

Design of Social-Psychological Interventions to Help People Change: Research through Design

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Abstract

Background: Wise interventions are brief, non-clinical strategies that help people overcome social and personal problems. They may be applied across a range of areas where unproductive interpretations of a situation exist that undermine peoples functioning. The interventions involve a soft form of persuasion by offering alternative interpretations attributions which are more productive and thus may evoke an individual's own capacity for change. Despite promising results in experimental research, these interventions are primarily research instruments, and unlike "real-world" artefacts, there is a lack in emphasis in engagement and interaction, meaning users will not want to engage with them.

Objective: The aims of this study was to explore how wise interventions might be embedded in everyday settings leading to natural interaction with the wise intervention.

Methods: This study explores a Research through Design (RtD) approach to the design of wise interventions, that is a designerley exploration using past experimental wise interventions studies (primarily values affirmation and self-affirmation interventions) as "design material".

Results: Emerging from this study was a "Mental Vitamin Dose", an experience installation where students might engage with psychological content through interacting with plants. The concept included a tree of values where touching the plants triggered audio- and screen-based interaction. Lessons learned in the form of reflection on action resulted in a proposed framework for further designing of wise interventions into different real-world contexts.

Conclusions: The Research through design approach allows for following a "design-intuition" based on experimentation through trial and error and working from opportunities arising from exploring different materials and objects. Using wise interventions as design material in such a process might enable overcoming the implementation-gap between experimental research and practice-based applications. Wise interventions may also offer a valuable contribution to the emerging field of designing for behavioural change.

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Original Manuscript

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Keywords: wise interventions; research through design; social psychology; social-psychological interventions; design

Introduction

This study explores positive psychology and “wise interventions” in a research-through-design project, that is, psychological remedies for social and personal problems [1,2]. These interventions promote well-being, resilience and grit [3,4] and prevent helplessness and negative self-talk [5]. Wise interventions seek to improve individuals’ behaviours through persuasion and attitude change [2], yet are minimally directive. Instead, they offer new information to individuals and request engaging in exercises that involve reflecting through writing tasks and drawing conclusions for themselves [1,2,6] as a form of self-persuasion [7]. The reason this may be effective, is partly due to correct timing, and a deep understanding of the interaction between context and cognition [8] building on the work of Kurt Lewin and his behavior equation [9]. Furthermore, there is a need to understand how people explain the reasons for their behavior [5]. Most wise interventions are a form of attribution re-training [5] and pursue to tackle self-blaming and maladaptive attributions which cause dysfunctional behavior, by offering other alternative and non-pejorative interpretations of the situation that may lead to better actions and thus outcomes for the individual. A notable example of such a re-attribution wise intervention is the work by Carol Dweck (and others) to improve academic performance in children and students through teaching the metaphor of “growth mindset”. Growth mindset is the idea that intelligence and abilities can “grow” in response to effort and coaching [10] and is an alternative perspective to the “fixed” intelligence and talent view. This has been the source of many experiments [8,11], and interventions that teach growth mindset has been demonstrated to not only improve results, but also to increase the likelihood of taking up challenges in the first place [12,13].

Most of these interventions are developed in the context of experiments where the participant needs to go through content “in full focus” for example in a classroom or other structured setting. There are some examples of implementation of for example growth mindset in education settings [14], but in general there are a lack of “interventions in the wild”, particularly beyond the classroom. But if they could scale and be applied to real-world contexts, such interventions may have tremendous benefits to society and would likely be very cost-effective. Here, a design-exploration could be a way forward to create new intervention artefacts that might inspire future innovative implementations in the real world.

Although the design discipline have for some time crossed paths with affective/positive psychology [15,16] and behaviour change [17,18], wise interventions are largely unexplored in design/HCI research or practice. Of course, design methods, such as design thinking, have been used for optimizing interventions to make them more relevant to their intended audience [19–21], but due to the highly conditional effectiveness attributed largely to the concrete implementation of the intervention [8], it has been complicated to really *design* wise interventions. It requires both in-depth skills in design, engineering and psychology [6]. Even small nuances in the implementation might completely undermine the intended outcome [8]. This likely have led to lack of co-creation with designers and end-users alike in problem-setting/framing stages, even if designers should be well positioned to work holistic and to strive to take the user-perspective with an empathic understanding of the individual in context. Moreover, real-world contexts imply a fiercer competition for attention that experiments can overcome through rewarding participation and controlling the situation. Here, creative designing may contribute beyond finetuning concepts for a better fit with user needs and preferences, to find alternative modes of interaction and explore completely new arenas for wise interventions stretching beyond the traditional to identify pleasurable and enjoyable experiences or products that users want to engage with in the first place (i.e. designing the *right* thing).

