Designing for Social Engagement: Evaluating the Effectiveness of Social Features in a Progress Tracking Application

Ema Devcic

N00226327

MSc User Experience Design

Institute of Art, Design and Technology Dún Laoghaire

Project Supervisor

Susan Reardon

2024

Contents

Declaration Statement

I hereby certify that the material, which I now submit for assessment on the programme of study leading to the award of Master of Science, is entirely my own work and has not been taken from the work of others except to the extent of such work which has been cited and acknowledged within the text of my own work. No portion of the work contained in this thesis has been submitted in support of an application for another degree or qualification to this or any other institute.

Ema Devcic

N00226327

3rd May 2024

Introduction

Goal setting and planning are part of our lives, both private and professional. Goals are the first step towards planning for the future and play a fundamental role in the development of skills in various aspects of life [2]. Monitoring goals is a crucial process that intervenes between setting and attaining a goal and helps to ensure that goals are translated into action [1]. Unfortunately, often despite a clearly defined goal, we fail to achieve what we set out to do. Sometimes, the reason for failure is the lack of tracking our path to achieving goals. Just setting goals is not enough to be successful. Tracking tasks is very important because it allows us to keep control over the entire process of achieving goals. One of the ways to do this is using smartphone technology. Individuals can now effectively carry out their daily routines through mobile applications, leading to more productivity and higher likelihood of goal attainment [5]. In an era dominated by digital connectivity and social interaction, the integration of social features within mobile applications has become a prominent trend. The addition of social features introduces a new dimension, allowing users to connect with their peers, share their accomplishments, and collaborate towards common goals [6]. This research examines how the incorporation of social elements influences user engagement and behaviour within such platforms.

Keywords: progress tracking, social features, motivation, progress tracking with photographs

1. Literature Overview

The literature review addresses research gaps on topics of interest to this study, focusing on research on motivation and effective goal setting, progress tracking, social aspect, and progress tracking with photographs.

1.1 Motivation and Effective Goal Setting

People have an inherent drive to set goals and achieve them [2]. This desire becomes more prominent as we satisfy our basic needs and move up to trying new things, embracing challenges, and developing our abilities and skills. Our inherent desire and aspiration naturally evolve as we fulfil our fundamental needs for sustenance and shelter, progressing through the various stages of the hierarchy of needs. When we successfully complete a complex task, our brain releases a large amount of hormones called endorphins, which leads to feelings of euphoria and well-being [2].

Motivation is the process that initiates, guides, and maintains goal-oriented behaviours. It can be described as the impulse that drives a person to follow a need or desire. Motivation is what propels us to exercise or strive for a promotion at work. Essentially, motivation pushes us towards actions that bring us closer to our goals. Motivation can stem from external sources or from within us. Psychologists differentiate between extrinsic motivation, which comes from the outside world, and intrinsic motivation, which originates internally. These different sources of motivation deeply affect our decision-making process. Goal setting involves the process of identifying and pursuing desirable outcomes individuals aim to accomplish. While all individuals partake in goal setting to a certain degree, consciously setting and monitoring goals is more likely to lead to successful goal attainment [2]. For the purpose of this study, understanding the mechanisms of motivation and goal setting is essential. It allows for development of products that meet user expectations and addresses their needs effectively.

1.2 Progress Tracking

The key to being productive lies in effectively managing our time and tasks, and it is crucial to utilize this wisely in order to grow as individuals. Tracking goals is similar to placing mile-markers along the journey. By monitoring progress, we will feel motivated to push forward and therefore accomplish more. Breaking down big goals into smaller steps also helps to reduce the feeling of overwhelmingness [1]. The study on goal attainment conducted by Harkin, B, Webb, and Chang [1] indicates that progress

monitoring has a significant impact on goal attainment. Their research also found that progress is most effective when outcomes are reported or made public, or when progress is physically recorded.

Self-tracking or monitoring involves the conscious tracking of one's behaviour and variables of interest. When we are trying to achieve a goal, the more often that we monitor the progress, the greater our chances are of succeeding [4]. Everyone has goals or benchmarks in their lives that they want to achieve but it's a difficult task staying constantly motivated and keep working to reach where we want to be. We need a way to make this process motivating and increase the chances of succeeding. One way of doing that is through the use of mobile features for self-tracking, such as progress bars and feedback mechanics, that summarize performance and provide benefits to users. Research suggests that self-tracking not only offers benefits but also creates enjoyable experiences and motivates engagement with the activity. Specifically, in health-related mobile applications, it has the potential to effectively change behaviour and influence the formation of new habits [31].

1.5 Social Aspect

There's no disputing the ever-increasing presence of social networking in our daily lives. Most applications incorporate it since it keeps users engaged and entices them to return repeatedly [14]. An increasing number of online services are built around online social activities, such as communication, content contribution, media sharing and social navigation. The extent to which a digital platform supports social activity can be an essential contributor to a positive user experience [7].

