MASARYK
UNIVERSITY

FACULTY OF INFORMATICS

Boosting Workout Adherence: A UX-Centered Approach to Motivational Gym Apps

Bachelor's Thesis

CHRIS BOHÁČ

Brno, Spring 2025

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Advisor: Daniel Ricardo Echeverri Giraldo, PhD

Department of Visual Computing

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Declaration

Hereby I declare that this paper is my original authorial work, which I have worked out on my own. All sources, references, and literature used or excerpted during elaboration of this work are properly cited and listed in complete reference to the due source. During the preparation of this thesis, I used the following AI tools:

- Grammarly for grammar check,
- ChatGPT to improve my writing style,
- DeepL to translate the vocabulary.

I declare that I used these tools in accordance with the principles of academic integrity. I checked the content and took full responsibility for it.

Chris Boháč

Advisor: Daniel Ricardo Echeverri Giraldo, PhD

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Abstract

The goal of this thesis is to create a prototype of a fitness application, that focuses on motivation by the adaptive user interface and functionality which help others support the user in their journey. Analysis of existing applications such as Fitify or FitAi was necessary during the process to understand what is out there in the world and what is not. The creation of the prototype included basic software engineering methods (e.g., requirements and diagrams) and advanced design methods (e.g., personas and scenarios). User testing, including eight participants, was done. Most of the users were satisfied with the application interface and functionality, and many of them noted that they would use the application if fully developed.

Keywords

Motivation, Accountability, UI, UX, Prototype, UML, Fitness

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Introduction

A person's health is widely dependent on many factors, but mostly on nutrition and activity. People who neglect those factors are lowering their lifespan. People who do not have enough physical activity not only start to have cardiovascular issues, but they also increase the chances of having type 2 diabetes, which on its own reduces life expectancy by approximately 8 years (1, 2). Even though many individuals know those facts, they do not have enough motivation to engage in the activity and make a consistent habit out of it.

Fitness coaches may try to help with this issue by rigid training focused on achieving given goals, but this was found to make people feel incompetent in the sport and not have fun, resulting in amotivation and dislike of sports or exercise. (3).

I can see this problematic myself as someone who deeply enjoys exercising, but in contrast, having a father who neglects this part of his health. This led me to attempt to motivate him many times by setting given goals and pushing him to exercise, but it never led to a consistent habit. When the motivation stopped from my side, he stopped exercising. Only when he found out why he wanted to do it and what motivated him as an individual, he started engaging in the activity, somehow of his own free will.

This made me take a deeper look into motivation as something that is not universal but specific for each person. As a result, I became more inclined to explore this in this thesis from the perspective of someone who uses fitness applications to help them with habit establishment based on their individual needs.

My studies at the Faculty of Informatics at Masaryk University, combined with the opportunity to study graphic design, allowed me to explore the importance of the User Interface (UI) and User Experience (UX) connected with the knowledge of how applications should be built and how the development should look allowed me to me connect this personal interest with my academic studies.

The thesis is structured into four main chapters. The first chapter is oriented toward an explanation of what motivation is and what are the basic types of motivation. This chapter includes a review of popular fitness and habit applications and how they focus on the

motivation of individuals. The second chapter is dedicated to the methodology used during the analysis and design of the prototype of the application, including the software engineering perspective (e.g., requirements, UML diagrams) and the design perspective (e.g., prototyping, design, and testing methods). The third chapter includes my application and its unique features, and also describes important pages, their functionality, as well as their user interface. The fourth chapter focuses on user testing, how it was realized in this thesis, the findings of the testing, and possible solutions based on the user's feedback.

1 Context

Motivation is a psychological force that drives the behavior and actions of all living organisms. It is the reason why people do something, why they like something, and why they want something. Humans engage in activities due to motivation. The usual motivation of humans is some kind of reward. The reward can be in many forms, either emotional (e.g., confidence, self-esteem, pride) or in a physical form (e.g., gift, hug, attention), but in the end, it is what drives people's actions (4, 5).

This is why the best way to help people stick to a habit of regular exercise can be to take a deep look at what motivates them to exercise and understand how to reinforce their motivations as individual human beings to increase their physical activity and reduce their health risks. To understand how to motivate people on their individual needs, knowledge of what types of motivation exist is needed, how they manifest themselves, and how impactful they are. The next section is dedicated to those types of motivation.

1.1 Types of motivation

This thesis is based on five basic types of motivation that were found to have an impact on the frequency, intensity, and duration of exercise sessions (5). For this reason, this section explains those five types of motivation and reveals their impact on the factors mentioned above.

1.1.1 External regualation

External regulation can appear when there are important rewards or threats and if the person is willing to submit (6). Duncan (5) says that "An individual who exercises for external reasons may do so to appease their spouse or their physician" (p.2). For example, a man can experience this type of motivation if his wife wants him to take out the trash under the condition that if he does not, he will not have dinner.

A study by Calvo (7), which talks about *external regulation* and motivation, suggests that *external regulation* may not be the best way

to motivate someone if the goal is to make them stick with the habit for a lifetime, due to the fact that young athletes were more likely to end the sport if externally motivated or demotivated.

1.1.2 Introjected regulation

Introjected regulation is connected with self-esteem and makes the individual try to do or avoid certain activities to have a feeling of pride or avoid the feelings of shame (self-oriented social emotion) or guilt (restrictive emotion oriented toward others) (6, 8). Where self-esteem, as stated in (9), stands for an opinion one has of oneself or what view of oneself he has. For example, a man may not want to stop with the morning routine he does regularly because otherwise, he would feel guilty for not taking care of his body, or in contrast, he may feel proud of the fact that he sticks with the routine for many months.

Research done by Duncan (5) found that "introjected regulation was a positive predictor of all three motivational consequences for females only. This finding suggested that females may experience a sense of pride associated with exercise or some degree of guilt or shame if they do not exercise." (pp. 2–3).

This gender difference can be further supported by Gillison's study about introjected regulation across genders, which found out that "Girls rarely exercised with their friends, and *introjected regulation* more commonly reflected the partial internalization of a health and fitness rationale" (10).

1.1.3 Identified regualation

Identified regulation occurs when a person engages in a behavior because they see value in the benefits it brings or because they themselves think it is important. Those individuals may do high-intensity cardio training because they know it helps to strengthen their heart (5).

1.1.4 Integrated regualation

Integrated regulation is connected to one's values (things a person respects and values in himself and others) and needs (things that a person requires for life). The individual usually accepts some value

or restriction and modifies it into a special form that he resonates with (6). A person of this kind may go to the gym because he believes that he is a gym enthusiast, so the activity itself is consistent with his identity. People with this kind of motivation are more likely to have longer workout sessions than others. (5)

1.1.5 Intrinsic motivation

Intrinsic motivation is the highest level of self-motivation which comes from pure pleasure (something that feels good) and satisfaction (pleasant feeling from getting something the person wanted) of doing the activity itself (11, 12). *Intrinsically motivated* people may run, because they enjoy the feeling of their feet hitting the ground (5).

1.1.6 Summary

Understanding the previous factors is required to build an application based on motivation that helps people form a new habit of being consistent with their regular workouts, which leads them to reach their health goals.

Results from a recent study (5) show that the impact of the three important factors is statistically significant. Most impactful were *identified regulation*, followed by *intrinsic motivation*, *integrated* and *introjected regulation*, whereas the *external regulation* impact was almost negligible.

In another study by van der Weiden (13), they found out that habits are easier to form under larger amounts of repetitions and the consistency of those repetitions. This complements the impact of correctly chosen motivation on frequency and intensity, leading to easier building of a healthy habit that the user would be trying to form with the application.

Even though there are particular types of motivations that are more effective than others, (14) suggests that the best way to motivate a person may not be universal and that people do react differently to a certain type of motivation. Different individuals have different motivational profiles (a profile is a specific combination of controlled and autonomous motivation), even for the same activity or situation (15, 16).

The existence of different types of motivation directs this work toward examining how existing applications address these motivations and influence user behavior.

1.2 Existing Applications

In his study done in 2019 (17), Chiu mentioned that there were more than 100,000 mobile applications on the Apple Store and more than 85,000 mobile applications on Google Play Store in the category "Health and Fitness" in 2019.

In those applications, there are three categories recognized. Training applications where the separating feature of this class of applications is exercise prescription. Tracking applications have a main focus on tracking many different aspects of user activity (e.g., steps, distance) and physiological indicators (e.g., heart rate, respiration). Fitness games involve physical activities, where the main distinctive aspect is the inclusion of competition, comparison, and cooperation (18).

Many health apps have grown, but only a few of them, such as Noom Diet, Nike+, and Lose It are successful across the whole mHealth market, mHealth stands for the use of mobile technologies to support and advance health care (19). "Moreover, in spite of the considerable usefulness of health apps in helping people to effectively manage their health, people's use of those technologies often lasts only for a short period of time" (20). This leads to the focus on habit building and connection to motivation, which is necessary for a user to stick with the application and the exercises it provides, which, as found earlier, is a big challenge for other fitness and health-related applications.

In 2022, the worldwide percentage of people not getting enough physical activity—enough being 150 minutes or more of medium intensity—adjusted for age differences, was around 38% (21). With 4.69 billion worldwide owners of smartphones, projected to be 5.83 billion by 2028 (22), the number of people using fitness applications could be expected to rise as well as requests for an application that will fill the needs and requirements of people within the insufficient physical activity group.

I chose applications for my research from Google Play Store based on the number of downloads, and their ranking in Google Play Store under words such as "Fitness", "Workout", "Exercise" and "Habit". I selected only those that were unique in style or had unique features. Applications chosen based on those criteria were "Fitify," "Hevy," "My Workout Plan," "BetterMe," "FitAi" and "Habitica."

To better test how the application adapts to a user's specific needs and goals, I tested each application twice, simulating two different types of users. The first one was a man with good health habits wanting to build strength and increase self-esteem. This user type was created based on myself as someone who visits a gym regularly and has tried many fitness and motivation apps. This step made evaluation from the user's perspective much easier. The second one was a man of a sedentary lifestyle with many other issues, wanting to lose weight to be more attractive to his spouse. This user type was created as the opposite of user type one to highlight differences across as many factors as possible. This made an evaluation of what changed in the application much easier because if any changes were made in the application based on the data a user filled in, they would be clearly noticeable.

1.2.1 Fitify

Fitify is a fitness training application where AI helps build suitable workout plans for individuals. The application was developed by two FIT CTU graduates, Martin Mazanec and Matouš Skála (23). Their mission is to provide the best personalized fitness experience in the world and make fitness and health available for everyone in the world (24).

When opening the application, the user gets a quick questionnaire to make a workout that suits them. First, they ask the user about their gender, which includes a non-binary option. Followed by the user's name and goal. After that, a part with social proof showing how many people they have helped till today appears, which felt highly persuasive (Figure 1.1).