In this study, the challenge of exploring psychology, and in particular wise interventions, as ‘design material’ is taken up and acted upon. I had been part of teams working to design mobile-based and gaming-based wise interventions previously at [Project name and university name omitted due to

anonymity of review] and had experienced some of the challenges and opportunities of designing interventions first-hand. The process followed a research-through-design approach [22] with a perspective of design as a reflective practice [23]. No research question was initially set, but retrospectively it might be phrased as “how we might design wise interventions from psychological research to be embedded into everyday objects or real-world experiences”? It was the intention to explore whether such interventions could somehow become part of a daily ritual, on occasions or placed in specific contexts.

Thus, this paper reports on the design actions and reflections of exploring wise interventions as a research-through-design-case study, which is relevant to both social psychology and literature on wise interventions to inspire future applications [1], emerging literature on design for behaviour change [18], and to the HCI-research community [24]. The paper is structured as follows: First, it reports in detail on the process of work and introduce reflections on the different directions taken. Second, results of this work are presented, which in this case are the designed artefacts. And third, I discuss the lessons learned and draw implications for future work.

Reflecting in action as a research process

The process of the design research work was highly organic with planning, making and reflecting happening simultaneously, and thus unfolded as action-reflection cycles [25] where research emerged through action [26]. The process evolved through creative play with concepts inspiration from past psychological experiments and other sources where a visual log was kept documenting the process (refer to figure 1). The visual log, a miro-board, ended up as a mix between a workbook, log, and a mood-board, using found and created images to express ideas [27] and to document the process. It acted as a digital version of a rich design research space [28] encompassing the "chaos" and thoughts/reflections during the design process. Interesting pieces of information from past research on interventions were also added into this mix.

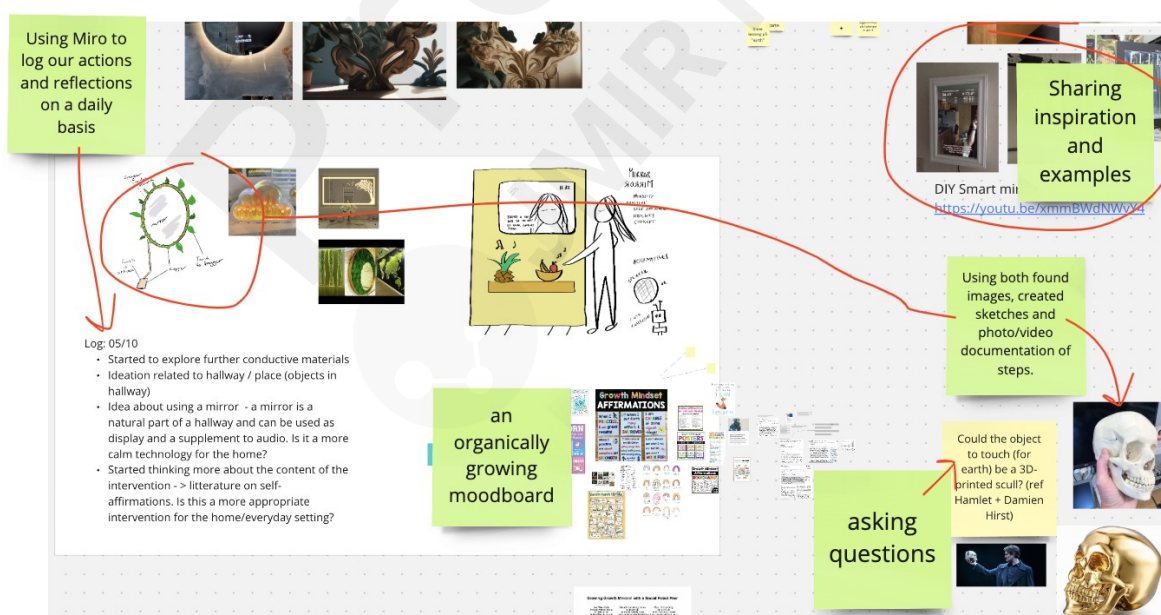


Figure 1. Excerpt from shared Miro-board with annotated explanations.

Looking at the miro-board retrospectively, a myriad of design choices were considered [29], such as the functionality of the design, the aesthetics and which technologies

could support the desired functionality and aesthetics (refer to figure 2).

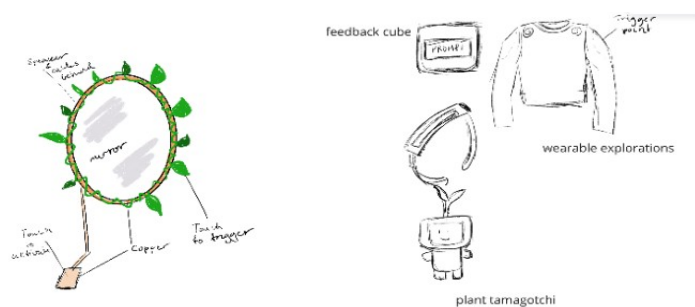


Figure 2. Reflecting on a myriad of design choices resulted in numerous sketches, prototypes and testing different technical approaches.