1.6 Progress Tracking with Photographs

Sharing photos online has emerged as a prominent trend in recent years, with people effortlessly exchanging visual information through various online platforms. The act of sharing photos has become an integral part of our daily routines, enabling individuals to connect with friends, family, and even the wider public [20]. People are inherently visual beings [19]. Our perception of the world and our subsequent emotions and actions are greatly influenced by what we see. Visual imagery carries significant weight in shaping our attitudes and behaviour, making it a potent tool for promoting positive change [19]. Studies show that approximately 54% of adult Internet users actively engage in sharing their original photos or videos online [20]. Considering an effective way to stay motivated on the journey is by tracking milestones [10], one way to highlight these milestones can be in the form of photographs.

1.7 Related Work

Several studies have experimented with incorporating social features in digital platforms and testing their influence on user engagement. Most of them focus on health or fitness applications.

1.7.2 Social Aspect Research

In their 2014 study, Chen and Pu developed a mobile game called *HealthyTogether*, aimed to understand how users interact in different group gamification settings: competition, cooperation, or hybrid [24]. HealthyTogether allowed team members to engage in physical activities together, exchange messages, and earn badges as they progressed. Results show that users significantly enhanced physical activities using *HealthyTogether* compared with when they exercised alone by up to 15%. Among the group settings, cooperation (21% increase) and hybrid (18% increase) outperformed competition (8% increase). In addition, increase in physical activities significantly associates with the number of exchanged messages, and users in cooperation groups sent nearly twice the number of messages compared to those exchanged in hybrid groups and three to four times more than in competition groups.

Research conducted by F. Spillers and S. Asimakopoulos in 2014. [17] examined a health running application and found that most runners were interested in sharing a small goal with a friend or if it is a milestone with a wider audience.

One study experimented with adding a social feature through an application called *PolyXpress*. This application allowed users to play through stories in real-world locations by using their smartphones. The study aimed to test if adding social networking features would increase user engagement. The added social features would allow users to participate in public forums about stories, message friends while playing stories, and view their friends' experiences within the app. The results indicated that the overall user experience of PolyXpress was not increased by the social networking features. Even though these features were desired and liked by the users, 70% of the experimental group enjoyed using the social features, while 30% remained indifferent [14].

1.7.1 Photograph Progress Tracking Studies

Research conducted by Oeldorf-Hirsch and Sundar in 2016. [34], identified forty-two unique online photo-sharing motivations. Their findings highlighted that photo-sharing serves as a means to satisfy higher-order needs, particularly in the realm of bonding. Additionally, the study revealed a growing

trend in the use of photo-sharing for purposes of communication, relationship cultivation, and active participation within a community.

The idea of mundane activities being worthy of capturing in photographs was explored by Lasén and Gómez-Cruz in 2009. [23]. Their study explored how online photo-sharing capabilities transform the relation between privacy and intimacy around self-identity and self-knowledge. This transformation gives rise to intricate behaviours and motivation factors like disclosure, seeking, and showcasing experience identified.

Cho, Smith, and Lee conducted a comprehensive study on the motivations behind online photo-sharing behaviour [20]. Their research involved the examination of 4,555 photos shared on the internet, ultimately revealing that online photo-sharing fulfils higher-order needs, particularly in terms of bonding. The study demonstrated that photo-sharing is increasingly utilized as a means of communication, relationship-building, and community engagement. To gain deeper insights, the research involved interviews with ninety-two participants conducted by seventeen interviewers. The primary objective of this study was to gain a thorough understanding of the motivations driving online photo-sharing behaviour and to propose essential features for photo-sharing tools that could enhance users' overall experiences when sharing visual information. They identified a total of nineteen distinct photo-sharing motivations. The most notable ones are sharing memories (32.12%), for amusement (fun, humour) (9.15%), appreciating beauty or cuteness (8.45%), to show off (7.51%), and disseminating information (6.37%).

2. Research Problem

In recent years, progress tracking applications have gained significant popularity among users seeking to monitor and enhance their personal development in various aspects of life, including fitness, productivity, and organization. These applications provide users with tools to set goals, track their progress, and receive feedback on their achievements [8, 9]. Many of the goal tracking applications currently available on the market fail to captivate and keep users engaged, resulting in limited success [11, 12]. In 2015. *IMS Institute for Healthcare Informatics* reviewed health and fitness tracking mobile applications and found that almost half of them (40%) had a limited success among the final users (less than 5000 downloads) for reasons related to considerable differences in terms of features, engagement, and user-friendliness [21]. Setting long term goals and impactful objectives require determination, concentration, and effort over extended periods of time. Long term goals come with many steps and milestones along the journey, and reaching these milestones should be noted and celebrated in order to keep motivation through the entire journey [10, 11]. While these functionalities are essential for individual progress monitoring, the integration of social features, such as social sharing, peer comparison, and collaborative goal setting has the potential to further enhance user engagement and motivation [24, 17]. Progress tracking applications serve as valuable tools that can help individuals achieve personal goals. However, despite being widespread, there seems to be a gap in understanding how integrating social features into these applications can enhance user engagement and their overall effectiveness.

