Augmenting the Therapeutic Relationship

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Abstract

This thesis presents the development and evaluation cycles of a prototype admin portal intended for use by therapists with Zeeds' mobile application to monitor patient’s progress. The mobile application is designed as a habit formation tool based on the therapy method acceptance and commitment therapy (ACT). Together with the portal, it aims to improve adherence to therapy homework.

The project went through two design and implementation cycles, with the first cycle focusing on focusing on gathering information through a literature review of ACT and cognitive behavior therapy to understand the therapists’ work, creating design mockups, and developing a prototype. In the second iteration, the design was tweaked. The portal was evaluated through a questionnaire in the first cycle and a usability test in the second cycle. The app’s evaluation results suggest that it can be a valuable tool for supporting adherence to therapy homework, but further testing and development are needed to realise this potential fully.
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Zeeds is a psychology startup that specializes in habit formation tools. They currently have one product on the market: A mobile app based on the therapy method acceptance and commitment therapy (ACT). The app consists of three phases. In the first phase, the users define their values through a series of exercises. In the second phase, the users define behaviours from their values. Finally, they track and perform these behaviours.

Even though there has been interest from private consumers, the most interest has been from psychologists. Habit formation underlies much of therapy. It is an essential part of ACT and the most common form of therapy, cognitive behaviour therapy (CBT); hence, they see using a tool like Zeeds. In these forms of therapy, which contain behaviour activation, the therapist gives homework at the end of a session. Together the therapist and the patient check the homework at the beginning of the next session. This homework is often a paper or perhaps a PDF. As with regular homework in school, many people do not do them or, as severely, do them the day before the session. It is predicted that low adherence impairs the efficacy of therapy.

This thesis aims to prototype a solution to improve treatment adherence by building an admin portal called Zeeds Insights. The mobile app will be connected to Insights, allowing the therapist to review live data. In the admin portal, the therapists can prescribe the Zeeds mobile app to their patients so they can complete their homework there instead of with pen and paper.

Before this work, some mockup designs existed and an implemented version allowed for login and account creation by uploading a CSV file. In the implemented version, no other operations are supported, including seeing created accounts after refreshing the browser. The mockups were designed for a company and its employees. Therefore it does not include ideas about how to show detailed information about an individual employee but rather group aggregated data, so some adaptations were needed to get to the initial prototype.

1https://www.zeedsapp.com (2022-01-06)
1 Introduction

This thesis aims to do the following:

- Provide a list of features required to improve adherence to homework
- Adapt the existing mockups to work in the new setting of the therapeutic relationship and implement a prototype with the most important features
- Iterate the initial prototype based on feedback from psychologists
Zeeds is meant to augment the therapeutic relationship in therapy methods that includes homework. Two examples of such methods are cognitive behavioural therapy and acceptance and commitment therapy. The patient is to track homework using Zeeds Core. In addition, the patient’s progress is visible in Zeeds Insights, to which the therapist has access. These two connected systems will allow the therapist and the patient to improve adherence to homework and, by extension, the effectiveness of therapy.
2 Background

2.1 Acceptance and Commitment Therapy (ACT)

Acceptance and commitment therapy (ACT) is rooted in some foundational theoretical theories, particularly relational frame theory (RFT), a theory of human cognition. The underpinning philosophical theory of both ACT and RFT is functional contextualism. Besides the theoretical frameworks, there are also several empirical studies showing the efficacy of ACT. A 2015 meta-study found ACT to be as effective as cognitive behavioural therapy for treating anxiety disorders, depression and addiction. It operates from the assumption that normal psychological processes often are destructive, which differs from other behavioural therapies that assume that psychological processes are healthy by default and not destructive by nature. From these foundational theories, we arrive at the core processes that ACT identifies as responsible for many forms of psychopathology. Changing these is said to lead to increased psychological flexibility. This is the goal and what ACT identifies as a healthy mind. There are many techniques that therapists use to teach psychological flexibility. In the figure above, some of these can be seen.