Exploring objects and technologies

What objects and activities could allow people to interact with wise interventions? Different interactions were also considered, included touching, reading, listening, looking at and so on and so forth. Of interest were *meaning* and *use* of different everyday objects, and the actions embedded in their use [30], as we initially wanted to explore an intervention that could be placed in an everyday setting, for instance into a home. We considered objects that were primarily symbolic, sculptural, and cultural (a scull, an owl, jewelry, a puzzle), everyday objects (mirror, book, speaker, plants, clothing), as well as emotional objects (a teddy bear or other stuffed toy, a picture frame). We realize that these are rather broad-brushed and to some extent overlapping categories, but considering a multitude of objects introduced a range of options, rather than starting from a screen-based interface, which would have been our usual practice as HCI/design practitioners and researchers.

We were interested in the objects of plants and mirrors, as they represent subtle everyday objects that seem well suited for a calm and non-intrusive technology [31] as objects that are not stealing too much of our attention. This included for instance reflecting on what does a mirror mean to a person. How and when is it used? A mirror is a reflected representation and not a true representation. But it is the object we use to gauge ourselves in general: “Who am I?” – and in the moment: “How do I feel today?”. We also considered its symbolic meaning from our cultural heritage, from fairy tales such as Snow White (*mirror, mirror, on the wall...*), and whether a concept such as a mirror would be an odd – or natural – item to introduce interactions to: Would someone ever touch a mirror or is that in opposition to everything we have been taught as children, to not get fingerprints on the glass?

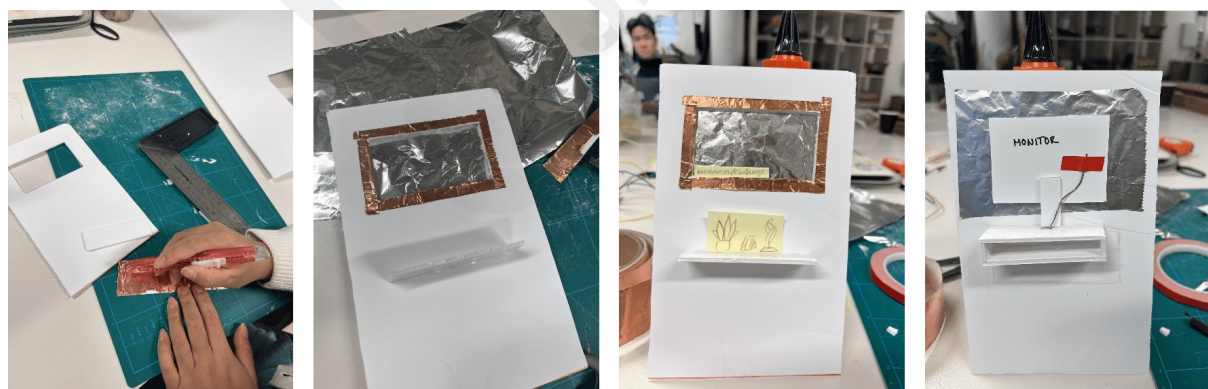


Figure 3. Early mirror intervention prototype.

The other key object of exploration were plants. Plants are interesting from a sustainability perspective, they add something organic and fresh to a home, but house plants may also for some represent a companion and observing their growth (or lack thereof) teaches us about life. Furthermore, there are

some interesting metaphors about *growth* often used in wise interventions, including the notion of “growth mindset” [10]. Different plants may also represent different personality or character traits, for instance hardy plants such as the snake plant or the dandelion may represent grit / toughness, whereas other plants symbolize calm or healing such as the aloe vera or eucalyptus. Furthermore, plants may in themselves help reduce stress or contribute to fostering well-being [32], so that using plants for the purpose of wise interventions could be fitting with our intent and interesting to explore further (refer to figure 4).



Figure 4. “The plant effect”: The internet is swarming with notions on what different plants may represent symbolically and what health gains plants may have on people.

But how could we make plants interactive, without causing harm to the plant and thereby undermining the very metaphors we wanted to utilize? And furthermore, how should interaction be initiated (if it even should be initiated by a human at all)? These were questions to explore further. An idea we had was that users can touch any objects, and wise intervention content, for instance a self-affirmation will show in the mirror. An alternative idea was to stroke an object (such as a plant) sitting on for instance your desk (or another situation where you might experience challenges) in order to induce a self-affirmation to appear.

Thus, these two objects, the mirror and the plant, represented challenges in terms of their interactivity because they are not usually something we interact with using technology, although we look at these object everyday (worth noting that there are mirrors for sale that have embedded TV-screens and mirrors were also dystopically depicted in the Netflix series Black mirror where every object is made into an entertainment screen [33]).