Other multiple-choice or single-choice questions were asked regarding current body type, which muscles the user wants to focus on, regularity of their exercises, their current shape, their daily activity,

pains in particular areas, and what motivates them. This part included biometric questions—measurements of physiological characteristics such as age, weight, and height.

There were only two options regarding goals, losing weight or gaining muscles, which felt insufficient regarding people's potential motives. Using two completely different personas had an impact on personalized workouts, but no other impact on the user interface or texts was found.

The application pushes the user's personalized workout into the middle of the home screen to make them use their unique feature. A personalized workout is paid as a monthly recurring fee of 379 Kč. After the user pays, they get access to statistics, food recipes, and a personalized workout plan.

Frequent use of clickable and similarly shaped cards helps with consistency and a user-friendly approach. Usage of AI-generated pictures of muscular men all over the applications could harm user expectations of how and what they may achieve (Figure 1.1).

Two highly saturated colors are used in the application, blue and lime green. Those colors align well with the health industry and make the interface feel alive and fun. This feeling can help with the motivation of the user whenever they use the application by creating an environment that resonates with their goals.

Roboto, even though a very common font among applications, is used in different weights, works well, and feels very light and energetic (Figure 1.1).

The application includes a food section, which presents recipes based on a questionnaire asking questions about the user's budget, eating habits, intolerance, and food preferences. Those recipes are paid.

Experiencing this application helped me in my project to realize that there may be different ways to visually represent workouts or exercises beyond photos or videos.

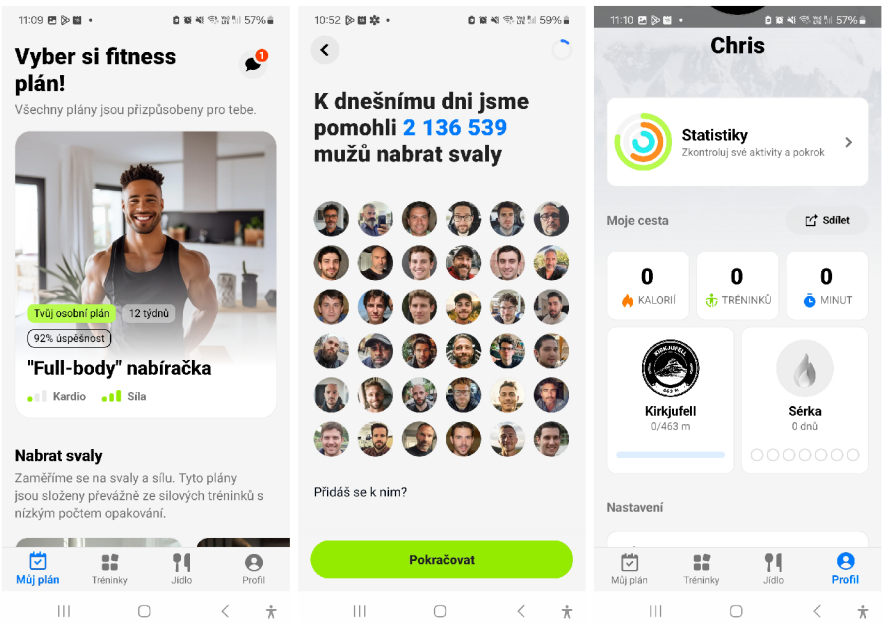

Figure 1.1: Screenshots of Fitify

1.2.2 Hevy

Hevy created in 2019, is a workout tracker that lets athletes log their workouts with ease, track progress and deduce unbiased conclusions based on analysis and clean infographics. Hevy does not aim to tell people how to exercise but rather help them to be more successful on their fitness journeys (25). Their mission is "to provide gym athletes with the tools to become more successful at reaching their fitness goals" (25).

After the user enters their email or registers through a Google account, it asks them for their nickname and in what metrics they will be measuring. After that, the user gets a quick introduction to the application.

There are a few premade routines for beginners, but the rest of the application is rather suited for people who are intermediate or advanced in working out and do need to track every single part of their workouts, such as rest, sets, and repetitions. Detailed infographics help the user orient in those sophisticated numbers and statistics, including

a man figure highlighting muscles they worked on this week (Figure 1.2).

When looking at motivation aspects, there was no special focus on this matter other than the option to share the user's workouts with a friend or the Hevy community.

The tracking, statistics, and analytics, which are their key selling points, are not presented on the main screen but are hidden under a few clicks on the profile. This makes it inconvenient for the user who wanted the application for this purpose. The free version of the application provides enough features even for a pro athlete. All the visuals, including graphs, are consistent and easy to read. I noticed the use of stock illustrations for the purpose of showing proper exercise execution.

The application has a clean UI design mostly in black and white shades, with a few occurrences of blue to make important buttons stand out. The font used in the application is Inter and is very common due to its legibility and wide range of sizes and weights.

During the examination, I saw a special focus on types of sets such as warm-up sets, drop sets, and failure sets, which are used by advanced athletes (Figure 1.2). Those are usually not available in other workout applications, which provide the feeling of being built with the purpose of helping athletes, not complete beginners.

This application helped me realize the importance of the structure of the application and how nested functionality can be hard to find or use. This may lead to user confusion and make the usability worse when using the application, potentially lowering the motivation to use the application and stick with the habit that the application helps to build.

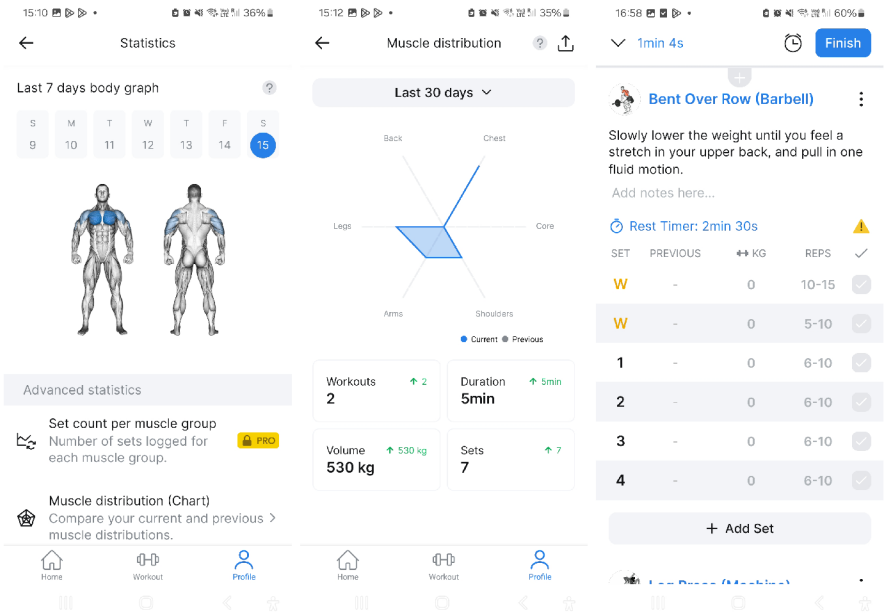

Figure 1.2: Screenshots of Hevy

1.2.3 My Workout Plan

My Workout Plan - Gym Tracker, released by My Workout Plan, is a gym-tracking application with more than 2,000 premade exercises. It focuses mostly on tracking the user's progress and showing statistics calculated based on finished workouts (26).

There is no questionnaire or registration needed after the application is downloaded. The user is able to create their own workout immediately without any obstacles. In the settings, there is an option to register via Google account, which allows the user to open the same workouts on other devices or save them for future usage.

Focusing only on the motivation elements, the only ones that were found were reminders. Reminding the user when to work out, set by themselves in the application. These were found useful in scenarios where one is overloaded and would completely forget to do the daily workout, but the notification helps the user to stay on the right track. The notification functionally based on a similar goal, helping with consistency, was taken into account during the design process of the proposed prototype.

The main part of the application is the ability to fully customize the user's workouts, build them from scratch, and even create their own exercises. It directs the user's focus on this feature by making the buttons with high contrast and glow effects, which makes them unable to miss, as seen in Figure 1.3. This unique approach is not convenient for beginners, because the only option to download a premade workout is to take it from a community place where other people share their workouts.

All the exercises are included in the free version of the application, as well as the basic statistics regarding individual workouts as seen in Figure 1.3. More complex statistics, removal of ads, and the option to store user data on the cloud and synchronize them across multiple devices are included in the PRO plan. The pro plan costs 550 Kč per year with an option to split it into monthly payments.

The app uses dark mode as the default, which allows them to emphasize the buttons that they want the user to press. The emphasis is created by a highly saturated green color with a pushed-up glow effect. The option to switch to light mode is included. The use of black shades for a background with white color for texts made it feel more user-friendly and less stressful than a white background. The vibrant green color used consistently across many buttons throughout the application provides clear visual guidance (Figure 1.3).

Consistent usage of the font Montserrat in different weights can be found throughout the application. Montserrat is a geometric sans-serif typeface that works well for websites and applications due to its legibility and clean style. Usage of one typeface and its different weights eliminates the issue with font pairings, making it easy to use.

Not only did the app include an option to change the number of sets or repetitions the user has in the plan for a given exercise, but it also allowed the user to change the amount of rest between sets, which is a very important metric for advanced athletes. No obstacles after the download felt highly convenient for someone who just wanted to try the application.

Vibrant color buttons with high contrast that direct the user to follow the desired path may be useful in optimizing how the user moves in the application. Like this, the user can be subconsciously led to press buttons that activate the required action to build healthy habits.

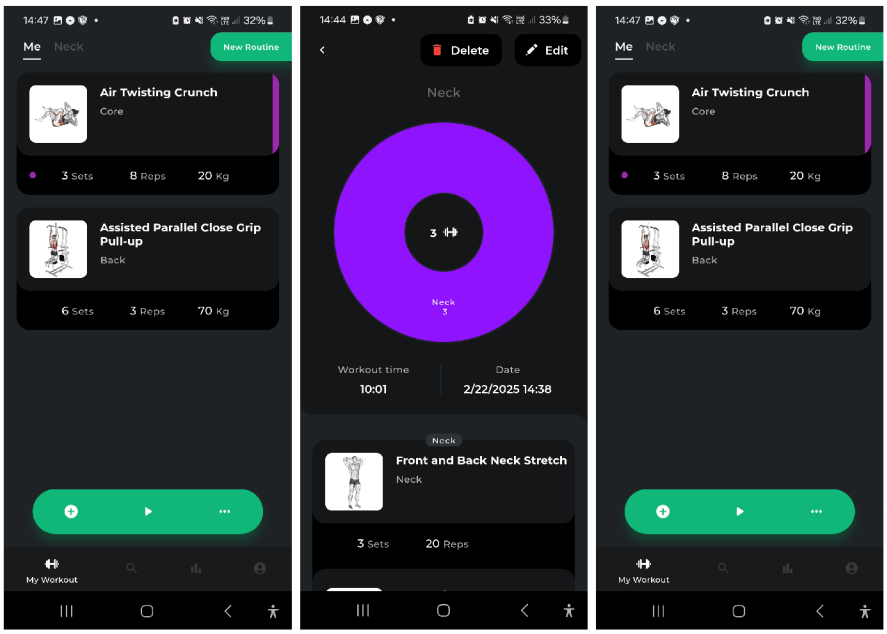

Figure 1.3: Screenshots of My Workout Plan

1.2.4 BetterMe

BetterMe is a wellness platform established in 2017 with a focus on diversity, simplicity, sustainability, and community (27). The application's mission is to *activate wellness from within*. Their vision is to make exercising easy and fun in the home environment (27).