2.1 Research Gap

Several studies have explored the role of social features in various digital domains, including fitness applications [24], educational platforms [36], and professional networking sites [35]. However, the effectiveness of social features in progress tracking specifically remains unexplored. Although existing literature acknowledges the effectiveness of social features [24, 17], there is a lack of direct research specifically investigating their impact on user motivation and retention in progress tracking applications. Understanding how social elements influence user behavior and engagement within these applications is crucial for optimizing their design and maximizing their impact on user experience. Furthermore, there appears to be a gap in research investigating the effectiveness of progress tracking with photographs in goal attainment.

2.2 Research Questions

The research study will aim to answer the following questions.

Q1: To what extent do social engagement features that promote accountability influence users' commitment to goal attainment within progress tracking applications?

Q2: How do users' interactions with social support features, such as doing a goal with a peer, impact their overall engagement with progress tracking applications?

Q3: How do progress tracking apps with social engagement features differ in terms of user motivation compared to applications without such features?

2.3 Research Hypothesis

Based on the above research questions, the following hypothesis has been developed.

H1: Progress tracking apps with social engagement features will lead to higher levels of user motivation compared to applications without such features.

H2: Social engagement features promoting accountability (e.g., peer-to-peer goal sharing, progress updates) will positively influence users' commitment to goal attainment within progress tracking applications.

H3: Users who perceive a high level of social support within progress tracking applications will demonstrate greater motivation and commitment to their goals.

2.4 Feasibility and Ethics

The study on a progress tracking application will be feasible due to increasing demand for personal development. This is supported by the current popularity of fitness and productivity tracking applications in the market [21], indicating a strong interest in tracking progress and achieving personal goals. The only limitation of the research is that it is not possible in the timeframe of the study to determine users' long-term behaviour and achievement of long-term goals. To address this, the study will have to use qualitative methods to evaluate users' willingness and motivation to continue monitoring their progress over time. Overall, the feasibility of the study is supported by the demand for personal development applications, the technological advancements allowing for easy development and distribution, and the availability of research methodologies to gather user feedback.

Participants for the study will be recruited through a circle of friends, family, work connections and through various social media. Ethical and legal considerations have been reviewed, the study will not research any sensitive topics, cause distress to participants or collect data from a potentially vulnerable group.

3. Research Methodology

In the upcoming chapter, an overview will be presented, providing insight into the methodology and providing detailed understanding of the research process used to validate the research questions and hypotheses.

The project used the Double Diamond design process [13] to examine the problem and develop a digital product. This model is an innovative design approach to addressing the design challenge more efficiently by exploring and testing different solutions of the product. With a number of progress tracking applications that already exist, the objective is to focus on creating a unique and innovative design. This process adopts an iterative approach where all ideas generated in response to the design challenge are tested and modelled, and only the most relevant ideas will be retained, resulting in a more refined and applicable solution finding process. The design process followed four stages: discover, define, develop, and deliver.