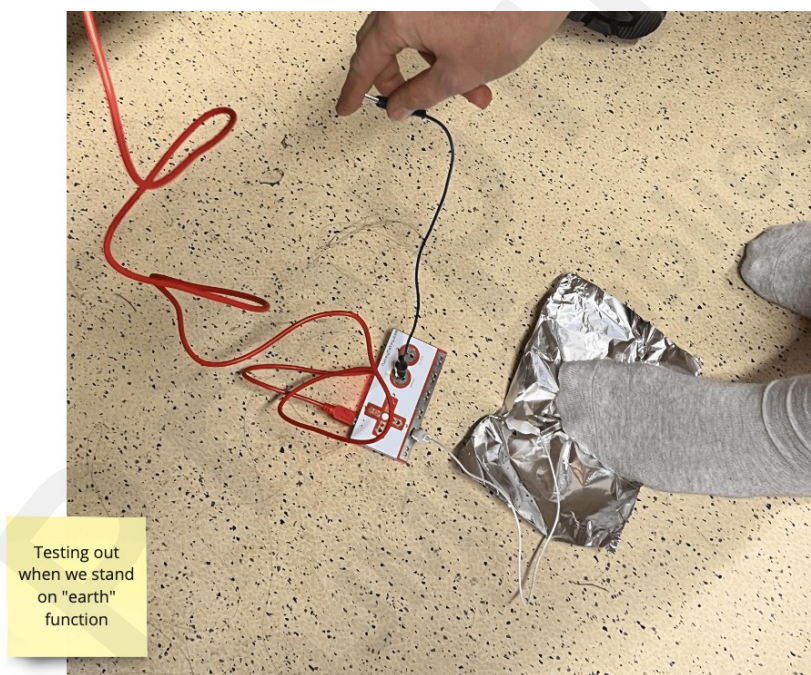
For the mirror, we found several DIY references of how one could build a smart mirror [34,35]. For the plant interaction, we found inspiration from research at MIT Media Lab’s Fluid Interfaces Group that explored plant-robots where among other things electrodes were added to the leaves of plants to trigger movement [36]. We also found a project using MakeyMakey and Arduino and plants to make sounds from product designer Will Wang [37], and an artistic exploration from Maria Castellanos on plant-human dialogues [38]. We were able to find a MakeyMakey touch board, a plant and used basic coding in Scratch to get an early working prototype of how it might work to touch a plant to trigger some form of interaction (sound, text etc.).



Figure 5. Early test with Makey Makey hooked up to a houseplant, where touch triggered recording or other sound (set up through the MIT developed simple programming interface Scratch).

A weakness of the system with MakeyMakey was the need to wire the board to “earth” to start the interaction. If we were to continue with this technology in further prototyping, we would need to get the user to interact with two elements somehow, for instance to press a button while touching the artefact. This did not seem very natural, and we thought about making a bathmat to stand on that would be conductive in order to ground to earth.

Figure 6. Testing out an idea of having a conductive bathmat step (barefoot or with socks) in



Testing out an idea of having a conductive bathmat step (barefoot or with socks) in

plant/pot/mirror/object to trigger intervention as audio and/or text.

In the end, we decided to go for another kind of board, the Bare Touch Board which was more sensitive and did not require grounding to earth. We also found a DIY instruction that was quite useful to our problem solving [39]. We investigated different materials such as copper and conductive ink / aluminum foil and 3D-printing with conductive PTA to produce objects that would be conductive and could be used with a touch board. In other words, a large chunk of the miro board does concern exploration with different technologies, materials, and problem solving/testing.

Now that we had a working technology, we could focus more on aesthetics, context of use and which intervention would be appropriate (as this had not been defined by us initially, as we did not want to limit our exploration too much from the start).

Two important and highly interrelated aspects were important in this regard:

1. Context of use (public vs private - or something in between?)
2. Interactivity (how to interact with the system and how much/how engaged an individual should be in the interaction).



Exploring interaction and context of use

We were not overly concerned with the intended user group, in contrast to traditional user-centered design approaches usually starting from user needs. Here, we rather imagined everyday situations and objects for any kind of users. In the process, we looked at having a smart mirror, that was one of our first concepts, in everyday life. From reflecting on different kind of objects, we also found that different kinds of interventions would lend itself more or less to certain modes of use in different contexts, and we spent a lot of time considering this situated use [40] towards our last few weeks of this RtD project in a 'field approach' to RtD [41].



Figure 7. Which contexts to design for and in what ways may people interact with an intervention?