In order to understand what ACT is, it first helps to learn what it is not. ACT is not a treatment for a specific disorder. Instead, it is a general theory from which specific protocols to treat several disorders can be developed. It has been successfully used for disorders ranging from stress to depression. It starts with the assumption that language is at the root of much suffering. In a more abstract sense, our mind’s eye, in extension language, allows us to imagine great things. However, the same processes can be used to imagine horrible futures and ways seemingly all-day situations can go wrong. Since this inner world is the world a human experiences, this can lead to a person believing that it is the world they live. The stated goal of ACT is to help avoid this way of thinking by developing what the authors of refers to as
psychological flexibility. ACT aims to teach people how to control language and thought when necessary. The teaching is not done in a traditional way where logic analysis and direct instruction are the core tools. This is done more indirectly where experiential processes, stories and other more flexible techniques are used to teach a better approach to inner language.

2.1.1 Functional Contextualism

Functional contextualism is a philosophy which defines truth in a different way than what is conventional. It does not concern itself with objective truth. Instead, the truth is defined in a more practical way where something is said to be true if it leads to the desired outcome. Assumptions that do not contribute pragmatically to reaching a specific goal can safely be ignored.

2.1.2 Relational Frame Theory

Relational frame theory of human language argues that humans create frames that assign values to things. These frames consist of bidirectional links between objects (e.g. external stimuli, physical objects). These frames, in turn, give rise to how we feel and think about things. Combining individual frames gives rise to more complex structures, such as metaphors and analogies. The meaning of these structures often arises automatically; if the meaning is negative, it can be at the root of psychopathology. The intuitive nature of the structuring of these frames is why ACT works from the assumption that language is often at the core of suffering.

2.1.3 Core Processes

Psychological flexibility, at the core of ACT, is said to have six core processes. These can be seen below, along with a brief explanation. It is essential to note that these are tightly interconnected and work together. They are usually written in the corners of a dihedral, where each process has a line connecting it with all others, and psychological flexibility is written in the middle.

1. **Acceptance** - Not fighting with difficult emotions not meaning being okay with what caused the complicated feelings, but it means not actively trying to make them disappear since it is not controllable.

2. **Cognitive defusion** - Recognise those thoughts are just thoughts and hence be able to have perspective and not let them be consuming. In essence, experience things for what they are.
3. **Self as context** - Reason about oneself’s mental state. Take a more observing role.

4. **Committed action** - Taking action in an effective way guided by your values.

5. **Values** - The set of things about which you want your life to be.

6. **Contact with the present moment** - Focus on the now and less on the past or future.

### 2.2 Cognitive Behavioral Therapy (CBT)

Aaron Beck developed cognitive Behavioral Therapy in the 1960s. He noted that his patients often expressed “cognitive distortions”, meaning a point of view lacking basis in reality. This perspective led him to view depression more as a cognitive disorder and less as a mood disorder. From this observation, he outlined cognitive therapy. CBT’s model is based on three processes: automatic thoughts, meaning interpretations that appear without conscious thought. An example is a bird hitting a window with its beak. This scenario could lead to the automatic negative thought that the bird hates the person inside and wants to harm it or the more realistic thought that the bird is using the window to break open some seeds. These types of distorted automatic thoughts are assumed to be, in part, responsible for psychopathology. The second aspect is cognitive distortions, meaning logical errors that cause conclusions that do not correspond to reality. The third one is underlying beliefs. These determine how a person interprets input and can cause problems if dysfunctional.

CBT is often customised in a clinical setting to fit specific patients’ problems, but the sessions have an underlying structure.

1. Brief update and check of mood
2. Establish continuity from the previous session
3. Review homework and establish agenda of the session
4. Going through the agenda
5. Feedback and summaries
6. New homework and final summary
2.3 Adherence to Homework in Therapy

CBT, ACT, and many other therapy methods include homework between sessions.\cite{15} Completion of the homework is crucial for recovery. However, adherence to homework for adults has been approximated to be 20% to 50% by gathering data through surveys from practitioners. Although the number is approximately 50% in adolescents, it might be assumed that it is higher because of the better support network youngsters often have.