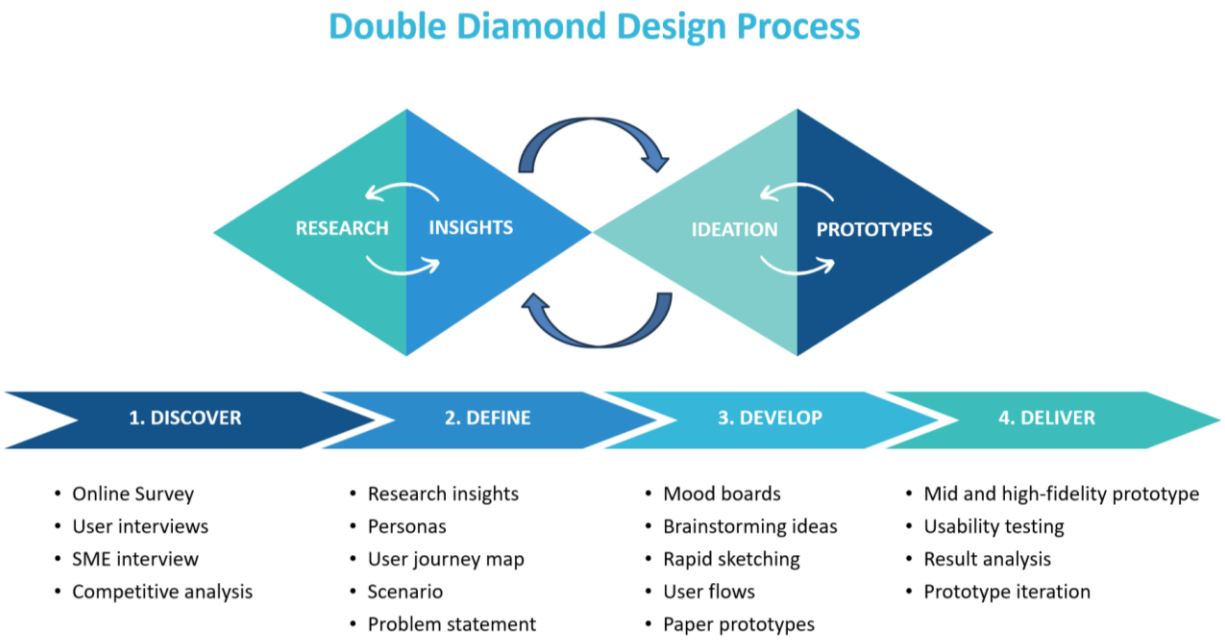

Figure 1: Project Methodology – Double Diamond Design Process

3.1 Discover Phase

Discover phase focused on complete review of the research problem, as well as user research. This will be achieved through conducting user and stakeholder research with the relevant audience and utilizing the already existing research on the subject [13]. The primary quantitative tool will be a survey [37], and the qualitative research will be in the form of user interviews and SME (*Subject Matter*

Interviews) Interviews [38]. The benefit of this approach is to gain a general understanding of the research problem before getting a deeper understanding with qualitative research [13].

3.1.2 Survey

An online survey was circulated to gather information from a large group of users of various demographics, backgrounds, and lifestyles. The survey consisted of both open and closed ended questions to gather both qualitative and quantitative data [38].

Objectives:

- Identify which features users expect to see in a progress tracking application.
- Identify pain points and challenges users face when tracking their goals.
- Explore the motivational aspects that users find help them achieve their goals.
- Evaluate the impact of personal photographs, on user motivation.
- Evaluate the impact of social features on user motivation.
- Identify how users prefer to engage with others in goal setting environments.

Schedule:

Time	**Objectives**
T – 5 days	Determine and write survey goals. Review research to create an average user and target audience.
T – 5 days	Write down ten questions to start. Review the questions with a few people. Rewrite as necessary and add more questions based on participants' answers.
T – 1 week	Create a survey with Microsoft forms. Test the functionality of a survey and review for mistakes before the final draft is done. Get mentor feedback.
T – 6 weeks	Release the survey. Advertise on multiple platforms and distribute with a wide audience to reach as many participants as possible.
T – 2 weeks	Close the survey. Conduct data analysis, extract most valuable insights.

Table 1: Survey Schedule

3.1.2 User Interviews

For the purpose of understanding the target audience, this study will conduct user interviews, to provide qualitative data that will contribute to understanding user's pain points and validate research hypotheses [38]. To analyse data, an open coding method of sorting qualitative data [39] will be applied.

3.1.3 Subject Matter Expert (SME) Interview

Through conducting an SME interview the objective is to gather comprehensive information about users' perspectives on goal achievement, motivation, progress tracking, social accountability, and expectations from goal tracking apps.

Objectives:

- Gain insights into effective strategies experts advise their clients during challenging times.
- Understand expert preferences and perspectives on indicators and methods, and metrics for tracking progress towards goals.
- Investigate the role of social accountability in goal achievement and understand its significance from the user's perspective.
- Identify specific features or functionalities that users expect in a goal tracking app designed to assist individuals in achieving their ambitions.
- Encourage experts to share any additional insights, experiences, or thoughts they believe are crucial for understanding goal achievement.

3.2 Define Phase

In the define phase the objective was to develop a firm understanding of the challenge derived from the conducted research. The study will focus on identifying customer needs and wants, analysing research data to extract insights, and finally developing a concise problem statement [13]. Target user [24] will be defined through a persona; a fictional character which represents user characteristics extracted from user research to better understand the target audience and make design decisions accordingly. Following the persona, a journey map and a scenario will be developed. The journey map [23] will serve as a visual representation of how a user interacts with the product, the steps they go through to complete a particular task and achieve a goal. Furthermore, a scenario [22]. will be developed. Which will serve as a brief story about an individual using the product and provide additional context and insight about how a user might perform the task.

3.3 Develop Phase

Develop phase will focus on generating potential solutions for the defined problem while considering up-to-date user research. Design ideas will be tested and iterated to determine their viability, using brainstorming and sketches. These tests will determine which ideas will be discarded and which will be fine-tuned [13]. First phase of brainstorming will be creating a mood board to visualize potential

feelings and values of the digital product. Some of the things that will be explored are visual design identity, the product's primary user interface (UI) colours, typography, mood, tone of voice, and more. Mood board will be a valuable tool to generate ideas for design inspiration and align different product interpretations and future design directions [22]. Next, simple sketches will be developed using brainstorming exercises like crazy eights, before continuing with paper prototypes, making them more complex with each iteration.

3.4 Deliver Phase

Final deliver phase will focus on prototype testing, to collect user feedback and design evaluation. Observations and feedback will be then used to improve the future versions of the product [13]. Low and high-fidelity digital prototypes will be developed then tested. The usability testing method will involve testing and monitoring user behaviour as they interact with the product, what problems they face and their thinking process. Involving users in the design process will lead to developing a product that users prefer and contribute to proving or disproving the research hypothesis. The testing script will be prepared, as well as a consent form. Feedback will be gathered through open ended questions to collect qualitative insights, followed by a SUS (*System Usability Scale*) [32] and an IMI (*Intrinsic Motivation Inventory*) [33] scale to gather quantitative data.