An alternative use of the mirror concept could be if we made it into a less interactive system where users might not need to engage with it, rather intervention content could simply appear at set times as a weekly or daily intervention. We explored this more passive kind of interaction with a push-delivery of content in a design concept for a smart mirror where the intervention content would simply appear. This work was based on a very recent wise intervention experiment where users would receive a "stretch challenge" to step outside of their comfort zone [42]. We designed this as a smart mirror featuring weather forecast and time/date so that it would be useful as a regular mirror but still indicate that it is a smart mirror. In our prototype as pictured below in figure 8, the stretch challenge appears once per week without any touch as a trigger.



Figure 8. The mirror concept in a more passive interaction, featuring a “stretch challenge” intervention encouraging the user to step out of their comfort zone.

It could be interesting to develop this further to be perhaps triggered based on for instance facial expressions or other forms of mood indication, as this intervention was proven to work best for ‘unhappy’ people [42]. However, we were worried that these interventions would very easily become background noise. Plus, it is another screen in the home, would this not be against our idea of not wanting to increase screen-time? We reflected on how long users would interact with this in their home. And would they just forget to interact with this? Would they want a daily interaction or a more intensive “boost”? Thus, we also considered more immersive design concepts where users can “bathe” in interventions in times of need, for instance during times of stress. These ideas were largely based on art installations such as Michelle Vine’s play moves at Museum of Brisbane 2022-2023 and her Feminist Affirmations room from 2017 [43,44].

However, is the home really the most beneficial context of use if all a user needs is a one-off for it to be effective as long as it is timed right and designed right (considering that most wise interventions are brief and one-time interventions)? Based on these reflections from exploring situated use in combination with psychological theory and practice-based experiences, we decided to explore public spaces rather than the home to engage with more people on single occasions yet embedding in our design a kind of shared environment that these experiments cannot offer. These reflections and considerations led to dropping the mirror as a concept and to explore further public spaces as a place for interventions to be embedded. We decided to shape an intervention for a particular space where lots of people pass by where the intervention could be some form of pop-up, built with temporary materials such as cardboard, taking inspiration from found images of cardboard shaped trees and display material to design something temporary to engage with once upon passing by.

Interactive wise interventions

Throughout the process we discussed and envisioned how often and what way people should interact with the intervention material. We wanted to make it easy, that it does not require too much effort while at the same time being a meaningful and reflective experience. Was it going to be possible to tie the intervention to an everyday situation - such as getting ready in the morning in front of the mirror, or would that be too passive? Sometimes the experimental studies involve some form of logging or writing tasks in order to learn / reflect / self-persuade or commit to action / describe action. This may be part

of how the intervention work but is also a research instrument to collect data. If this is part of a daily interaction or ritual, then it would be nice to keep interaction at a minimal level, and yet try to prevent the intervention from becoming "background noise" that can easily be completely ignored.

We took inspiration from an experiment done at the University of Waterloo in Canada [45], and decided to craft an intervention based on the values affirmation used in this study and design a physical experience of it in a public space at the [University name omitted due to anonymity of review] bringing together our initial exploration of interactive plants.

Results: The Values-Affirmation 'Mental Vitamin dose'

Our final research output was an intervention pop-up based on different implementations of values affirmations interventions [1,45,46]. People may interact with the intervention through touching different plants - for this initial setup there are three plants, which all represent different things other students have valued: "Helping others", "Doing sports or engaging in a hobby" or "Relationships with friends and family".

When you touch a plant, you get stories of others as quotes generated by different AI-voices. The quotes were shortened versions from the original experiment. Afterwards, you can contribute with your own stories to help build a Values Tree for the chosen context by writing notes and attaching them to the pop-up installation which is shaped like a cardboard tree. The notes were green so the tree will become greener and appear leafier as more people share. Refer to figure 9 and 10 for a summary of the research outcome.

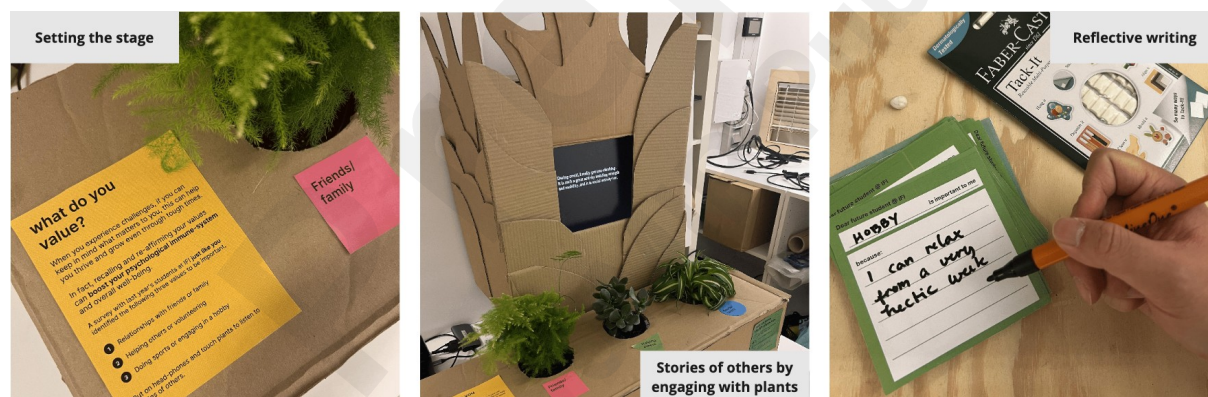


Figure 9. A self-affirmation values intervention designed to be inserted into a public space.