The registration process was quite exhausting, due to many multiple-choice questions about my experience, daily life, and issues, followed by Yes or No questions focused on internal and external motivation. After I logged in, it did not allow me to enter the application without a payment plan or free 7-day trial, which I had to check in with my card. This was highly persuasive and created a feeling of them wanting money from the user rather than helping them grow as a person. No option to change language from Czech to English was found during the testing.

The application proposed workouts fitting my goal as well as workouts that help me with my specific pain or issue, in my case, knee pain. No other noticeable customizations of the application were found based on my answers (Figure 1.4). It also tryed to reinforce user's

habits with reminders, which it pushes on them right after they register. No other extra ways of motivating the user were found, with the exception of statistics.

There is no free plan, only a free trial for 7 days. After that, the user is required to pay a minimum of 499 Kč/month. To use its full functions, such as diet and yoga plans, the user has to pay 400 Kč/month extra, with 50 percent off, so in total, without a sale, they would be paying 1799 Kč/month for the whole suite. This approach made my experience stressful, because I only wanted to try it and did not want to pay if I forgot to unsubscribe.

The application is made in a minimalistic style, where it is really hard to guess what action they really want from the user. The general buttons are either white or just black outline, which is very minimalistic, but does not lead the user in any way. The biggest visual emphasis is put on big red buttons, which usually lead to payment options. The application has its own set of pictures and videos demonstrating the exercises, which gives a high-quality feel in comparison to stock images, as seen in Figure 1.4.

The color palette found in the application consists of black, white, and shades of grey, with one accent color, which is red. I assume that the 60:30:10 principle was used with 60 percent white color, 30 percent grey color, and 10 percent red color as seen in Figure 1.4. The primary typeface used in the heading and subheading is Gilroy by Radomir Tinkov; a free typeface. I identified two other fonts used in their branding: Aeonik Pro and Inter, both well complementing Gilroy.

A unique feature of the application was the recommendation of tools the user needs for a given workout and the button to buy them immediately, as seen in Figure 1.4, helping people to invest in their workout journey from the comfort of the application. The unique approach to the pricing and free trial made me realize that paying for the application from the first day may be a good approach to increase financial and emotional investments and give a reason for people to stick with the activity long enough to successfully build a habit from it.

Experiencing this application also helped me to consider the importance of clear visuals by either a meaningful hierarchy or color palette with enough contrast to help with user guidance throughout the application.

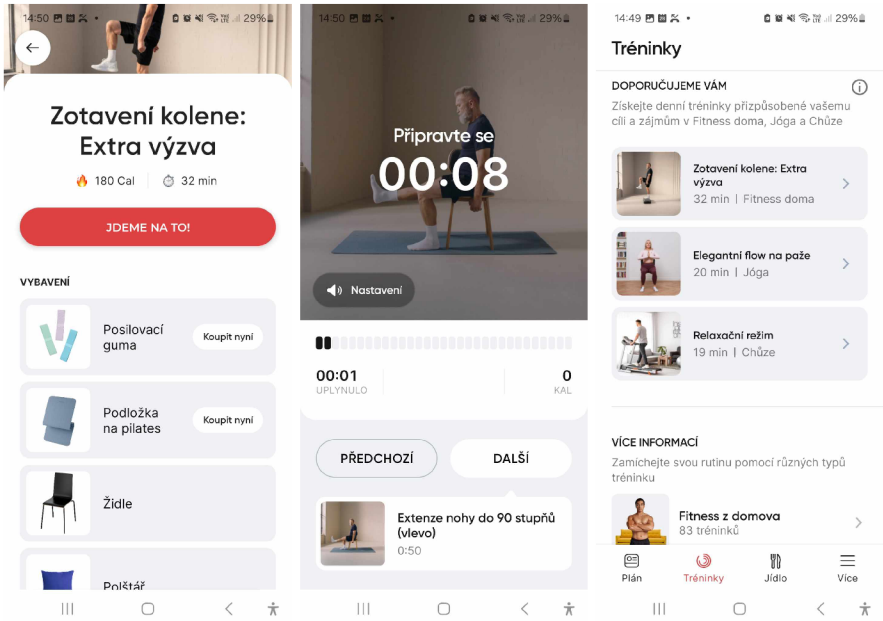

Figure 1.4: Screenshots of My Workout Plan

1.2.5 FitAi

FitAi, under its full name Workout Planner Gym Log - Fit AI found on Google Play Store, is an application that structures the user's workouts based on their inputs by AI (28).

The application asks the user similar questions as in BetterMe, except for motivation and injuries, which it does not cover. Based on the answers in the login questionnaire, not only did the exercises and the workouts change, but there was also a difference in indicator of how much muscle soreness a given exercise does. This makes sense due to the lower predicted damage to the muscle in the case of a professional athlete due to adaptation that the athlete went over in that many years of working out regularly.

No motivational features were found throughout the whole app, not even the notification about the user's next workout to not miss a day.

The application clearly leads users to start a workout as soon as possible and log their sets during the workout with blue buttons nicely standing out on the dark background. The second thing that

the application tries to highlight is its AI features, such as a chatbot with whom the user can talk about fitness.

All the necessary functions, such as workouts and statistics, are provided in the free version. The pro version primarily allows the user to interact with the chatbot and costs 330 Kč/month.

The color palette consists of dark purple and blue. Those colors have a low contrast, which makes smaller blue texts on a dark purple background not legible, as seen in Figure 1.5. The last color in their palette is lime green, which is used for two important buttons, "Log In" and "Try Free," which makes it stand out in a dark environment. The typeface used across the whole application is Lato. It is used in many different weights, which creates inconsistent feelings between the body of text, sub-headers, and headers.

A unique feature allows the user to see how much recovered each individual muscle is while recommending which exercises they could do today to let the sore muscles rest and focus on the ones that are fully recovered, as seen in Figure 1.5. This feature was not found in any other fitness app and is very useful for intermediate and professional athletes.

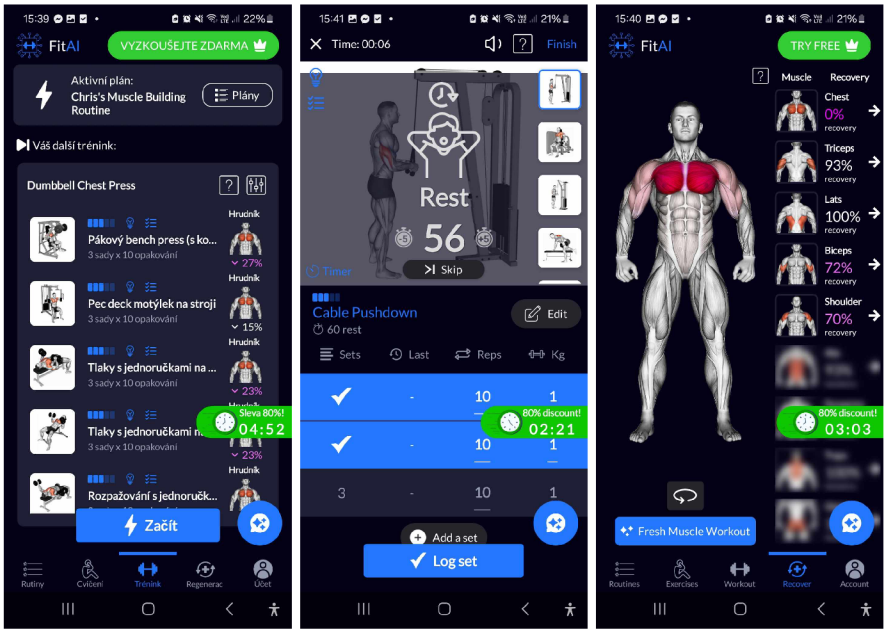

Figure 1.5: Screenshots of My Workout Plan

1.2.6 Habitica

Habitica is an application that helps the user with productivity and the establishment of good habits by gamifying those experiences (29).

The registration process was through a Google account, followed by two tasks. The first one was to modify my character, and the second one was to choose which type of habits I wanted to focus on and where I chose to exercise.

The application itself provides simple features like creating a task or to-do list, but the exceptional thing is how they reward users with coins and experiences that allow them to buy accessories in the shop or level up their character (Figure 1.6).

Their focus on motivation is strong. The main motivational features are rewards that a user gets every time they complete a task or make the daily habit they want to encounter, which puts focus on *external regulation*. The application also touches on the *identified regulation* by allowing the user to equip clothing and accessories, with hardly earned money, on their avatar, which represents them as an individual in the Habitica world (Figure 1.6).

They strongly focus on gamification elements such as avatar health, experience, gems, and money (Figure 1.6). I did not find any other attempts to focus the user's attention on something specific. The application is free with an option to buy a subscription, which allows the user to get more money per task completed or regenerate health.

The primary color of the application is vibrant purple, which appears throughout the navigation bar as well as the habit creation process. Complementary colors are green and yellow. Those three colors paired with pixel avatars create a pleasant environment that the user will want to return to, as seen in Figure 1.6. Roboto, as the typeface used in the application, is very neutral and works well in the many weights used throughout the application without grabbing attention from colors or icons.

The customization of the avatar and its accessory helps the application to present itself more as a game, something where the user has fun, even though facing such a high effort activity as building habits.