Several barriers have been identified. They can be divided into two categories, external and internal factors.\cite{15} There will be a focus on external factors since Zeeds aim to fix these. One of these is the inconvenience of pen-and-paper homework, and another is not accurately estimating the difficulty of the homework. Finding ways to improve adherence could increase the effectiveness of therapy since many studies show a correlation between adherence to homework and a reduction of symptoms.\cite{15}

There is a concern that studies looking at adherence overestimate the percentage that does their homework.\cite{10} The number of people who adhere to treatment tends to be lower in studies where only the psychologist estimates the percentage of homework a patient has done and higher when the patient also does an estimation. The estimated adherence is generally higher in controlled trials compared to a standard clinical
setting. One reason for this is the increased support in controlled trials, which causes the results of adherence research to be diluted.

CBT outcomes have improved even with only a tiny improvement in adherence.\cite{10} It has been shown that patients need to understand why they get specific homework to get the full benefit. If they adhere for the wrong reason, which might be a fear of failure, the effect is different from the wanted one. However, this is also hard to measure as the quality of performed homework is more subjective than completed homework.

2.4 Mobile Apps to Support Homework Compliance

![Image of mobile app features]

*Figure 2.4: Features found to be essential to support homework in a meta-study by Tang and Kreindler.\cite{15}*

Starting from the assumption that the patient will still be attending CBT or some other form of therapy in which homework is given by a psychologist, the primary purpose of mobile apps becomes to improve adherence and hence the efficacy of therapy.\cite{15} This can be contrasted to an app designed to be done by oneself. Such an app would need to be designed differently than one designed to aid in work already done with a therapist. That is, an app designed solely for self-help would need to put more emphasis on educational content. This type of content, along with other essential features such as aids for behaviour activation and symptom tracking, has been shown to improve adherence.

Most people keep phones close by, in contrast to pen and paper. The possibility for patients to track things immediately with phones can improve the accuracy
since it does not suffer from bias introduced by too much time passing until it is recorded. [15]

As the necessary steps for people to recover might differ significantly, it is also vital that the app is flexible in its structure, allowing easy customisation to fit a specific person’s needs. [15] There must be an emphasis on the ease of use even with the customizability since it will positively impact adherence. It is also noted that the app must guide therapy, which requires an easy way for the psychologist to review the patient’s progress. Reviewing homework, providing guidance, and troubleshooting problems have been identified as predictors of patient adherence to therapy. The therapeutic relationship between the patient and the psychologist is still essential for better adherence. Even after integrating features such as reminders to aid adherence, apps have shown a decrease in completed homework by up to 40%. This fallacy of apps shows us that the therapeutic relationship must be the starting point to construct any digital solution. Not doing so is likely to result in a worse outcome than going the traditional pen-and-paper route.

Mobile apps designed to aid in therapy can have many features and gather different data types. [5] This data could also be gathered from other sources, e.g. pen-and-paper and computers, but patients prefer using their phones. Built-in sensors can also be used to gather data that might aid in therapy without the conscious effort of the patient. An example of such data is step count. Mobile apps to support treatments seem to work. Extensive studies have shown them to contribute to significant decreases in depression.

2.5 Existing Commercial Systems

There are many commercial systems designed to help psychologists in their work. Most of these take an end-to-end approach, helping with everything from admin work to designing modules. However, these often require customisation by the psychologist. One example of such a system is Quenza which allows psychologists to create homework or use pre-made modules. [12] The clients receive these activities in a mobile app. Zeeds is much more narrow but aims to be more customisable from the patient side.

Existing systems also include systems focused on patient notes such as Theranest and TherapyNotes, both of these also have a more do-everything approach like Quenza. [15] [17]. Features like billing are included in the system. More general systems, not just directed at psychologists, also exist. Such an example is Kareo, which has the approach of doing everything a healthcare provider might require. [9]
2.6 User Experience (UX)

Achieving a great user experience requires a focus on evaluation.\[4\] This means involving users as soon as possible by studying what they do and how they might use the application and involving them in the design process by having them try the product. Data should be gathered from when future users try the product. This data can be empirical, e.g. rating the difficulty of performing a task. Given this feedback from users, appropriate changes need to be made. The design process is not linear. It is iterative. To summarise, user experience design should be human-centred.