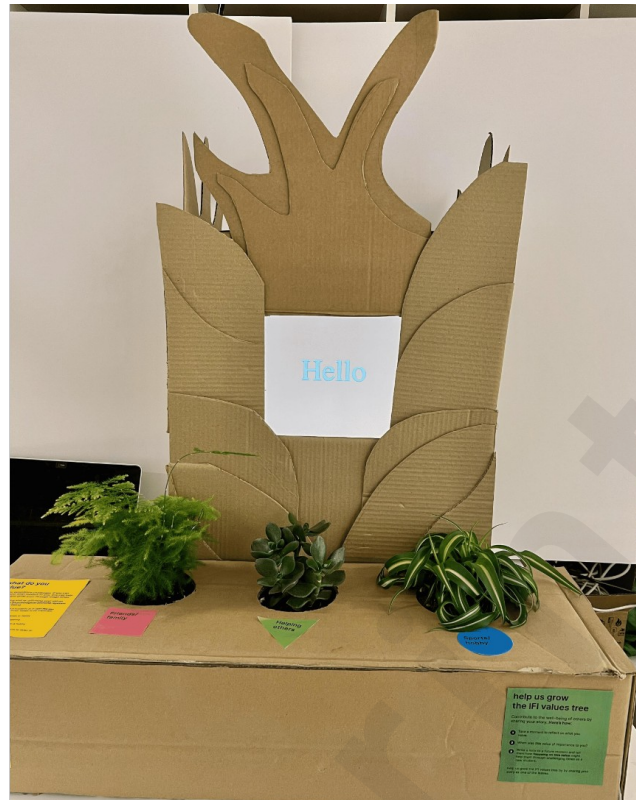


Figure 10. Mental vitamin dose: View from front, showing the tree shaped monitor box. For a further understanding of how the intervention works, see also this video recording [link removed due to anonymity of review].

The designs presented were crude, using simple tools and what we had at hand. The simple design allowed us to build an initial prototype version of the intervention which could be tested quickly with users (figure 11). We collected feedback and iterated on ideas that we have listed in table 1. These ideas represent potential for future design-oriented research for the conceptual direction of using plants in a public display.



Figure 11. From the exhibition at the design Lab at [omitted due to anonymity]. Lessons learned from testing out the research output with people have been documented as ideas and improvement suggestions in table 1.

Table 1. Ideas and improvements from observation of use as well as concrete feedback from our presentation.

Ideas	Improvement suggestions
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FORESTATION: Could consider painting the cardboard green or using other materials to make it more “tree-like”. Make it into a forest of plants - that one can wander into with multiple plants to talk to/interact with. A calm space to relax in or wander in?

ORGANIC GROWTH: Bring messages back into the system itself - either manually (everyday someone will come to “harvest” values and enter into the system) or automatically.

FEEDBACK: Make something happen when notes are posted (can be a kind of reward for those that contribute) - you want to see what happens. For example, can something grow or move? Consider different sensitivity for touching the plants such as a soft touch for low volume and a harder touch to increase volume? Match plant personality, value and accent?

GIFTING: Include a take-away gift? Take with you a chosen value as a reminder and trigger to reinforce the intervention. The gift could represent the chosen value or be personalized. Consider to include 3D-printing to achieve the personalization.

Improve screen interface (color, fonts, contrast etc.) and adapt size of screen to overall design.

Improve overall experience, in particular interaction audio / voices: For instance, avoid voices “quarrelling” and plants talking to each other, as it is very tempting for people to touch multiple plants simultaneously, so they end up drowning out each other’s voices.

Expectation that there are new quotes coming - people repeat touching the same plants – consider introducing further content.

There is something nice/interesting about the AI-generated voices but perhaps we need to eliminate some of the problems (too long a break when there is a period, people are not patient enough to wait) and find less “posh” voices.

When in semi-public space with other people watching it is not so tempting to write something personal – improve experience of privacy.