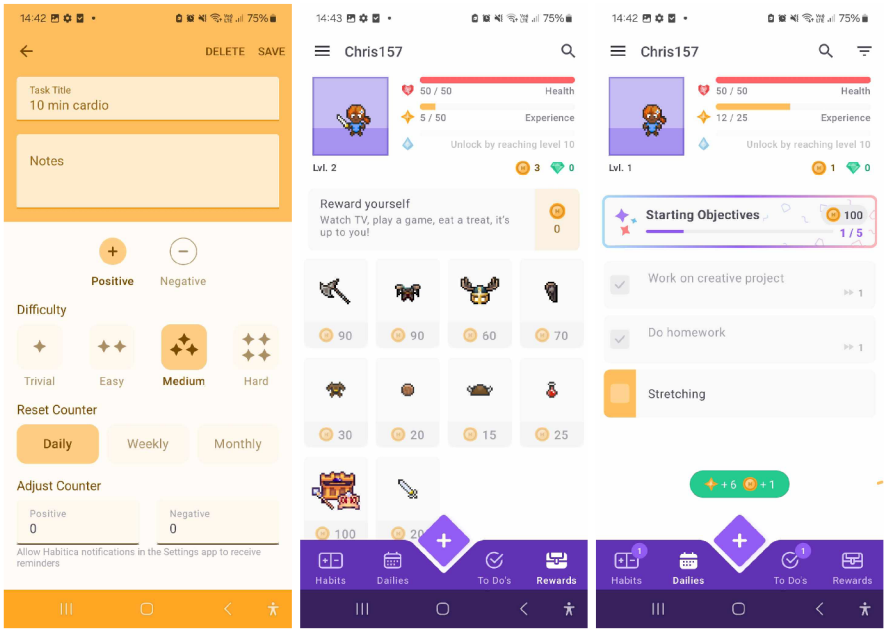

Figure 1.6: Screenshots of My Workout Plan

1.2.7 Summary

User experience throughout these six applications was completely different. Most of them tried to navigate users throughout the application with buttons of vibrant colors. Those buttons clearly create a desire to press the given button when everything else is dull. Those colors were usually green or blue, which people connect with health and relief. (30). This may help them to identify as a healthy person, falling under the category of *identified regulation*, which is known to be a highly effective type of motivation and could lead to easier habit establishments, see 1.1.6.

However, tactics, such as directing a user, could be used for malicious intents and forcefully direct the user to buy the paid version of the application or something in that manner, even if it is not anyhow related to the user's goals or needs.

Four of those six applications used AI-generated or stock images. AI images reduce the trustworthiness of the application by setting unrealistic expectations. Those expectations, as found by Harrison (31), if created from an external source, as it was in the case of explored

applications, do reduce healthy behaviors. This is the opposite of what the thesis is trying to achieve, so it is better to avoid AI images. At the same time, stock images make the application feel cheap and disrupt the consistency with other UI parts.

AI-generated images and stock images are not suitable to represent specific exercises or workouts in this scenario. In this case, there are potentially only two other suitable approaches. Create custom professional photos or create an avatar that will be set into different poses with different equipment to represent a given exercise.

No noticeable changes in the behavior or texts of the application regarding motivation were found in connection to different answers to corresponding questions. This approach neglects that people do have universal motives to exercise and that there are certain types of motivation that may work better on them than on others, as discussed in 1.1.6. This exposes the gap that other applications do not focus on and creates an opportunity for new applications that would fill the gap.

Targeted topics by initial questionnaires were about user's goals, their personal health background, or whether anyone supports them, but it seems the intention was to collect data rather than optimize the application for individual users.

2 Methodology

The first part of this chapter explains the approaches used to design the prototype. These approaches, selected based on the project's goals, help guide the development and provide a clear direction for the entire process. The second part of this chapter discusses design methods used in prototype development, as well as methods applied during testing to evaluate the prototype's performance from the user's perspective.

There are many standard methodologies, such as SA&D (System Analysis and Design), JSD (Jackson System Development), or SSADM (Structured Systems Analysis and Design Method) (32). The SA&D methodology was selected due to its thorough coverage of elements such as requirements, which were established during the initial research. It also covers analysis, design, implementation, and testing processes essential for developing functional and effective prototypes, as demonstrated in this thesis (33).

2.1 System analysis and design

"Systems analysis and design (SA&D) is arguably one of the core areas in the information systems (IS) discipline. In practice, SA&D seeks to identify business problems, capture information requirements, analyze data structure, and design computerized information systems" Tan, p.2 (34). SA&D primarily focuses on IT-centered solutions, the so-called design science paradigm, and moves away from human and organizational behaviors, called the behavioral science paradigm. The main purpose of SA&D is to produce and evaluate an IT tool that should help to solve business problems. Those tools made for designing information systems include the Entity-Relationship Model (ERM) and Unified Modeling Language (UML), as well as models, methods, and prototypes (34).

UML is employed in this thesis due to its effectiveness in bridging academic theory with practical applications, thereby reducing abstraction. UML is also widely used in almost any larger software development process and would be a good starting point for any application such as the one prototyped in this thesis (35).

2.1.1 Requirements Engineering

Requirements Engineering (RE) involves determining and defining the requirements of the system now and predicting them in the future. This part is typically conducted between software engineers and stakeholders. It is a crucial part of the development process, as a poor definition of requirements is responsible for 50% of software project failures (36). Depending on the stakeholder's interest, requirements have to take into account, human factors, human and computer interactions, marketing, financial resources, and other external and internal factors to describe the requested and functional system (36, 37).

There are five basic types of requirements that can be identified. Business requirements focus on the value that the system should provide to the company. Stakeholder requirements focus on final users so the system can do what they need in the requested form and be easy to use. Transition requirements focus on changes that could be done to the system or potential changes of the intended users. (38). Functional requirements tell the designer what functionalities should the system have, what it should provide, and how it should behave in certain situations (39, 36). Non-functional requirements focus on aspects like usability, accessibility, safety, and limits of the system (e.g. operational hours, recovery time after the crash) (40, 36).

Application requirements for this thesis were mostly focused on the usability and the adaptability of the user interfaces as well as on the basic functionality required for the application to run as intended.

2.1.2 Unified Model Language

Unified Model Language (UML) is a widely used language that became a standard for designing software systems (41). UML tries to describe the system requirements, functions, properties, and boundaries by diagrams. Those diagrams can be sorted based on four perspectives when looking at the system. The external perspective focuses on possible interactions between the user and the system, which includes the Use Case Diagram. Structural perspective, which includes diagrams such as Class Diagram, Object Diagram, and others. Structural perspective tries to capture the organization of the objects, their attributes, and how they interact with each other in the system. Inter-

actional perspective includes diagrams such as Sequence Diagram or Communication Diagram. Interactional diagrams are used to capture how exactly two or more objects interact with each other or how objects interact with the environment. A behavioral perspective which includes an activity diagram and a state diagram. Those diagrams try to model the behavior of individual elements and changes in their internal state or the behavior of the system as a reaction to given events (42, 43).

I used a Use Case Diagram to illustrate user interactions and an Activity Diagram to outline the potential implementation of activities and how they might be realized in the application.

2.1.3 Use Case Diagram

Use Case Diagram describes the functionalities of the system and who can do them. Single instantiation of any functionality is called a use case. Those use cases can be further specified by Activity Diagram as seen in 2.1.4. It follows the functional requirements and tries to show what the system should be for. Use Case Diagram does not care about implementation details such as relations, algorithms, etc. (42, 44).

Use Case Diagram is built from the *system boundary*, *actors*, *use cases*, and *relations* between them. *Use cases* are functionalities that should be realized during the system development and are connected to one or more actors, meaning that it is provided for them. The *system boundary* defines what is in the system and what is outside, separating actors from use cases. The *actor* is an entity that is expected to interact with the system, either a human, such as an admin, or non-human, for example, a server (42, 44).

Use Case Diagram has many types of relations (e.g. generalization, extend, include) between use cases as well as between actors, explained below (42, 44).

Generalization can be used either between actors or between use cases. In the case of actors, the generalization means that one actor is a general version of the other, which is the *ancestor*, and the second one is a more specific version of the ancestor, which will be the *descendant*. To not overwhelm the diagram with lines, a simple generalization can be made between them, meaning every relation that the ancestor had would have the descendant as well (e.g., user and student, where

the user is the ancestor). The child can have other relations on top of that. Generalization is represented by a line with a triangular arrow in the direction of an ancestor. Use case generalizations means that the descendant is a specific version of a general ancestor (e.g., "start a game" and "start a Tetris," where "start a game" being the ancestor) (42, 44).

Extend relation is used only between use cases and gives additional behavior to the base use case. If use case A is in and extends relation with a use case B, it means that the use case A can trigger use case B, but is not dependent on it and does not need to know about it. As an example when a user buys the pro version, the discount can be applied, or it does not have to be. Extend relationship is represented by a dashed line, complemented by the text "«extend»" with an arrow pointing to the base use case (42, 44).

Include relation is used only between use cases, and means that one use case has to happen with the other one. If use case A includes use case B, it means that use case A can not be executed without use case B, but it puts no restrictions on use case B, which can be used individually as an ordinary use case. Include relation is represented by a dashed line complemented by the text "«include»" with an arrow pointing to the included use case (42, 44).

Figure 2.1 shows a use case diagram that describes the application as a whole and presents simple use cases that should be included in the final version of the application.

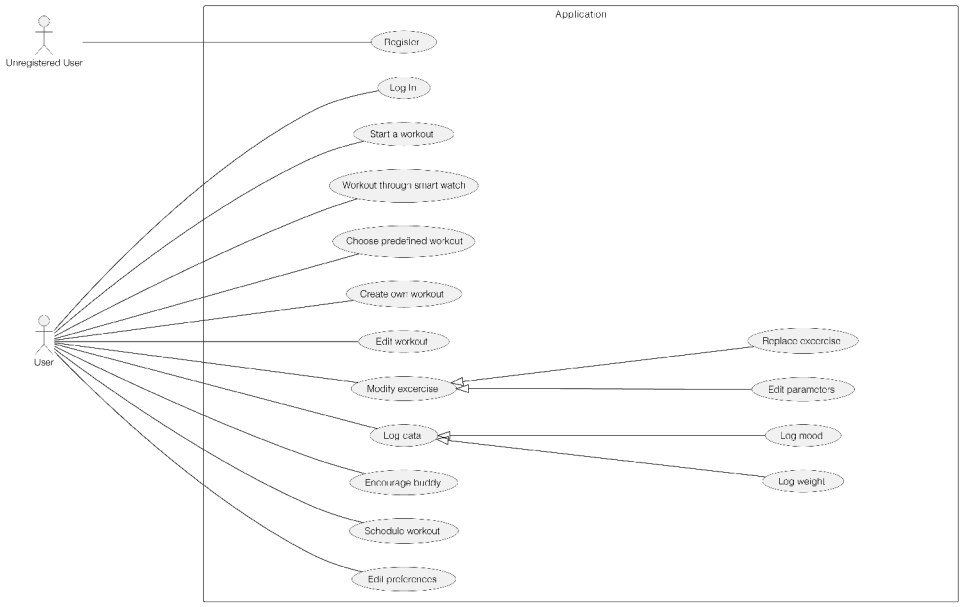

Figure 2.1: Use case diagram

2.1.4 Activity Diagram

Activity diagrams "are intended to model both computational and organizational processes (i.e., workflows)" (45). They can be used to model behaviors and interactions, for example, use cases as seen in Figure 2.2 and Figure 2.3 (45, 36).