3.5 Competitive Analysis

Through competitive analysis (Figure 2) several direct and indirect competitors were evaluated, ranging from habit building, project management, productivity tracking and goal tracking platforms. The analysis determined each competitor’s business size, product offering, unique value proposition, UX, first impressions, and accessibility features. The comparison presented an overview of features users would expect from a progress tracking application.

Insights:

- Almost all competitors use data analysis and data representation.
- Some use gamification and/or social elements.
- Most have a strong onboarding process.
- Most are overwhelming to use at the beginning.

Competitors	Competition type & value proposition	App Experience	Features	Accessibility	User flow & Navigation	Brand identity & Tone of voice
Habitica	**Direct competitor** Turning your habits into a fun game for all who want to challenge themselves and build effective habits.	**Very good** + Strong onboarding + Visually appealing with gamification elements, easy to use -Can be overwhelming to get started	**Outstanding** + Four main features: Habits, Dailies, To-dos, and Rewards + Social element: join or create groups, participate in challenges, and compete with friends. + Habit tracking with a +/- system (avatar health) + Rewards to purchase with in-app currency earned by completing tasks and building good habits.	**Good** + You can set rewards based on the weighting of tasks + customize their settings to their preferences and priorities as: emailing your to-do lists or using browser extensions	**Outstanding** + Clear indicator of clickable elements	**Outstanding** + It feels like a game, playful & very relaxed, doesn't feel like a chore
ClickUp	**Indirect competitor** productivity platform and project tracking for both individuals and teams.	**Very Good** +Clean and simple interface -depth and comprehensive features can be overwhelming	**Outstanding** + flexible task management tools, goal setting, time tracking, collaboration features, automation, and robust reporting	**Very Good** + Custom Dashboard with choose from 50+ widget variations (task lists, project timelines, charts, graphs, and more)	**Very Good** + Custom Dashboard with choose from 50+ widget variations (task lists, project timelines, charts, graphs, and more)	**Very good** + simple, but effective
Strides	**Direct Competitor** help individuals set, track, and achieve their goals and habits.	**Very Good** -A bit overwhelming for beginners. + simple and good-looking layout, making it easy to enter and track goals	**Outstanding** + Users can analyze their historical data to identify trends, patterns, and areas for improvement in their habits and goals. + reminders, Visual Motivation,	**Very Good** + simple and intuitive interface, making it easy for users to navigate and understand.	**Very Good** + simple and intuitive interface, making it easy for users to navigate and understand.	**Very Good** + Formal, professional
Toodledo	**Direct Competitor** full-featured platform that allows you to manage tasks, notes, and even habits, in one centralized location. It's the ultimate tool for users who want control over how they manage their tasks.	**Very Good** + organizational options, like folders, tags, a hotlist, and search filters. + option to ignore all reminders and keep things simple.	**Outstanding** + to-do lists, the ability to write long notes, make custom lists, create structured outlines, track your habits, collaborate with others	**Outstanding** + customize every aspect of the app to fit your specific preferences: creating custom fields, designing workflow, and even choosing the level of detail you want for each task. + Ability comment and communicate within tasks, to fosters better team communication	**Outstanding** + Audible pop-up alarms. + Syncing between devices. + Customizable widgets.	**Outstanding** + formal and friendly tone
Way of Life	**Direct competitor** focuses on the power of daily habits. You note what you did each day, marking it as a 'good' or 'bad' choice for your goal. Changing habits is hard work. Having the right tool is half the battle.	**Outstanding** + simple and functional design	**Outstanding** + Chains: users can challenge themselves not to break a positive streak + Powerful reminders with flexible scheduling and custom messages	**Outstanding** + offers multiple themes to choose from (dark mode, serenity, light, rose...) + color blind mode	**Outstanding** + strong onboarding process + intuitive and simple to ger started and use	**Outstanding** + friendly, helpful tone
Streaks	**Direct Competitor** Streaks is the to-do list that helps you form good habits. Every day you complete a task, your streak is extended.	**Outstanding** + clean and intuitive interface + Simple and colorful design + Effective Motivation: The "Don't Break the Chain" philosophy encourages users to maintain streaks, boosting motivation and helping establish consistent habits.	**Outstanding** + widget for home screen showing app progress + offers tracking of 3 different tasks: positive, negative and timed tasks. + share tasks with others like a habit-building team cheering each other on. They can see the progress and give a thumbs-up -Limited Task Slot	**Very Good** + Its not not cluttered like similar apps, very simple UI + choose your own background color + advance setting customization + Users can choose from many different themes and icons to personalize UI + Personalize color schemes.	**Outstanding** + seamless integration across multiple apple devices -can't complete tasks directly from the widget.	**Outstanding** + It's like a game where users are trying to beat their own record. This keeps them motivated to keep going and not give up.
Productive	**Direct competitor** virtual to-do list that's always with you. daily habit tracker app that helps you build positive habits and new routines. Effortlessly track your habits, set reminders, reach your personal goals, and stay motivated every day.	**Very Good** -unable to set the same habit multiple times a day (drinking water)	**Outstanding** + location-based and time-specific reminders + transforming behavior with challenges, include other participants + Statistics, habit management, articles,	**Outstanding** + ADHD Assistance (users can manage distractions and create a focused daily routine) + customization: special icons and colors for each habit -users complained about "vibrate" notification for those who cant hear well	**Very Good** + simple and easy to use, users can focus on just the morning, afternoon, or evening tasks	**Outstanding** +formal tone