The acronym PACT describes some good focus areas. PACT stands for people, activities, contexts, and technologies. The people part of the acronym is concerned with the users, who they are, why they might want to use the product and how they prefer such a product to look. Activities mean the specific things people want to accomplish by using the application. Context refers to places and scenarios where the application is used. Finally, technologies can be on which devices the people use the application, what the software looks like, the content, and more.

2.6.1 Understanding

This part of the process is concerned with understanding the users, the product and the environments in which it is to be used.\[4\] This means that it is important to talk to users but also to understand what the users will be using the product for.\[4\] The goal of understanding is to generate requirements, so it is possible to build prototypes and, finally, a production version.\[4\] In the concrete case of Zeeds, this means to, at a good enough level, understand the patient, the therapist and the relation between them. It also means understanding how homework and adherence can be improved upon by replacing pen-and-paper with two connected applications.

Understanding can be gained in a plethora of ways.\[4\] Since there often are real people using a system, one of the main methods is to talk to potential users. This can be done in more formal and informal ways. It can also involve how people do things now and ways to improve upon them. If there are other systems that try to solve the same set of problems, this process can also involve understanding them.

2.6.2 Persona

Once a broad understanding of a problem has been achieved, it is useful to generate more concrete depictions of users.\[4\] One way of doing so is to create personas. There is no consensus on how a persona should be defined. However, the main goal is to allow designers to see things from the users’ perspective and hence not to
design from their own perspective but from the users’. The important thing is to create a persona that is like a potential user and try not to let personal preferences decide.

2.6.3 Scenario

Scenarios allow us to make the requirements of a system even more concrete. Starting from defined personas, a scenario can put the user in a specific environment in which the user might use the technology, e.g., does the person have access to a computer or only a phone?

2.6.4 Evaluation

The consensus is that 3-5 people are ideal for testing usability. That number is not without criticism, as some researchers suggest a larger number. There are many ways of doing the testing, but two main ways are questionnaires and usability testing.

- **Questionnaires** - A document consisting of a set of questions that can be more open-ended or empirical in nature. Using this approach allows for a more automatic way of understanding as no manual interviewing, or similar is required. However, the complexity is instead moved to the design of the questionnaire. Creating good questions requires them to, among others, be understandable and unambiguous and that the answers give useful feedback.

- **Usability Testing** - This type of testing can help designers figure out how intuitive an application is. Therefore, it is useful to find testers that have not seen the system before. This can be done as a more controlled survey where users are asked to perform certain tasks and evaluate their difficulty.
3 Design and Implementation Cycles

The above flowchart shows how the work is conducted. First, the available data is analyzed before arriving at the initial prototype. The analysis is done by considering existing mockups and understanding the problem by reading research papers. This research consists of papers regarding the adherence problem and the theories the Zeeds application incorporates.

Since Mamduh is a psychologist by education, he was also used as a resource for questions and any requirements that he thought might be necessary. At a high level, there was also a need to understand the system architecture, especially the data flow. Mostly what type of data to display in the admin portal.

The difference in the envisionment and evaluation cycles between the prototypes is that the first uses a questionnaire developed in conjunction with Mamduh, and the second is a usability test.
3 Design and Implementation Cycles

3.1 Cycle 1

3.1.1 Existing Mockups

Figure 3.2: Mockup of the overview page

Figure 3.3: Mockup of the teams page
Above are the mockups created by the consulting company WeApp, which also built the mobile app. The mockups are for a company, FysioTest, not a psychologist, which means that the data is aggregated on a group level. So the data of a single employee is not accessible. However, there are still elements that can be used in the case of therapists who need patient-level data. The images are png and exist only in that format. It took two weeks to get access to the code, so the initial sketches were built in Figma. These can be seen below. Note that this means that the mockups could not be used to build the initial designs in Figma.

There are some key elements here. First, the design of the graphs can be used—especially the life satisfaction graph. In conversation with Mamduh, it was found that a life satisfaction that prompts the user one to two times a week is planned to be added to the application. There are also the life areas that are represented as cards, with rounded corners, icons and text describing which life area it is.