In activity diagrams, there are many variants of nodes and edges such as action nodes, decision nodes, merge nodes, fork and join nodes, and many more (36). The next section will describe the ones that are used in the activity diagram for my application.

The initial node shows the starting point of the activity, shown as a full dot. The activity's final node serves as an endpoint of the activity, shown as a full dot with one circle around it. Decision and merge nodes, shown as rhombi, can split the flow based on a condition and then later connect it into one if needed. The fork and join node splits the flow into more flows where each of those flows can happen independently, but all of them have to be completed in order to join and continue as one flow. Fork and join nodes are shown as full long rectangles. Lastly, there is an event signal node which is represented by

a rectangle with an arrow on the right side. This type of node indicates that an external event is triggered as a result, and the responsibility for subsequent actions lies beyond the scope of the current activity.

Activity diagram in Figure 2.2 describes the scheduling of a workout with a buddy, whereas the activity diagram in Figure 2.3 describes the process of creating a workout or choosing a premade one.

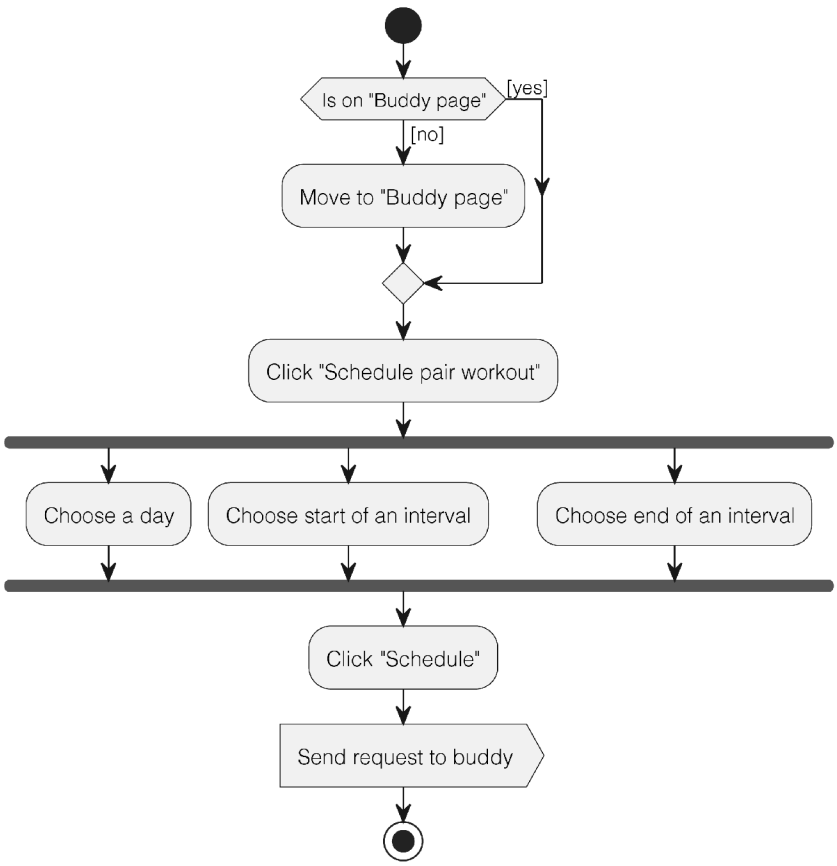

Figure 2.2: Activity diagram of scheduling a workout

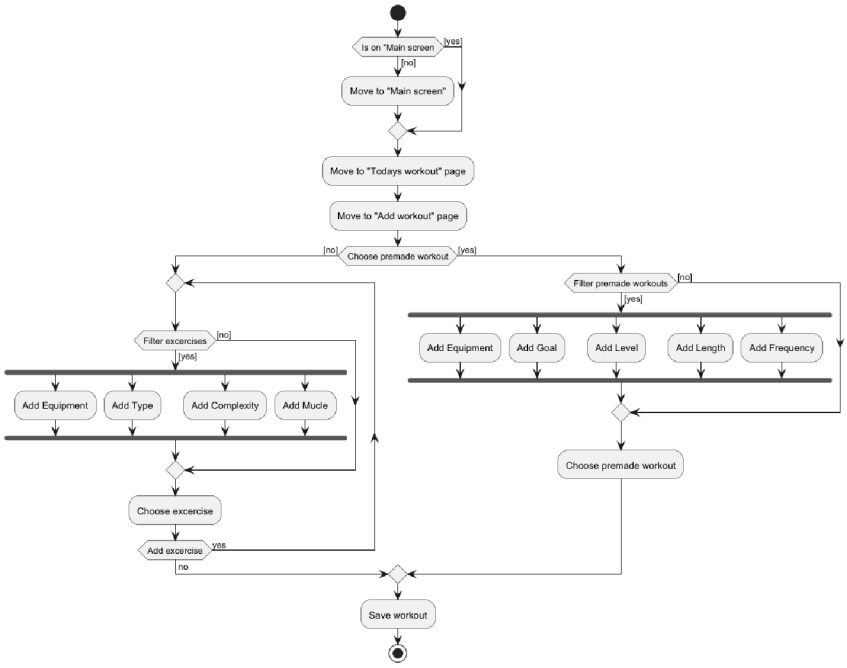

Figure 2.3: Activity diagram of selecting a workout

2.2 Design Methods

Design methods serve a designer as tools that can be used to create meaningful outputs in a much easier and faster way (46).

They systematize the processes and help with activities such as describing new or known problems, deciding what to do with them, and providing a pathway for completing such a task. Design methods can also help with understanding a user, their emotions, needs, or goals (47).

2.2.1 Low-fidelity prototype

A low-fidelity prototype is an interactive diagram that focuses on core functionality, without incorporating additional graphic enhancements. It helps to identify issues in an early phase of development and prevents unnecessary expenditures on something that would be discarded later on. A low-fidelity prototype also helps to test new

ideas that could be included in the final version in an easy, cheap, and fast way. Real-time changes can sometimes be made to a prototype, allowing for more testing rounds in one session and reducing development time and costs (48, 49).

From a graphic perspective, the prototype includes only rough ideas of the interface, such as shapes of the elements, placement, size, and hierarchy (48).

In this project, the low-fidelity prototype helped to define the required number of pages and groups of pages to fulfill all the use cases and establish basic connections between those pages, which helped with creating the overall structure of the application.

2.2.2 High-fidelity prototype

A high-fidelity prototype is also an interactive diagram, but it is more appropriate for later stages of development, such as user testing. This type of prototype should closely resemble the final product in terms of functionality (49).

A high-fidelity prototype, in comparison to a low-fidelity one, includes graphical elements such as animations or interface elements (navigation bars, buttons, etc.). The prototype should give a user a feeling that they are using a real application. (49, 50)

High-fidelity prototype includes real content such as cards, events, and texts. Placeholder texts are no longer suitable, due to their possible negative effects on tested users (49).

Including this stage in development helps with detailed feedback from the user side on usability and their overall experience with the application. Relationships between stakeholders and developers also benefit from this stage because it allows stakeholders to share their opinions on the product before the real development begins, which can save a lot of money and time for both sides (49, 50).

2.2.3 Personas

Personas are profiles based on information collected from users, which are somehow grouped and aggregated. This helps the designers to understand the needs of the user and allows the designers to put

themselves in the shoes of the user. It also creates the awareness that designers are designing for others, rather than for themselves (51, 52).

Three personas were created for this project: Persona A, Persona B, and Persona C. They were developed based on various motivation profiles 1.1 to ensure the design's universality, rather than focusing on a single motivation type. Additionally, personas were created based on different levels of physical activity, reflecting a range of fitness levels.

Persona A is a male athlete in his 20s who exercises daily and is used to highly specific workout plans and exercises. This person possesses extensive knowledge of fitness and health. His motivation stems from the potential benefits he knows exercise provides. His motivational profile is *identified regulation* 1.1.3. Persona A´s lifestyle focuses mostly on career development and improvement of health in all directions (nutrition, exercise, psychology, etc.) (51).

Persona B is a male student in his 20s. This persona likes to jog regularly and once a week goes to the gym to do an exercise session. This male feels guilty if he does nothing for his health, meaning that his motivation profile is *introjected regulation* 1.1.2. The persona has basic knowledge of how to exercise but no deeper understanding of how muscles or other health-related stuff work. Persona B focuses on finishing the university and landing a job while staying healthy and preventing bad posture or injuries to increase life quality.

Persona C is also a male student in his 20s. This persona does not like movement and, due to being a student, spends most of the time inactive on a chair. This persona has no understanding of why exercising regularly is good and how avoiding it can be detrimental to one's health. This persona is *externally motivated* 1.1.1 by a spouse, which has no effect on the physical activity of the persona. Persona C has no specific direction in life and tries to enjoy their student life as much as possible without taking the future into account.

2.2.4 Scenarios

Scenarios are tasks designed in meaningful order to get a grasp of how the user will use the product in the future (51, 53). They also describe the details of such a task, as well as what happened before, in what state the user is right now, and what they will try to accomplish. Commonly, those scenarios are based on one or many use cases (53).

Scenarios were used in this thesis as part of the user testing process. Those scenarios were to start a workout on a smartwatch, choose a predefined workout, and then edit one of the exercises from the workout, and schedule a workout with a buddy.

2.2.5 Think-Aloud Protocol

Think-Aloud protocol is based on observation of the user completing predefined tasks (scenarios) and having the user talk about what they feel at the moment, what they think about, and why they do certain actions (51, 54). This protocol offers several advantages, including low cost and the ability to be applied without requiring a fully functional application, as even a low-fidelity or high-fidelity prototype is adequate for conducting such research (54). This technique usually exploits unwanted reactions that the interface may evoke, such as frustration, confusion, or even anger. It also allows the designer to understand what is going on in the head of the user, and what they focus on, and usually leads to actionable steps that could be acted on immediately to improve the overall design (51, 54).

This technique was used during the user testing phase to systematically evaluate the functionality and effectiveness of the application. It played a critical role in identifying areas where the system performed as intended, as well as highlighting elements that required modification, addition, or removal to better align with user needs and expectations.

3 MyBuddy : Proposed application

This chapter focuses on my application, detailing its core features and unique functionality. It will explain the specific contexts in which design decisions were made, the methods and processes used to arrive at those decisions, and the rationale behind them. Furthermore, it will demonstrate how these decisions align with the principles of motivation. Secondly, the chapter will focus on specific parts of the application, especially on the graphic design aspect.