Figure 2: Competitive Analysis

4. User Research

This chapter presents the findings from user research, which was conducted in order to investigate the user experiences and behaviours around progress tracking. Research consists of a mixed-methods approach, combining qualitative and quantitative techniques to gather insights into user perspectives and behaviours. The research methods include an online survey, user interviews, SME interview and creating a target user.

4.1 Survey – Results

The survey was active for eight weeks, and a total of eighty-three responses were collected. The survey consists of a total of seventeen questions, divided into five categories. First question covers demographics, specifically participants' age group. Next section is marked as “Goal Setting”, and participants are asked to reflect on the time when they had set personal or professional goals for themselves. In this part the objective is to find out how many have set specific goals for themselves in the past year, how important is goal setting in their lives and what methods have they used for progress tracking. Second section covers social accountability topics, where participants are asked to reflect on the time they shared their progress or a milestone with friends, family or through social media channels. This explores how often participants share their goals with others and how important they find the aspect of social support in their goal attainment journey. Next section explores progress tracking with the use of photographs. Participants were asked to reflect on time when they looked back on photographs showcasing their achievements and think about how it made them feel. The goal was to determine what emotions participants associate with viewing their achievement photographs. More specifically, have they ever shared these kinds of photographs with a supportive community in order to get social feedback and does sharing them enhance their motivation? Finally, would they be interested in an app particularly designed to share progress photographs with others and what specific features would they expect and/or benefit from. The survey ends by asking participants if they would like to be part of further research, such as an interview or prototype usability testing. What resulted was recruitment of participants for further research who fit the target user characteristics and were essential for focused group user feedback.

The survey insights were gathered and analysed through a card sorting exercise [39]. In this exercise, the most crucial data was categorized into three themes: goal setting, social accountability, and progress tracking through photographs (Figure 3).

Figure 3: Survey Data Insights – Sorting Exercise

In depth data analysis indicated that 65% of users have set specific goals for themselves in the past year. While 31% respondents said that goal setting is extremely important for them, 56% said it's somewhat important. It was found that the most popular goal tracking method is notes and/or to-do list with 44% users reported using it, while the second most popular method is sharing a goal with friends and family where 41% of users reported they would use (Figure 4).

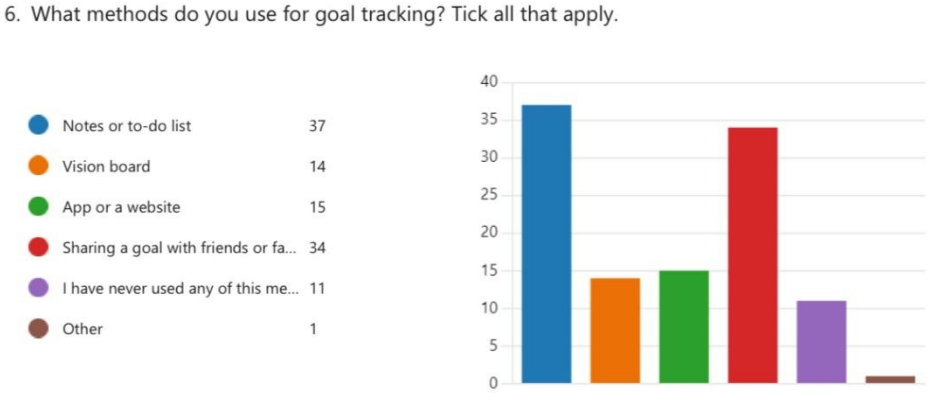

Figure 4: Survey Results - Goal Tracking Methods

An interesting insight was observed (Figure 5), revealing that a significant proportion, specifically 66%, seldom share their goals with others, whereas only 25% do so very often. When respondents were questioned about the perceived significance of social support in the goal achievement journey, 39% reported that it was extremely important, while 43% considered it somewhat important.

