelft.nl**
Faculty/Dept.	**IO / HCD**
Position researcher(s):[1]	**Master Student**
Name of supervisor (if applicable):	**Jos Kraal**
Role of supervisor (if applicable):	**Graduation Chair**

II. A) Summary Research

(Please very briefly (100-200 words) summarise your research, stating the question for the research, who will participate, the number of participants to be tested and the methods/devices to be used. Please avoid jargon and abbreviations).

This project focuses on self-experimentation as a method for people willing to change their health behavior, such as their diet, physical exercises or stress. The goal is to enable individuals who are motivated to change their behavior, to follow through by facilitating self-experimentation with interventions. The intended effect is that individuals will find interventions that best fit their goal, personal values, as well as socio-cultural context, and through this establish a lasting effective behavior change. In order to answer the research question "how could self-experimentation contribute to sustainable health behavior change of individuals?", several protocols and prototypes will be tested with four focus groups consisting of 4-5 people each. The focus groups will consist of healthy volunteers who are informed and motivated to work on a personal goal to change their health behaviour. My research will involve sending participants a framework to start their self-experimentation process, as well as interviewing the participants throughout the four week self-experimentation phase.

[1] For example: student, PhD, post-doc

B) Risk assessment & risk management

Please indicate if you expect any risks for the participants as a result of your research and, if so, describe these risks and how you will try to minimize them.

I do not expect much risks for the participants as a result of this research. There may be a "social pressure" risk, in that people might not feel free to stop participating in the four-week study. To mitigate this, it is important to explain at the beginning, and during every session/interview, that their participation is voluntary and that they can stop at any time without having to provide reason. Interviews will take place mostly individually and sometimes in groups via online means. If participants feel uncomfortable in the group setting, they can do individual sessions with me instead.To reduce the social pressure to partake in group sessions, I will contact each participant individually to ask about their willingness to participate (and reiterate that participation is voluntary). The social pressure risk may also extend to answers provided in the session. However, as participants are working on their own goals and changing the behaviour they want to change themselves, we belief that giving socially desirable answers in a group setting does not pose any additional ethical risks. However, it can limit the validity of our results. Therefore, we will take extra caution in interpreting the answers where social desirability is a threat, and provide the option for individual sessions whenever possible.

Volunteers will be informed about the purpose and process of the study before being recruited as participants. Furthermore, the target group are healthy individuals, not part of any vulnerable group. Recruitment will take place through a flyer sent to the supervisory team's social circle of friends, colleagues and family and by asking them personally. Participants with a disease related to health behavior will be excluded from participation.

Important to note is that participants will be coming up with their own goals to work on as part of my study (example: "I want to do yoga three times a week") and thus will not be instructed to partake in a particular activity that may be risky to the individual.

III. Checklist

Question	Yes	No
1. Does the study involve participants who are particularly vulnerable or unable to give informed consent? (e.g., children, people with learning difficulties, patients, people receiving counselling, people living in care or nursing homes, people recruited through self-help groups).		x
2. Are the participants, outside the context of the research, in a dependent or subordinate position to the investigator (such as own children or own students)?[2]		x
3. Will it be necessary for participants to take part in the study without their knowledge and consent at the time? (e.g., covert observation of people in non-public places).		x
4. Will the study involve actively deceiving the participants? (For example, will participants be deliberately falsely informed, will information be withheld from them or will they be misled in such a way that they are likely to object or show unease when debriefed about the study).		x
5. Sensitive personal data • Will the study involve discussion or collection of personal sensitive data (e.g., financial data, location data, data relating to children or other vulnerable groups)? Definitions of sensitive personal data, and special cases thereof are provided here.		X
6. Will drugs, placebos, or other substances (e.g., drinks, foods, food or drink constituents, dietary supplements) be administered to the study participants?		x
7. Will blood or tissue samples be obtained from participants?		x
8. Is pain or more than mild discomfort likely to result from the study?		x
9. Does the study risk causing psychological stress or anxiety or other harm or negative consequences beyond that normally encountered by the participants in their life outside research?		x
10. Will financial inducement (other than reasonable expenses and compensation for time) be offered to participants?		x
Important: if you answered 'yes' to any of the questions mentioned above, please submit a full application to HREC (see: website for forms or examples).		
11. Will the experiment collect and store videos, pictures, or other identifiable data of human subjects? [3] .	x	
12. Will the experiment involve the use of devices that are not 'CE' certified?		x