Discussion: Reflecting on Action

This paper presents a Research through design process that occurred over 5 weeks that explored wise interventions that were explored using objects such as mirrors and plants. During this process we went through a large number of choices before producing our final artefact: The Mental Vitamin Dose. These multifaceted choices contributed to taking the designed outcome in many different directions [29]. We started from a large number of images and existing objects to inform our design choices, to a much stronger degree than using design theory, in line with what often happens in a design process where existing examples are more important to inform ideas development compared to theory [47]. Our research *emerged* [26,41], through the designing of the artefacts and moving back and forth between psychological theory, reviewing practical implementations and problem solving with technology and exploring for instance context of use. The design-research process in this project moved across all domains of the design-research triangle [48] looping in circles between design practice, design studies and design exploration (figure 12), although this was perhaps primarily design-oriented research [49].

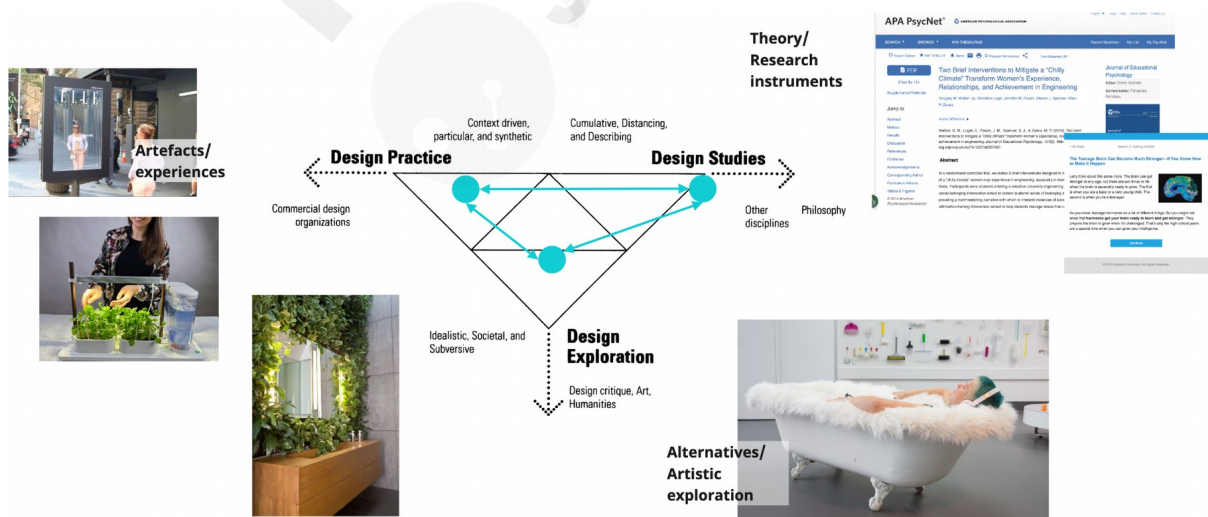


Figure 12. The design-research process in this project moved across all domains of the design-research triangle, based on Fallman [48].

Our design exploration included mapping out the material used in the affirmation training intervention from Walton et al., 2015 [45]. Considering critically our research through design retrospectively; how far did our presented design depart from the original intervention that we based our work upon? The original intervention was based on handing out written material about six values identified as important to manage stress and find “balance” in engineering, such as relationships with friends and family. Then, participants listened to audio clips with quotes about these values, followed by two writing exercises to facilitate internationalization of the messages. After completing the writing exercises, students received a key chain as a physical cue designed to remind them of the intervention message. Our re-designed intervention contained a similar process (as intended) including listening to statements about values (received by interacting with the plants to trigger text on screen and audio recordings) and in our case, just one writing exercise, making our intervention briefer. The key difference however, is that this is now designed as a playful experience that anyone can interact with beyond the context of research. Because of the interesting use of technology, we could see that the intervention sparked interest from passers-by, who *wanted* to engage with it, which in itself is a major find, as engagement and retention are major obstacles to implementation of interventions [50,51]. We think thus that there is potential to further explore creating wise intervention-experiences as described in this paper and have included suggestions in the next section for how they may be further explored in future research.

Suggestions for further research

This has been a complex project moving around between the lab and the field [41], and there is room for future explorative work. We may for instance in the public space consider further how to design for focus and mindfulness in a public space (headphones, relaxing sounds, making a tree/garden space, using sounds of nature etc), as well as reminders in physical objects to take away, and how to feed back into the system what the users share so that the installation may in fact grow and/or as a form of reward, a pleasure of the interaction. In the private space there is more to explore in the “drifting by” / minimal interaction mode, for the mirror idea, but also other objects or artefacts that together form the intervention. We could also explore further the notion of *timing*, for instance by giving people positive affirmations if they show signs of being stressed or ‘blue’ (for instance with smart wearables or mood recognition). Other suggestions for future research include trying out other interventions such as social belonging [45] or growth mindset [10] using the similar kinds of concepts as have been tried out here. There is also further research needs to review this from a more critical lens and to consider effects and ethics and responsibility of our designs and artefacts and to use RtD as an approach for speculative design and technological futures [52]. There could also be potential to pursue to move further away from the original interventions to create more innovative objects and experiences. Our concept was moving the intervention into the “wild” as an experience people could engage with on their own, but it did not depart drastically from the original wise intervention.