In the third mockup, similar cards are placed inside more oversized cards of different colours, with a headline describing the contents. Again, this is a way to do it, as this gives the user a way to discern the different categories that will be present on the page for a patient. Meaning that values can be orange, as they are that colour in the app and behaviours can have a different colour.
3 Design and Implementation Cycles

3.1.2 System Architecture

The entire system consists of two apps. Zeeds Core is the mobile application the patient uses, and Zeeds Insights is the admin portal the therapist uses to see how the patient is doing. Both applications use the same authentication service and are connected to the same database (DB). Psychologists need to be able to access their patients’ records in the DB, so a role needs to exist that ensures that. The patient can read and write their health data from Zeeds Core, but the psychologist can only read it.

The prototype implemented does not use actual data. Instead, it uses mock data randomly selected from a set of possibilities to give the users a feel for the final application. However, given that this will be taken from a prototype to a finished product, considering the current system’s architecture and making it compatible with that is crucial. No changes were made to the backend.

Zeeds insights is hosted on Netlify, which allows Zeeds not to manage any servers themselves. The code is pushed to GitHub and then automatically updated on Netlify\(^1\). The front end is built using react, a library for user interfaces\(^2\). Instead of writing user interface components from scratch, the UI library material-ui is used.\(^3\)

\(^1\)https://www.netlify.com (2022-01-06)
\(^2\)https://www.reactjs.org (2022-01-06)
\(^3\)https://www.mui.com (2022-01-06)
The first thing a therapist would do is input their email and password. When the user presses the login button, Firebase authentication authenticates the user. The user data is stored on Heroku in a Postgres database using Hasura to create a graphql API. When the user is authenticated the application also sets the Hasura user such that create, read, update, and delete (CRUD) can be performed.

Next, we assume that the therapist still needs to add patients. The first thing would be for the user to create a CSV file containing the name, birth date and email of all the patients to be added. This file is uploaded to the site where the formatting is checked. If the format is correct, the user can create patient accounts in the mobile application by pressing the send-in users button. This button triggers a serverless function on Firebase. The function creates the patients’ accounts and sends an email to each patient with a password they can use to log in to the mobile application. The patients would download the app and log in. The same authentication flow as with Zeeds Insights would occur.

The mobile app is written in react-native, a library for writing apps in JavaScript that compiles to native code. Hence, one codebase for both android and ios.

Both of the applications are connected, but there is no way to see a patient’s progress in the web application, remove an account, or even see which accounts have been created once logged out of a session where account creation has taken place.

The backend is disconnected in favour of using mock data in the prototype implementation. The browser’s cache is used to store data, as the intention is to build a prototype that can be quickly iterated. Not a fully functioning system.

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4https://www.hasura.io (2022-01-13)
5https://www.reactnative.dev (2022-01-06)
3 Design and Implementation Cycles

3.1.3 Persona

- Susan
- Age: 45
- Relationship: Married
- Profession: Psychologist
- Goal: Help as many patients as possible
- Problem: Many of her patients do not adhere to homework between sessions

Susan has been a psychologist for the past 20 years. Her speciality is cognitive behaviour therapy, so she regularly gives her patients homework. Susan has noticed a trend, the patients who do their homework seem to recover faster. She also understands why they do not do them. She does not find writing their homework on paper at the end of each session entertaining. She has been giving homework the same way for as long as she has been a psychologist. It has become a habit. She sometimes wishes a tool would make this more fun for both her and her patient since she cares for her patients and wants them to do better. She is an avid phone user, as most people these days and sometimes spends her breaks just scrolling through her phone or playing addictive games.
3.1.4 Scenario

Susan unexpectedly gets a phone call between one of her sessions from someone at Zeeds explaining the tool and how it could help her. She decides to try it as it appears to be what she wants. Setting up an account is simple, and she decides to try it in her next session.