[2] **Important note concerning questions 1 and 2.** Some intended studies involve research subjects who are particularly vulnerable or unable to give informed consent .Research involving participants who are in a dependent or unequal relationship with the researcher or research supervisor (e.g., the researcher's or research supervisor's students or staff) may also be regarded as a vulnerable group . If your study involves such participants, it is essential that you safeguard against possible adverse consequences of this situation (e.g., allowing a student's failure to complete their participation to your satisfaction to affect your evaluation of their coursework). This can be achieved by ensuring that participants remain anonymous to the individuals concerned (e.g., you do not seek names of students taking part in your study). If such safeguards are in place, or the research does not involve other potentially vulnerable groups or individuals unable to give informed consent, it is appropriate to check the NO box for questions 1 and 2. Please describe corresponding safeguards in the summary field.

[3] Note: you have to ensure that collected data is safeguarded physically and will not be accessible to anyone outside the study. Furthermore, the data has to be de-identified if possible and has to be destroyed after a scientifically appropriate period of time. Also ask explicitly for consent if anonymised data will be published as open data.

Question	Yes	No
Only, if 'yes': continue with the following questions:		
➢ Was the device built in-house?		
➢ Was it inspected by a safety expert at TU Delft? (*Please provide device report, see: HREC website*)		
➢ If it was not built in house and not CE-certified, was it inspected by some other, qualified authority in safety and approved? *(Please provide records of the inspection).*		
13. Has or will this research be submitted to a research ethics committee other than this one? (*if so, please provide details and a copy of the approval or submission).*		

IV. Enclosures

Please, tick the checkboxes for submitted enclosures.

Required enclosures

- A data management plan reviewed by a data-steward.

Conditionally required enclosures

if you replied 'yes' to any of the questions 1 until 10:
- A full research application

If you replied 'yes' to questions 11:
- An Informed consent form

If you replied 'yes' to questions 12:
- A device report

If you replied 'yes' to questions 13:
- Submission details to the external HREC, and a copy of their approval if available.

Additional enclosures

- Any other information which you feel to be relevant for decisionmaking by the HREC.

V. Signature(s

Signature(s) of researcher(s)
Date:

Signature (or upload consent by mail) research supervisor (if applicable)
Date:

DATA MANAGEMENT PLAN

Health-behavior change through self-experimentation

A Data Management Plan created using DMPonline

Creator: Antonia Fedlmeier

Affiliation: Delft University of Technology

Funder: Pride and Prejudice Consortium

Template: TU Delft Data Management Questions

Project abstract:

This project focuses on self-experimentation as a method for individuals willing to change their health behaviour, such as their diet, physical exercises or stress. The goal is to enable individuals who are motivated to change their behaviour, to follow through by facilitating self-experimentation with interventions. The intended effect is that individuals will find interventions that best fit their goal, personal values, as well as socio-cultural context, and through this establish a lasting effective behaviour change.

Last modified: 01-09-2020

Health-behavior change through self-experimentation

General TU Delft data management questions

Name of data management support staff consulted during the preparation of this plan

Jeff Love, Data Steward of the faculty Industrial Design Engineering

Date of consultation with support staff [YYYY-MM-DD]

2020-08-24

1. Is TU Delft the lead institution for this project?

- Yes, leading the collaboration

This research is part of a master thesis written at the TU Delft, the TU Delft being the leading institution. However, the project will be carried out together with the Pride and Prejudice consortium, which is a group of researchers from TU Delft, Wageningen University, TU Eindhoven and Twente University.

2. If you leave TU Delft (or are unavailable), who is going to be responsible for the data resulting from this project?

Jos Kraal, chair of this master thesis and researcher in the Pride and Prejudice consortium

3. Where will the data (and code, if applicable) be stored and backed-up during the project lifetime?

- SURFdrive

We will use SURFdrive to store the data. The Irish Qualitative Data Archive (IQDA) 'Anonymisation Guidelines' will be used to remove any identifiable data from the data set before storing them.