The name of my application is *MyBuddy*. Referring to the main feature of the application as well as being homophones of "My Body," representing the idea of something that cares about user's physical selves, about their body.

3.1 Feature specification

The following section provides descriptions of the features unique to *MyBuddy*, with each feature implemented based on prior research and directly associated with motivation, habit-building, or usability.

3.1.1 User specific motivation

To achieve optimal results and motivation, the coach, as discussed in 1.1.6, should tailor their approach to the individual's specific motivations, rather than relying on general assumptions that all individuals exercise for reasons such as enjoyment or similar factors. This is the reason why the application changes its content based on the long-term goals the user chooses in combination with their *why*. At first, they may appear similar; however, goals are typically data-driven, such as losing 10 kilograms, while *why* refers to broader motivations, like feeling better or becoming more attractive to a spouse.

Adjusted content in existing applications is usually directed toward workouts or user's physical capabilities discussed in 1.2. *MyBuddy* instead tries to aim the adjustments more toward motivation, which means changing the tone of voice of the application to better fit the user's preferences. It also involves adapting the content of the texts to

align with each individual's personal goals and motivations, rather than using uniform phrases for all users.

3.1.2 Accountability partner

The functional core of the application is built around accountability. Because being accountable to someone helps users stay on track and achieve their goals in any activity that develops them (55). In *MyBuddy*, the user's accountability partner is referred to as a *buddy*. The buddy can be anyone, ranging from the user's mother to an acquaintance the user met at the gym. The primary role of the buddy in the user's development is to help maintain the user's commitment to regular exercise, particularly when they begin to lose the habit of consistent workouts.

Research has shown that users who enjoy their workouts are more likely to become long-term exercisers, as suggested in Introduction. Collaborative approaches, such as working with a buddy, may contribute to this outcome.

3.1.3 Watch integration

To reinforce a comfortable environment and accessibility, the application offers an option to connect the user's smartwatch. This allows the user to access their workout plan more easily during workouts, eliminating the need to reach for their phone while resting to check how many sets remain or what exercise will follow.

The smartwatch includes a specialized function. Modern smartwatches usually track the user's heart rate, which in *MyBuddy* is used as data to enhance the user's attention to their body during workouts and make the workout itself more interactive. It functions as a heart rate monitor, but in a more innovative and engaging manner, rather than the traditional approach. There is a pulsating ring going from the center of the watch. The pulses are in the same rhythm as the user's heart rate, so they have a better visual understanding of what is going on with their heart than when they see just a number.

The smartwatch serves multiple functions. In addition to its primary role, it functions as a reminder, either automatically from the application on days designated for exercise or manually from the

user's buddy. The notification from a buddy is made more appealing as a result of the accountability partner's encouragement, which is much more aligned with the goal of the application than the automatic one from the application itself.

3.1.4 Other functionalities

The process of habit forming is made easier by the amount of repetition and consistency of those repetitions, as mentioned in 1.1.6. So, the application has to take care of consistency and try to make the user stick with the app for as long as possible to fully develop the habit. That is why the habit tracker is built into the application. It works like a small calendar where the user can track their workouts, their weight, and their mood, giving the user a better understanding that they are on the right track and how much effort they have already put in.

When focusing on consistency as a predictor of successful habit-forming, (5) suggests that the best motivations for consistency are *identified regulation* and *integrated regulation*. The goal was to target both of those motivations in order to achieve a combination of both for maximal consistency.

The *identified regulation* factor based on 1.1.3 propagates itself in the application mostly at the mood tracking and overall adaptability based on the user's *why* and their goal.

For the *integrated regulation* factor based on 1.1.4, there was a specific part built into the application, the *avatar*. The *avatar* has a simple purpose, to create a character with an identity as a person who exercises, which the user will lean towards with their own real-world identity as someone who exercises as well. To improve motivation and willingness to work hard and make the user's avatar, their recently connected identity, look better, the user must exercise regularly and follow the plan they chose. This will improve the visual appearance of the user's avatar in the application, as well as their physical appearance in the real world.

Taking into account that people may have different goals, two sets of avatar progressions were created. One that evolves from a very slim character to a fit character, and a second one that evolves from an obese character to a fit character, as seen in Figure 3.1. These avatars

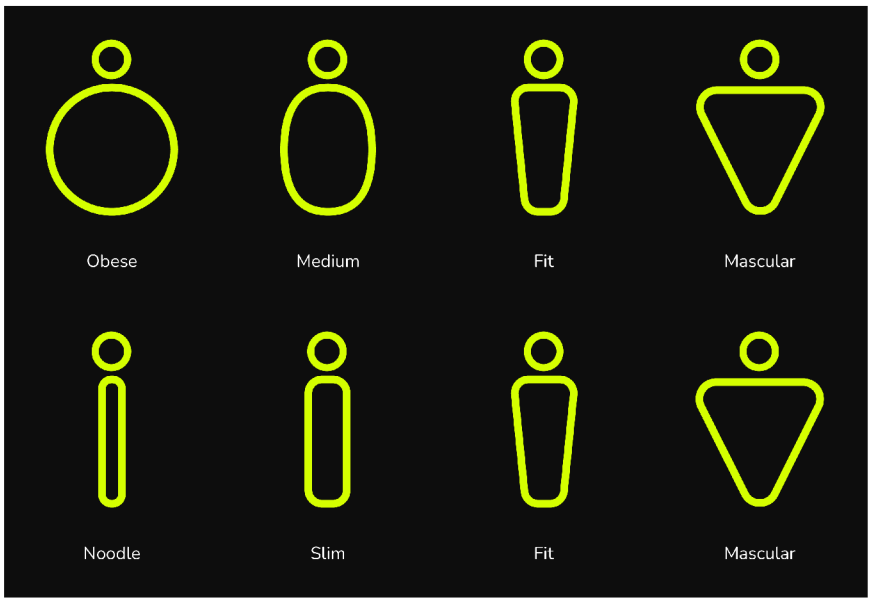

Figure 3.1: Different progressions of the *avatar*

are not an exact reflection of the user's body but primarily serve as an indicator of their progress.

The application also features a section where users can input their injuries and *problematic parts*, such as limbs recovering from surgery, genetically vulnerable parts, or areas prone to irritation during exercise. This information is used to automatically filter out exercises that may pose a risk to the user's *problematic parts*. As a user can heal from some injuries and recover in a way that does not affect them anymore, there is an option to choose this not only during account creation, but also to change it at any time in the account settings.

3.2 Graphical user interface

The user interface of *MyBuddy* is designed with a black background, akin to dark mode. Research has shown that dark mode enhances user satisfaction and provides greater comfort for the eyes. Additionally, dark mode can contribute to extended battery life, particularly when utilizing advanced screen technologies such as OLED, which then consumes less energy (56).

Almost all of the important elements are in luminous green color, which creates high contrast between itself and the background. The green color was chosen because it is commonly associated with health and well-being (30). This may make the user feel like they are doing the right thing for their health.

A simple navigation bar follows the user throughout the whole application. It is located on the bottom of the screen and is independent of the page the user is currently on, allowing simple movement to parts of the application that are included in the navigation bar. It also helps a user to redirect themselves to already known pages if they get lost in the application.

The navigation bar includes the three most important parts of the application: the main screen (Figure 3.3), the buddy page (Figure 3.4), and the tracking page (Figure 3.7).

Settings and announcements are somehow similar to the navigation bar, but they are present in the top corners of the screen so that a user is always able to enter the settings of the application or check if they have unread notifications, no matter which page they are currently on.

The remainder of this section will provide a detailed description of various components of *MyBuddy*, including their features and the purposes they serve.

3.2.1 Registration process

The registration process includes logging into existing accounts through email and password or creating a new account. The design of the process strategically guides the user toward selecting the intended buttons by applying clear emphasis on these specific elements. This emphasis is achieved through the use of neon yellow-green color, which provides high contrast against the black background, in contrast to the gray buttons, as illustrated in Figure 3.2. This concept of using contrast to the direct user was taken from MyWorkoutPlan 1.2.3.

During account creation, the user has to fill out the questionnaire, or they can skip it. The questionnaire is mostly focused on the user's *goals*, the user's *why*, and in general, motivation. Question about *problematic parts* is also included to determine what exercises are not suitable for the user.

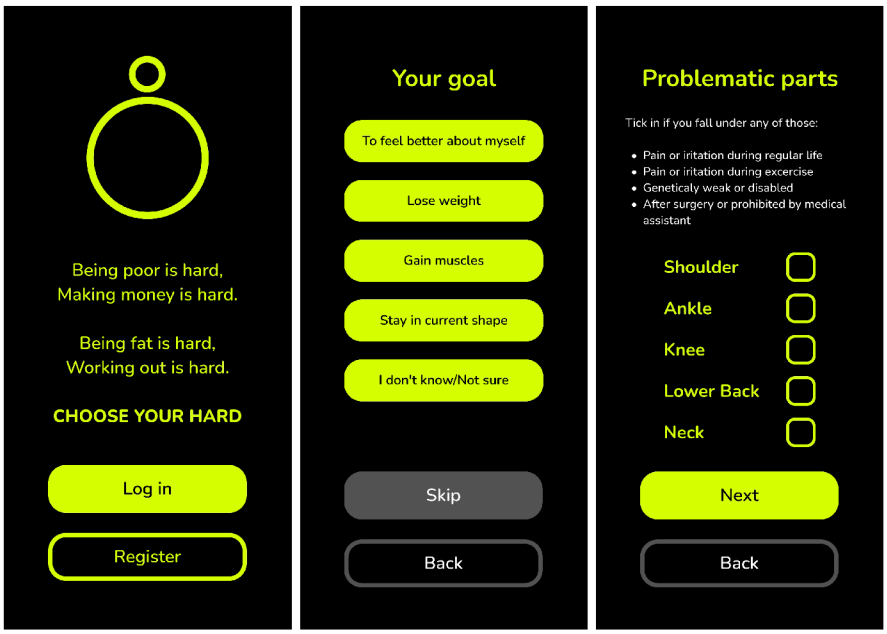

Figure 3.2: Screenshots of registration process

3.2.2 Main screen

This page was designed in such a way that it allows access to all core features of the application in one tap. Those features are *workouts*, *interaction with buddy*, *data tracking*, *achievements*, *watch integration*, and *settings*, which can be seen in Figure 3.3.

The two largest elements on the main screen are the avatar and the "today's workout" button. The purpose of this approach is to establish a clear hierarchy, guiding the user's focus towards the most important actions. In this case, the primary actions are reviewing the user's avatar to enhance identification and beginning the workout session, which promotes engagement and supports consistency.

3.2.3 Buddy page

The page displaying actions related to the buddy offers three options aimed at enhancing the user's activity. As a first option, the user can call a buddy and remind the buddy to do the workout, or they can ask if the buddy has any free time to have a workout session together.