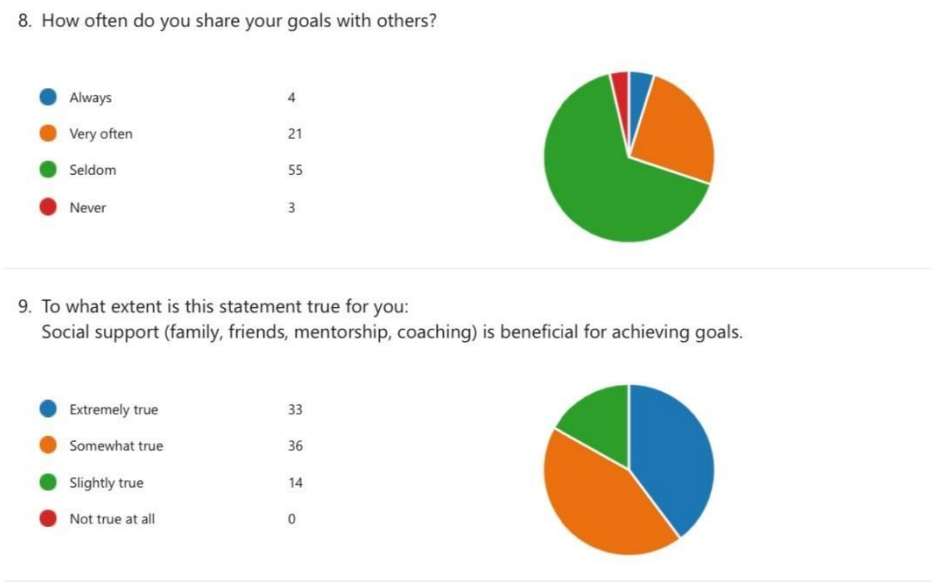

Figure 5: Survey Results - Social Accountability

Another aspect explored was monitoring of progress through the utilization of personal photographs. The findings indicated that 45% of individuals have shared their personal progress photographs on social media or with a supportive community. Furthermore, the majority, specifically 59%, stated they feel motivated when looking back at photographs that document their progress.

Figure 6: Survey Results: Progress Tracking with Photographs

4.2 User Interviews – Results

One-to-one interviews [38] with target users were conducted in order to gain insight and gather valuable qualitative research on how individuals set and achieve personal goals. The participants were chosen using an online survey, in order to target people who have reported setting clearly defined goals for themselves in the past year. The interview explored in more depth the methods they used and struggles they faced. The interview focused on keeping an open conversation and asking open-ended questions. Several areas were explored, including how users track goals, handle failure, struggles they go through, what motivates them and how often they share their goals with others. A total of nine participants took part in user interviews, contributing valuable insights and perspectives to the research process. The resulting data was analysed using thematic analysis (Figure 7), where patterns were identified in order to find meaning within a large amount of data and draw conclusions.

Figure 7: User Interviews – Thematic Analysis

Insights:

- Some users prefer to share their goals, while some prefer to keep them to themselves in early stages, but almost all agree that it can be beneficial to share your goals with those closest to them, friends, and family.
- Those that prefer sharing their goals, do so in order to gain feedback and support.
- Almost all agree that failure is inevitable, and most common challenges they face are daily distractions and keeping motivation over longer periods of time.

- Almost all handle setbacks by trying not to get too frustrated and remembering that failure is part of the process.
- Most break their goals into smaller manageable steps and keep track of improvements.
- Users stay motivated by keeping the end result in mind and focusing on that rather than the difficult journey to get there.
- Almost all agree that strong mindset and perseverance is what keeps them on track to achieve goals.

4.3 SME Interview – Results

The findings from the SME interview [38] provided valuable insights into the potential benefits, challenges, and recommendations for designing social features in progress tracking applications. The participant was a business mentor and a life coach, with sixteen years of experience in the field. The interview lasted approximately fifteen minutes and was recorded with the consent of the participant. The findings provided valuable insights into the potential benefits, challenges, and recommendations for designing a progress tracking application.

4.4 Target User

Creating a concrete definition of a target user, helped to guide the design process by ensuring that the right questions are being asked and users remain the central focus in decision making [24]. Collected data from the user interviews and survey helped facilitate and guide the development of a target user.

4.4.1 Primary Persona

The first step was to develop user personas [40], in an effort to define user characteristics and to better understand the target audience. A primary (Figure 8) and secondary persona was created to present and help visualize user's needs, experiences, and behaviours [25].