Susan and her new client, a young man, are at the end of their first session. Out of habit, she is about to start jotting down the homework for the next session on a piece of paper. Instead, she remembers she wants to try Zeeds and pulls out her phone. She explains to the patient that he will receive an email with his login credentials and that he should do the value phase of the app until the next session. She explains the importance of homework to the recovery process, how Zeeds will make it more fun, and how the measurement function in Zeeds Insights will help her better guide him. She creates an account. The young man’s phone buzzes in a few seconds as he receives the email.

It is 20 minutes until Susan’s next session with the young man. She opens up her computer to check how he has done this week. She searches for his name and sees that he has filled in most of his values, missing only one area. She now knows more about how much homework to give out, and she also knows she will have to convey how important it is to complete homework between sessions for recovery.

3.1.5 Requirements

Given the information about the mobile application, the existing mockups, the system requirements, the persona and the scenario, the following requirements are deemed necessary for an initial prototype:

- Patient account creation
  As seen above, the therapist will likely create an account for a patient in their first session. User creation should require no more than pressing a button and inputting the patient’s name and email. It can still be possible to upload a CSV file, but this should not be the primary way of adding patients.

- Mobile-friendliness
  The scenario includes the therapist creating an account for her patient using her phone, so phone usability is also required.

- Search
  If there are more than a few patients, manually searching would take much time, so this feature has the potential to save the therapists time.

- Patient list
3 Design and Implementation Cycles

- **Patient dashboard**
  Show values and inactive and active behaviours, differentiated by colour. Include a graph that shows life satisfaction as a line and the frequency of behaviour as a histogram.

- **Information page**
  Frequently asked questions and payment information. The cost for a therapist is determined based on how many accounts are active. The pricing for each account also differs depending on the number of active accounts. Therefore a calculated monthly cost along with information about different pricing levels are to be shown

### 3.1.6 Figma Designs

It took two weeks to be granted access to the codebase, so the initial designs started in Figma, a collaborative design tool for interface design.

The first page designed is the list of patients. From the requirements, we see that it needs to have search functionality, a button for adding users, buttons for removing users, and a list of users. When patients have not yet done anything in the app, they are shown as inactive, represented as them being greyed out. Also visible is the information about a patient’s current active habits, if value reflection exercises are completed, and current life satisfaction is represented as a smile.

![Figure 3.7: Figma patient table design](https://www.figma.com)

In the requirements, a patient dashboard is specified. The purpose is to give the therapist a quick overview of a patient. The cards for behaviours and values can

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6https://www.figma.com (2022-01-14)
be expanded to show more detailed information. A placeholder graph from the mockup is used. Active behaviours are white cards, and inactive behaviours are greyed out.

![Figure 3.8: Figma patient overview design](image)

The app requests information from a patient when they create a behaviour. The expanded view of a behaviour is a mirror of that data. At the top is a schedule showing the day and time for a behaviour. The ladder represents the three levels of a behaviour. Some days it is unlikely the patient will be able to do the entire behaviour. Since the goal is to establish healthy habits, it is better if the patient performs some version of the behaviour to keep the habit active.

![Figure 3.9: Figma expanded behavior design](image)
3.1.7 Implementation

Once granted access to the codebase, Figma was abandoned to implement an interactive prototype. Some existing code was written for Zeeds Insights, which was used as a starting point. Starting from what is already implemented is more accessible. That is why there is quite a significant difference between the patient table in Figma and the patient table in the implemented prototype. However, the main things from the requirements are there. There is search, a way to add patients one by one or in bulk by uploading a CSV file. There is also a table showing information about each patient and a button to remove a user. Note that this prototype is not connected to any backend, but it is written so that doing so should only require minimal changes. The other pages have the elements found to be required. The one thing that could be more functional is the graph which is only a placeholder image.

![Figure 3.10: Prototype 1 of the patient table](image)
3.1.8 Evaluation (Questionnaire)

The questionnaire developed in conjunction with Mamduh is sent to some psychologists he knows. It was not just for Zeeds Insights, but also had questions about Zeeds Core and the manual meant to accompany Insights. The questions not related to Insights are left out for brevity. Given that the questionnaire is only sent to Swedish-speaking psychologists the translated questions and answers are found below.