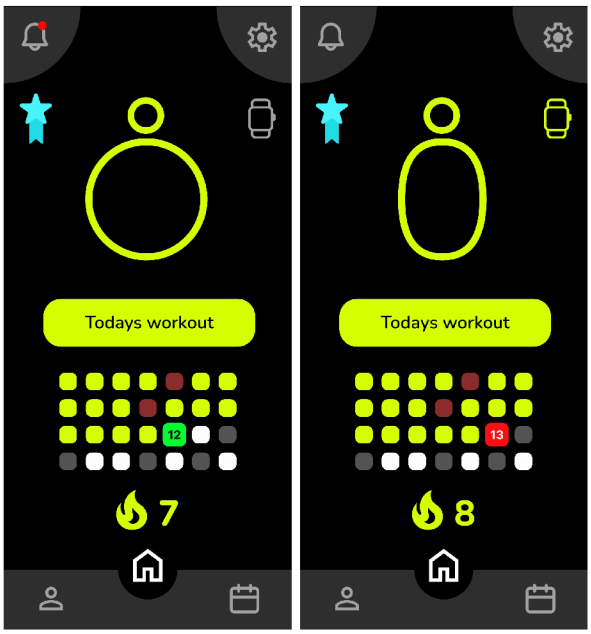

Figure 3.3: Screenshots of the main screen

Secondly, the user can schedule paired workouts with their buddy, so they do not have to call each other and can agree on a specific date and time directly in the application. Lastly, the user can notify their buddy that they have not worked out and encourage them to exercise. This is allowed due to the status in Buddy Page, where the user can see a buddy's status if they have a rest day, workout ahead, or if they have already exercised today, as demonstrated in Figure 3.4.

To further enhance how much a user can help their buddy, it is possible that the user can see their workout plan and calendar to synchronize those together so they can have the same workouts. If the buddy deviates from the workout plan they originally chose, the user can monitor their progress and step in when needed. This allows the user to offer support or guidance to help the buddy stay on track with their selected goals. It is also possible to let the user see their buddy's data, such as heart rate, weight, and mood, from the tracker if they wish to.

The design takes into account that not every user wants their buddy to see their heart rate or calendar, so it is possible to restrict access to

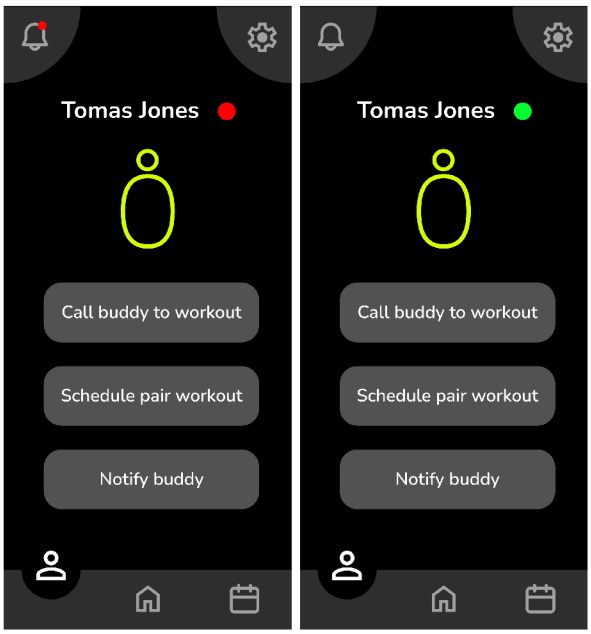

Figure 3.4: Screenshots of the buddy page

only some parts of the user's data or even no data at all. This feature is available in the settings section.

3.2.4 Workout process

The workout process begins with an option to choose if the user wants to start a workout on the phone they are currently using or on a smartwatch they have already connected to the application. This provides the user comfort in choosing what they prefer and allows them to exercise and execute the plan as they want without creating unnecessary obstacles, which could lead them to stop using the application.

When the workout is started on the phone, a simple avatar showing how the exercise looks appears, as seen in Figure 3.5. If the person is in the rest period between sets, the avatar is grayed out to provide further visual guidance about what state they are currently in.

Buttons used to mark the completion of a set are visually emphasized through high-contrast design elements, guiding the user to properly complete each exercise or workout and reducing the likelihood of skipping parts of the session. Options to skip exercise or quit

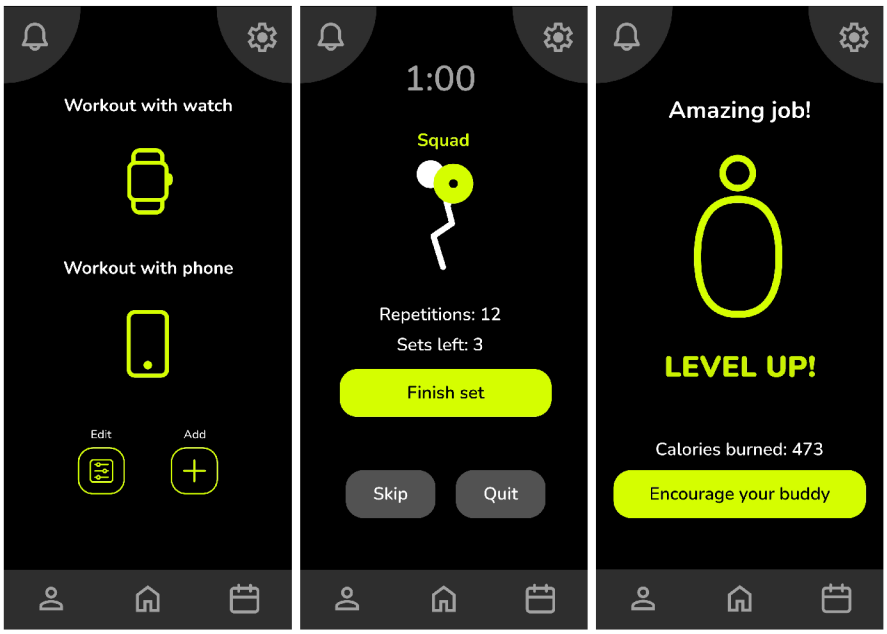

Figure 3.5: Screenshots of the workout process

the workout completely are also included, but due to the gray color, they do not grab the user's attention to click them because skipping the exercise is an unwanted action from the user.

After the workout is completed, an after-workout page appears (Figure 3.5). This page includes an avatar, which, if the user is consistent enough in the last few days and breaks through a hidden milestone level-up, the animation plays itself, and the application changes the appearance of the user's avatar. Hidden milestones are tailored to each specific goal. For instance, a user aiming to lose weight reaches a milestone for every 1,000 calories burned.

Text with specific metrics relevant to the user is also included, but is highly dependent on the user's goals or the user's *why*. For example, someone who tries to lose weight may have a metric with burned calories there, as demonstrated in Figure 3.5, whereas someone who tries to stay healthy may have brought prediction about how much longer they will live due to the workout they have just done as a replacement of burned calories.

3.2.5 Watch interface

This part of the user experience is separate from what is happening on the phone. It is triggered when the user chooses to exercise on their watch.

As the user moves onto the watch, they can start a workout immediately, or they can take a look at the workout overview as seen in Figure 3.6, so they know better what to expect from the day's workout.

The workout process was designed to provide immediate feedback on the user's heart rate. This was achieved by incorporating a pulsating ring on the watch screen that matches the frequency of the user's heart rate, allowing for a clear visual representation of their physical state during the exercise.

The ring can have three colors (blue, orange, and red) to further enhance the user's understanding of the user's heart rate. Established color conventions were followed to maintain user familiarity and minimize confusion—for example, using blue to represent cold or low values and red to indicate warmth, as shown in Figure 3.6. Blue means that the user's heart rate is too low, and they should put a little bit more effort into the workouts than they are doing now to reach the intensity that will most likely lead to ideal results. Orange means that the user's workout intensity is optimal. Red means that the user should slow down. Otherwise, they risk overtraining, injury, or even death.

After the workout is done, a summary screen appears with motivational text, as seen in figure 3.6. The graph shows the percentage of different heart rate zones during the workout. The text is there to motivate the user and make them feel good about themselves, increasing the likelihood of doing the same thing in the future. This text is goal-dependent and changes based on individual users to motivate them in the right way, not in a general way that may even lower their motivation.

The watches also include notifications that can appear at any time during the day and can be triggered by the application itself or by a buddy sending a notification. Notifications from a buddy are more visually prominent, emphasizing their greater significance compared to system-generated messages.

Figure 3.6: Screenshots of the watch screen

3.2.6 Tracking page

The tracking page serves two main purposes. Track the user's weight and mood daily, allow the user to see the development of their statistics over time, and visually represent their consistency in past weeks.

The visual representation of consistency is done by a simple calendar, where the days the user did what they should and logged their data are filled with white. Missed days are filled with a dark red color. The current day color is either green if everything is alright or red when it is not. Mark for today is purposefully larger to allow the user to quickly identify which day it is, as visible in Figure 3.7.

In Figure 3.7, an option to log previous days can be seen. This way the application takes into account the fact that people sometimes forget, and they do not want to have a red color in their calendar even though they worked out but forgot to log their data.

3.2.7 Settings

The settings screen includes two sub-sections distinguished by the color of their buttons, as seen in Figure 3.8. Black buttons provide functionality settings (e.g., notifications, sounds), whereas gray buttons provide personal settings (e.g., change buddy, equipment).

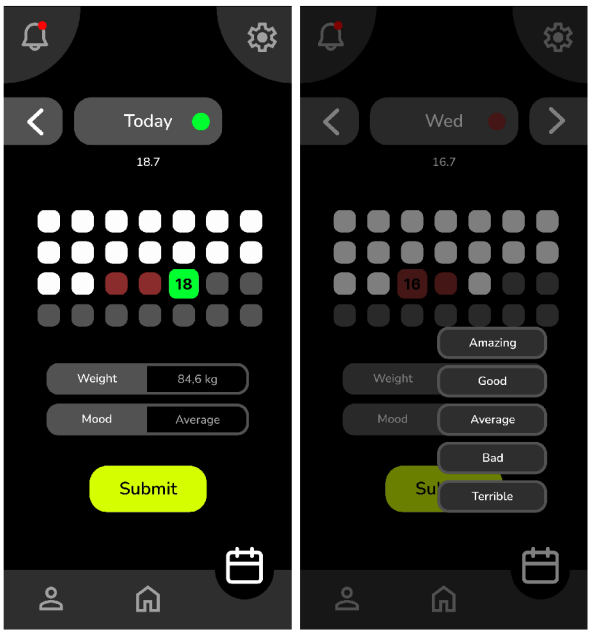

Figure 3.7: Screenshots of the tracking page

When the user chooses specific settings they want to adjust, a popup will appear that allows them to change their preference either through inputs or checkboxes, as shown in Figure 3.8.