4. How much data storage will you require during the project lifetime?

- < 250 GB

The research project is still in the first phase, so it is difficult to predict the amount generated data. I assume it will be (far) less than 250 GB.

5. What data will be shared in a research data repository?

- All data (and code) underlying published articles / reports / theses

The project will end in a Master Thesis and a research paper. As such, some of the data will be published in a research data repository. However, no sensitive data of participants will be included, and participants will have the option to indicate whether they allow their data to be published/ made available to other researchers. Furthermore, all data will be anonymised.

6. How much of your data will be shared in a research data repository?

- < 100 GB

The data collected is will be used by the researcher to inform the design of an artifact. Some of the anonymised data may be published as part of the master thesis, provided the participant gave permission for this in an informed consent form.

7. How will you share your research data (and code)?

- Data will be uploaded to another data repository (please provide details below)

Some of the (anonymised) data may end in the Master thesis documentation, which will be shared on the TU Delft education repository.

8. Does your research involve human subjects?

- Yes

The research looks into how individuals can improve their health behaviour through a process of self-experimentation.

9. Will you process any personal data? Tick all that apply

- Video materials
- Photographs
- Other types of personal data – please explain below

The project will facilitate the participants to experiment on themselves. As part of this process the participants get to decide for themselves which data they will collect about themselves. Due to this, it is currently difficult to describe the exact nature of this data. However, participants will be informed and advised against sharing sensitive personal data. Several experience prototypes will be tested throughout the project, and if given consent, these tests will be documented using videos/photographs. Interview sessions will be recorded, but any personally identifiable informations that participants may provide will be anonymised (or deleted if necessary) during transcribing.

TU Delft questions about management of personal research data

1. Please detail what type of personal data you will collect, for what purpose, how you will store and protect that data, and who has access to the data.

Please provide your answer in the table below. Add an extra row for every new type of data processed:

Type of data	How will the data be collected?	Purpose of processing	Storage location	Who will have access to the data
Signed consent form	through an online form	To record the consent of the participants who agreed for their data processing	SURFdrive	Antonia Fedlmeier (researcher) and her supervisory team (Jos Kraal, Marina Bos de Vos, Mailin Lemke, Merijn Bruijnes)
Photographs + Video recording	Depending on if testing is possible in person (Covid rules) either through camera of the participant and then sent digitally or a camera of the researcher	The photographs and video recordings are needed to evaluate the interaction of the participant with the prototypes.	Original footage will be kept on SURFdrive and deleted at the end of February 2021. Select footage will be edited to remove sensitive data and make faces indistinguishable and used for communication purposes in project reports (provided participants have consented).	as above
Other Data	During the self-experimentation interventions + interviews	To help answer the research and design questions raised in the project	Original audio recordings will be used to create a transcription (anonymized). The audio data will then be destroyed. Any personal data provided by participants during the self-experimentation will be anonymised before storing.	as above

2. Will you be sharing personal data with individuals/organisations outside of the EEA (European Economic Area)?

- No

3. What is the legal ground for personal data processing?

- Informed consent - please describe the informed consent procedures you will follow

The informed consent is based on the template provided by TU Delft.

4. Will the personal data be shared with others after the end of the research project, and if so, how and for what purpose?

No

5. Does the processing of the personal data results in a high risk to the data subjects?

If the processing of the personal data results in a high risk to the data subjects, it is required to perform a Data Protection Impact Assessment (DPIA). In order to determine if there is a high risk for the data subjects, please check if any of the options below that are applicable to the processing of the personal data during your research (check all that apply).
If two or more of the options listed below apply, you will have to complete the DPIA. Please get in touch with the privacy team: privacy-tud@tudelft.nl to receive support with DPIA. If only one of the options listed below applies, your project might need a DPIA. Please get in touch with the privacy team: privacy-tud@tudelft.nl to get advice as to whether DPIA is necessary.

If you have any additional comments, please add them in the box below.

- None of the above apply

Appendix 10 **Feedback Form**

FEEDBACK FORM

For me Self-Experimenting feels like....

For me the purpose of Self-Experimenting is....

Three things about the prototype that you found helpful/that you liked:
I liked...

Three things about the prototype that could be improved/left out:
I wish...

You do not have to send this form back to me via mail, but keep it around for our next meeting so you can let me know your answers!