1. Occupation/ongoing education
   - PTP-psychologist
3. What did you think about the admin portal? (1-10 where 10 is the highest point)

![Admin Portal Rating](image)

3. What did you like the most?
- Feels easy to use and clear
- Nice, intuitive design. Useful info, nice with the graph of life satisfaction. Really liked it
- It has great potential! I like the navigation flow
- It is easy to get an overview of behavior frequency
- The easy overview of the clients. Much better than other similar systems
- It is easy to see added users
- Easy to understand, tasteful, easy to follow over time

4. What did you like the least?
- I would like two numbers for behavior frequency: total behaviors done and behaviors done this week. Some spelling mistakes. Missing support chat or mail. "Trigger" to me sound like "anxiety trigger", maybe it can be switched to "behavior trigger"?
3 Design and Implementation Cycles

- Maybe a little too big text, a bit to zoomed in and the settings page were unclear lol
- Missing a function where it is visible which time behaviors are registered
- Just small stuff like specifying the graphs. It is unclear what values 6/8 means
- The menu where you enter to see measurements for each user was a bit cluttered and hard to get a good overview of

5. Could Zeeds’ solution for psychologists increase adherence to treatment? (1-10)

6. Could Zeeds’ solution for psychologists decrease administrative time in healthcare providers? (1-10)

7. Could Zeeds’ solution for psychologists decrease paper waste in healthcare providers? (1-10)
8. **Is there any feature you are missing?**

- Some small fixes I have written about above. If I am allowed to dream it would be nice if you could have the possibility to register exposure exercises and similar too.

- Maybe a chat/comment function? Such that the patient can ask questions/leave comments regarding stuff or the psychologist if the patient happens to write something unclear.

- Overview of when a behavior was registered. Do the description behavior need to be there when you are on a specific behavior page. Does every single psychologist have to have access to the pricing personally, maybe that is more important for the accountant at the healthcare provider.

- Message functionality and the possibility to suggest behaviors, but that the person gets to specify stuff like obstacles and time. I would also like a more clear habit tracker so I can see how often a person has done a specific behavior for example when doing forced exposure I want the person to do things every day, maybe even three times a day. Then I want to clearly see if the person has done so or not.

- I have a bunch of ideas, but we can take that tomorrow!

- The possibility to send messages to users.

- Notification about which behaviors that have failed and above all information about what the patient says went wrong/prohibited the behavior.

Most psychologists like the solution, given that the average rating is 7.875/10. Regarding adherence, they see the potential, as the average is 9/10. This is promising since one of the main goals of the application is to improve adherence. They are more sceptical about Zeeds decreasing admin time as the spread of the answers is higher, ranging from 5-10, but the average is still 7.625/10. They agree the most on Zeeds having the potential to reduce paper waste, with seven of the eight psychologists rating the potential to ten and one outlier giving it a three, bringing the average to
9.125/10. There are suggestions for improvement, some of which are possible and will be done in the next prototype. The ones that cannot be added at the current moment are things that would increase the risk classification. Zeeds is a medical product and hence needs to be CE-marked. Implementing features like messaging would increase the risk classification, making it more expensive to get approved. Hence Zeeds has chosen to limit the features in the first version. We get the following list of changes to be made in prototype 2:

**New Requirements**

- Make it seem less zoomed in
- Show the behaviour frequency for the current week and all time
- Better explain what some numbers are
- Change the histograms in the graph to be behaviours done on time and behaviours not done on time
- Instead of having a behaviour navigate to a new page, unfold it on the current page, which makes breadcrumbs containing behaviour and the behaviour name unnecessary
- Make the behaviour card less cluttered when showing all the information

### 3.2 Cycle 2

#### 3.2.1 Implementation

In the second cycle, the changes found in the questionnaire are implemented, giving the result below. These changes were then evaluated using a usability test.
3 Design and Implementation Cycles

3.2.2 Evaluation (Usability test)

The usability test was initially going to be done on another group of psychologists. However, to not bother potential customers this time, it was evaluated on people who are not psychologists. Since they do not know what a psychiatrist’s work looks like,
questions regarding psychologists’ features are removed. So instead, this usability test is only checking the ease of use.