3.2.8 Achievements

Achievements provide user-specific feedback on how well they do and allow the user to retrospectively see what they have already accomplished. There are more types of achievements, such as the amount of weight lost, days in a row without missing an exercise, etc. Each achievement is divided into multiple levels, with higher levels being visually more appealing than the previous ones. This design enables users to perceive their progress more easily than through text alone (Figure 3.9).

The adaptation of the application based on the user's motivation is presented here in the sorting of the achievements. The achievements that are related to the user's goals or to their *why* are prioritized and shown at the top of the page so the user is inspired by achievements that are meaningful to them.

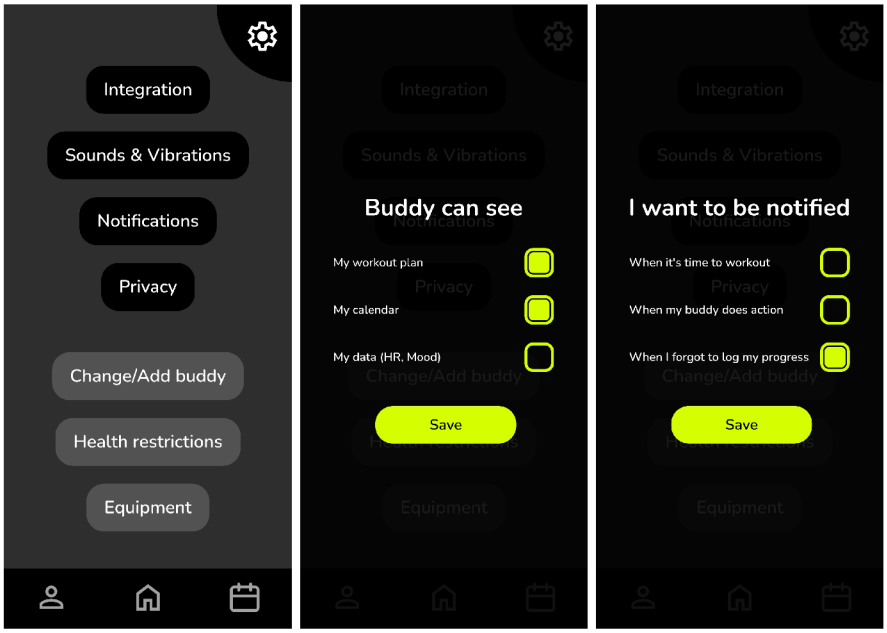

Figure 3.8: Screenshots of the settings

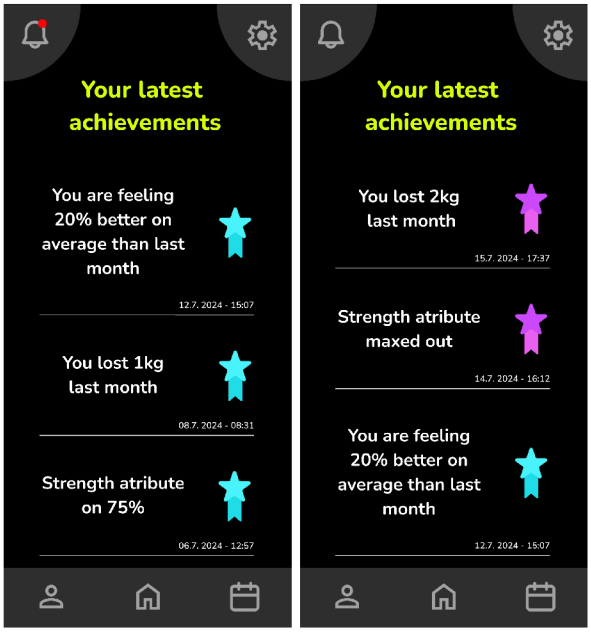

Figure 3.9: Screenshots of the achievements page

4 User testing

Testing was done on the prototype to evaluate how well it connects with the user, what works, and how the application could be improved if fully developed. Testing was done on a total of eight potential users. Users were selected according to their current level of physical activity, ensuring alignment with the activity levels of the personas described in 2.2.3. This resulted in the classification of the participants into three distinct groups. A beginner is someone who does not exercise at all. Intermediate is someone who exercises occasionally, but at least once a week. An athlete is anyone who exercises regularly, at least three times a week. Table 4.1 shows the demographics and the physical level of the tested subjects.

The testing was conducted with each participant individually in an environment where they could focus on the task without feeling rushed or stressed, as such factors could influence the results. Participants were interviewed in various locations, including their homes, schools, and areas where exercises could be performed, such as spaces equipped with dumbbells.

The testing was structured in the following way: First, users were asked questions about their motivation, such as "What motivates you to exercise?" and "How do you prefer to be motivated?" These questions helped identify the motivational profiles, which form the foundation of the application's unique functionality. Two additional questions were designed to explore user's expectations for an ideal application.

Table 4.1: Information about tested subjects

User	Category	Age	Gender	Occupation	Education
Person A	Athlete	21	Male	Student	High School
Person B	Intermediate	50	Female	Accountant	High School
Person C	Beginner	25	Female	Soldier	Grad. Engineer
Person D	Intermediate	21	Male	C# developer	High School
Person E	Beginner	22	Male	Student	High School
Person F	Athlete	22	Female	Student	High School
Person G	Athlete	22	Male	Videographer	High School
Person H	Intermediate	23	Female	UX developer	Bachelor

Those were "Why would you use a fitness application?" and "What should the application have?".

Second, a brief explanation of the thesis and its connection to the application, motivation, and accountability partner was provided. Subsequently, the participants were given a brief walkthrough of the registration process and the remainder of the application. They were introduced to the available screens and instructed on how to initiate a workout, ensuring they gained a basic understanding of the application's functionality.

After that, specific scenarios as described in 2.2.4 were presented to them, including tasks they were asked to complete while following the think-aloud protocol. Those tasks were "Connect the application to the watch and start a workout on it," "Choose a pre-made workout and change one exercise in it," and "Schedule a workout with your buddy."

Finally, feedback was gathered concerning the application's interface and usability. Participants were asked about the difficulty of completing the tasks, as well as which aspects of the interface made navigation easier or more challenging. They were also asked if they felt anything was missing from the application as potential users, and to explain why they considered it necessary. Lastly, they were asked whether they would use the application if it were fully developed, and to provide reasons for their answers.

4.1 Findings

The participants displayed different types of motivation 1.1 and preferred ways to be motivated. For instance, participant A exercises primarily for health reasons and prefers not to receive external motivation, while participant D exercises to improve their appearance and relieve mental tension, preferring a more assertive form of motivation that encourages them to perform at their best. Participants had different expectations for their ideal application. Participant A, who had extensive knowledge of fitness, preferred pre-made workout plans that included videos explaining each exercise in detail. In contrast, participant B primarily valued the inclusion of notifications,

which would help them stay consistent and remember their planned workouts.

Most of the participants found the usage of *MyBuddy* and completion of the task simple and "intuitive," as stated by participant G. Positive feedback was also given on the visual appearance and clarity of icons by participants A, E, F, and G. Participants A, F, and E specifically mentioned that the change of the color of the smartwatch icon from gray when not connected to green when connected made it intuitive to know in what state are the smartwatch.

Some parts of the application presented more challenges than others. For example, participants B, C, E, F, and H experienced difficulties when attempting to add a custom workout or edit an exercise. They assumed that all workout-related settings would be located in the main settings section. However, this was not the case, which led to confusion and made it harder for them to navigate the application effectively. Issues related to using the prototype, which was not fully functional, were encountered by participant A, affecting their overall experience. Additionally, a language barrier hindered participant B's ability to navigate the application due to difficulty understanding the texts. However, despite this challenge, participant B was still able to complete the tasks successfully, due to the simplicity of the interface and the assistance provided by the examiner.

Another potential issue that emerged during testing was the icon for the buddy page, which participants B, C, E, G, and H identified as icons for their accounts, which would lead to misuse if not mentioned during the app overview.

The questions asked after testing highlighted several opportunities for improving the application. For instance, participant F specifically mentioned, "I would appreciate an independent stopwatch," while participant E, who does not regularly exercise, suggested adding options for activities beyond fitness, such as running or cycling.

Participants also showed clear interest in trying the application if it were fully developed when asked about their willingness to use it. Participant E indicated an interest in testing the accountability buddy function. Participant F expressed a willingness to try the application due to its simplicity and ease of use, and was curious about how the buddy feature could influence her motivation. In contrast, participant A and participant B stated they would not use the application, as

they did not feel the need for additional motivation and were not accustomed to using applications while exercising.

4.2 Discussion

Based on user feedback, the evaluation identified key areas for improvement, and possible enhancements were proposed. One of the proposed improvements is based on the tested subject's issues with settings. When wanting to add a new workout, a simple button with the text "workout" would be put into the settings where people were looking for it, which would redirect them to the workout setting page. This will eliminate the issue of not finding workout settings in the settings screen and avoid user confusion. Another issue regarding the bad representation of the buddy page through the icon could be fixed by replacing the one-man icon with an icon that includes two figures to better represent the user and their buddy.

Many other functionalities that the users would appreciate could be developed and added based on the feedback from the testing, such as caloric tables, integrated stopwatch, food tracking, the option to choose and log other activities, not just workouts, a page with graphs, tables, and different metrics about user's progress or prediction of how fast the user will reach their goal or certain milestone.

5 Conclusion

The results of user testing made me realize the extent to which the application could positively impact the physical activity of many potential users. My realization is based on user's positive feedback, even in cases of athletes where the habits are already developed.

User testing and specifically answers of the subjects provided additional confirmation that regarding accountability partner, motivation, and fitness, there is nothing similar on the market yet, which compliments the possibility of filling the needs of people with insufficient physical activity as stated in 1.2 and changing their lifestyle to be more healthy.

This thesis taught me how difficult it may be to fully develop a functional application that changes its content based on specific users. I also learned the importance of the analysis and design processes, as well as prototyping and user testing, following the observation that users do not always act the same way as the designer or developer who created the application. I experienced this myself during the user testing, for example, when the subjects were looking for things in places where I did not place them because I thought they should be somewhere else.

In the future, the prototype should be improved based on the findings from user testing 4.1, followed by another user testing to find out if the changes impacted the user as intended while still maintaining the core features of the application. This will allow the development to be much faster and cost-efficient with no need for big changes in the future, due to the fact that the core of the application would be well-tested and fitted for the user's needs.

Thanks to this thesis, I deepened my understanding of the practical side of informatics, especially in the areas of analysis and system design, and user interaction. This thesis taught me how to manage larger projects and approach them systematically, which I believe will be essential for my future career as a graphic designer or software engineer.

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