There is also potential to do much more using smart technology. For instance, with the emergence of artificial intelligence (AI), and such technologies as chatGPT 4.0 recently launched in May 2024 [53], we could easily foresee training an AI with content from wise interventions in order to craft a personalized wise intervention specific to the intended user that offers re-attribution interventions.

Implications and Limitations

Our project could have a positive impact with further work to fine-tune its implementation. Despite the highly conditional nature of the implementation of the wise interventions, it was not our aim to explore whether the new interventions that we might design would be effective, this would be beyond the scope

of this study. We did find however, that it seems vital to consider time spend and engagement with the intervention, to understand how users should interact with the content, for instance whether the intervention would be more effective if there is some form of active co-construction involved that may act as self-persuasion (e.g. “saying is believing”, [7,54]).

After project completion, we mapped out our reflections on time spend and engagement with our journey through different conceptual directions for the interventions along with which wise interventions we deemed as appropriate for this kind of interaction with the system. Our journey through different conceptual directions is indicated by the arrow (refer to figure 13).

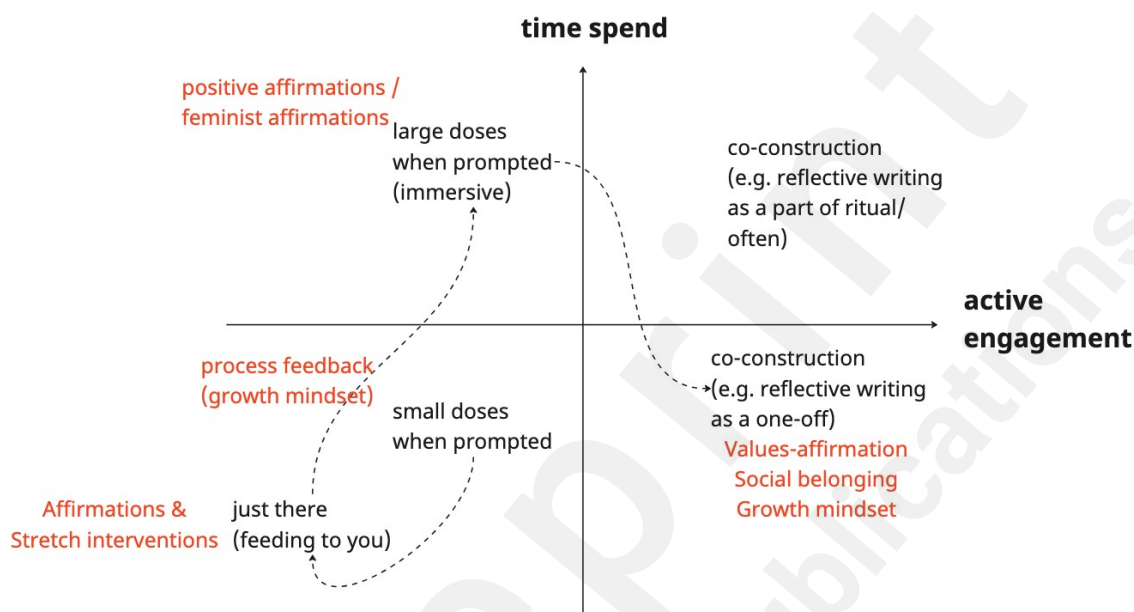


Figure 13. Time spend and engagement with an intervention – with the appropriateness of different kinds of wise interventions in mind.

This simple categorization may act as a framework for future design-oriented research on wise interventions, as such awareness may aid designing into different real-world contexts.

Conclusion and Personal Reflections on the Process

The Research through design approach allows for following a “design-intuition” based on experimentation through trial and error and working from opportunities arising from exploring different materials and objects. I had perhaps thought of RtD as more of a “methodologically normative” or prescriptive process much more closely resembling either design practice and human-centred design processes such as the double diamond and/or HCI-research on the other hand - and was positively surprised by the idea of *emergence* of research output and value placed on reflections.

Reflecting retrospectively, we likely could not have planned our steps taken in this project. We followed a winding path with frequent getting lost and retracing steps, learning along the way – coming together to something still yet to be defined. If we had planned the process, we would have ended up somewhere else entirely, and the journey would likely have been a less interesting one.

As a HCI-researcher and practitioner, I was unaccustomed to not working from specific user needs and was surprised at the new perspectives such an approach may introduce. And yet, wise interventions require both knowledge in (social) psychology as well as sensitivity and respect for values and norms in the user group, which means that any design-research process likely cannot disconnect from the users that should interact with the intervention. Thinking beyond the specifics and working from materials

opens up new paths for designing in HCI, which seems underexplored.

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