**Step 1**

1. Create a new user (The newly created user will be assigned some mock data)
2. Click on the newly created user
3. Locate the graph
4. In the graph find the life satisfaction and frequency of completed behaviors for the first week of November

*How difficult was it to find the information in the graph? (1 - 5 (hard - easy))*

![Graph showing difficulty](image1)

**Step 2**

1. Click on the second active behavior from the top
2. Locate the 3 levels of the behavior ladder

*How difficult was it to know which behaviors were active? (1 - 5 (hard - easy))*

![Graph showing difficulty](image2)

**Final step**

1. Remove the user you created
How difficult was it to perform the task? (1 - 5 (hard - easy))

How did trying Zeeds Insights make you feel? (1 - 5 (sad - very happy))

The main result from the usability test is that the usability could be better. The graph is hard to navigate as 50% found it hard to find the answer to the questions. The result of this question can be ignored since psychologists are used to this type of graph. Three out of four rated it as hard to find which behaviours were active, so improving this is important as behaviours are central to functionality. Deleting a user is the exception in the data, with three people rating it a five and one person rating it a four. All who tried the application felt neutral about it. If people are to use this in their daily life, getting this number higher would be very important. However, this question would be essential to ask psychologists as they are the ones that will use the app. This number might be higher for them as they will compare it to what they currently use.
4 Discussion

The Zeeds mobile app was initially designed as a standalone tool for people to use the therapy method ACT to improve their quality of life. Studies have shown that self-guided therapy apps can decrease adherence by as much as 40%, even in cases where the features found to be required for a self-help app exists. It is excellent that Zeeds has chosen to keep the therapeutic relationship and improve upon that. They are building a tool rather than an end-to-end solution to replace the therapist altogether. The same studies have shown that this relationship is imperative for patients to improve. Extrapolating from these studies, I do not see that the Zeeds app will improve adherence as a standalone app, but it might do so when coupled with the admin platform since then it can be used to augment the therapeutic relationship. Perhaps it will not do so in its current form, but stating that as the main problem to solve should be able to guide the development in a good direction. Designing a standalone tool differs from designing something meant to be used collaboratively. Improving upon this will be about improving communication. Building something that lets the therapist and the patient communicate between sessions would be helpful. For this to work, there needs to be some mechanism to avoid giving the therapists the feeling that they need to be available around the clock.

4.1 Conclusions and Future Work

There is still much work to be done. The first step is to implement a production-ready version of Zeeds Insights. In hindsight, it might have been better to build the functionality one function at a time to have a production-worthy site ready in the end. However, since this prototype uses mock data, it remains to connect to the backend and adequately test it to protect the users’ health data.

Getting this in the hands of psychiatrists will be crucial for it to work as this will give feedback and lead to a much better product than something developed in isolation. However, ensuring the health data is secure must be the priority.
There is much room for improvement regarding what data is shown at first glance of the dashboard. Right now, it is too much and, by extension, unclear what is essential. Hiding some of the information and figuring out what data is most important to show is an excellent way to start. The application must be in the hands of psychiatrists. In their clinical work, they will discover what is truly important for helping their patients’ outcomes.

Overall the admin portal is good enough for a first release. One thing that should be changed before this is how crowded a behaviour looks when expanded. There is no need to separate each category into its box. Having clear headlines and structure is enough.

The main goal of Zeeds Insights is to improve adherence. It is vital to figure out how this can be measured. It would be interesting to have a live research project showing live data of adherence using Zeeds. The data could be displayed on the website.

Given the nature of the data and its content, it is crucial to ensure it is safe, but it is also important to figure out a way to use it transparent and anonymously. It could show what makes people happy and satisfied with life. It could also hide truths about what works for people in therapy. The implication is that it will be good to aggregate the data. Not just showing the data for each individual but helping the psychologists see connections. Here a question about what should happen with the data of a discharged patient comes into play. Should the data remain in its aggregated form for the psychologist to use, or should it be removed? It is beneficial for the psychologist to keep this data to gain insights. Therefore, if privacy laws allow, this is the way to go.
Bibliography