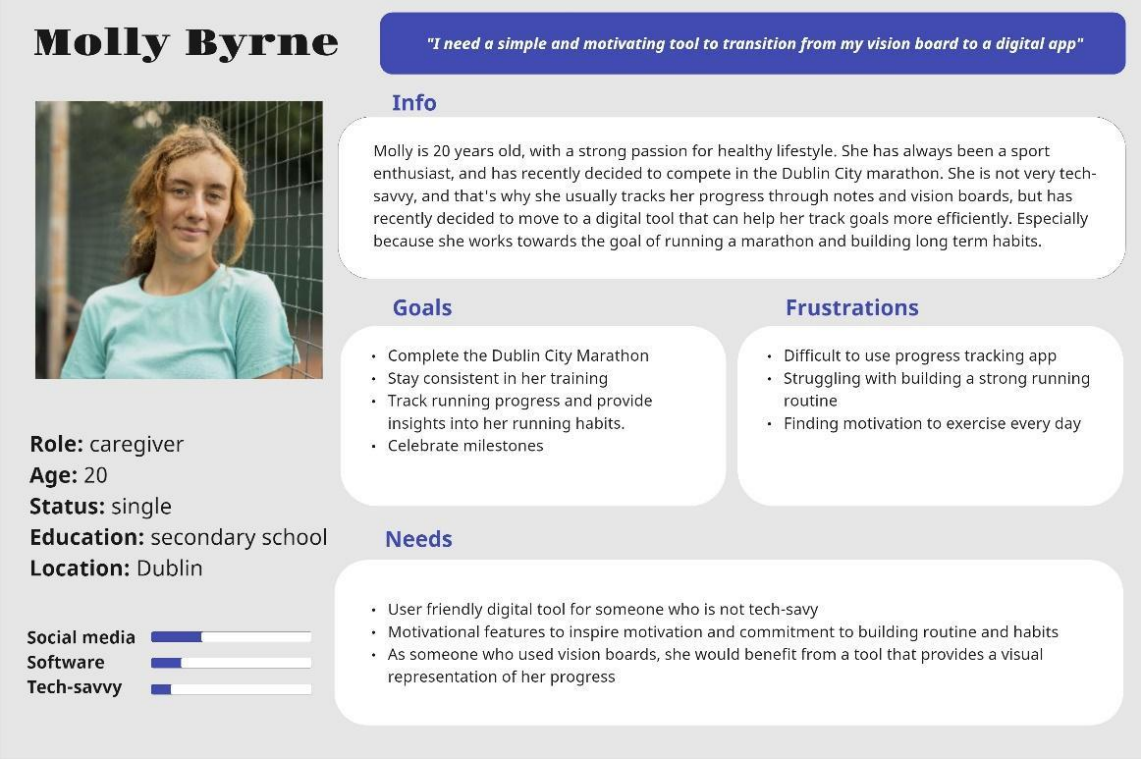

Figure 8: Primary Persona

4.4.2 Scenario and a Customer Journey Map

Following the persona, a journey map and a scenario were created (Figure 9). The journey map provides valuable insight into the customer journey, tracking their steps, highlighting their pain points, and understanding the process they go through to accomplish a goal. The map also features an opportunities section, in an attempt to explore potential solutions to our user's pain points [23]. A scenario was developed as an integration with the journey map, for the purpose of providing additional context and insight about how the users might interact with the product [25].

Scenario

Molly is a sport enthusiast, who has recently decided to compete in a Dublin City Marathon. She has always used vision boards but has recently decided to try to track her goal through an app on her phone. Molly opens the progress tracking app and goes through the onboarding process to learn more about hoe to use it. She sets a goal: "Complete the 20km marathon" and under social features adds a friend who is also interested in running and they decide to complete a challenge together.

User goal — **Track Goal Progress**

Journey Steps	ONBOARDING	SET A GOAL & ENTER A CHALLANGE	ADD A FRIEND	COMPLETE FIRST DAY STREAK	CHECK GOALS & EXPLORE
Behavior	• Opens the app • completes the onboarding process to learn how to use the app • Registers	• Sets her first goal and adds a name • Customizes the goal with choosing a color and an icon • Searches for challenges • Finds and enters a challenge about running a marathon	• under social features she decides to add a friend who recommended her the app • Decides between and her friend as a social support or competitive motivation	• She goes into her goals and marks first day completed	• Explores insight features like statistics • Enables home widget and allows notifications
Thinking	• Overwhelming at first • wants to register as soon as possible to start using the app	• there are a lot of options and customization about a goal • Entering a challenge is easier than trying to set milestones herself • Fun to try out a challenge.	• What does it mean to add a friend • How to know which of her friends already use the app • Doesn't know what to choose between social features	• Feels motivated to keep going • Anxious to complete such a big challenge	• Data statistics can be overwhelming but provide good insights • Addition features will be useful for keep a streak • Feels motivated to keep up the streak
Feeling	Curious Overwhelmed	Uncertain Excited	Interested but hesitant	Motivated Anxious	Excited Motivated
Pain points	• Uncertain where to start • Wanders if this app is right for her	• setting a goal requires entering a lot of information • Wanders if she doing it in a correct way	• Doesn't know if she would benefit more from social support or get motivated by competitiveness	• Worried about completed her whole goal	• Keeping motivation over long time
Opportunities	• **straightforward onboarding** process • **easy & quick to register** • **Important first impression** about the app to interest the user	• **Customization** elements • Make adding a goal as easy and straightforward • allow to easily **search challenges** or allow users to **create their own**	• Add an option for users to do a small survey to find out what motivates them most	• **Tips** on setting a goal • Allow users to **break goal into smaller manageable steps**	• Include **articles** on reaching your goals • Add a **freeze streak option**

Figure 9: Scenario and a Customer Journey Map

4.4.3 Empathy Map

An empathy map (Figure 10) was created with a purpose of building empathy with the end users. It is a representation of their attitudes and behaviours and helps to understand what drives users' behaviour. Furthermore, it helps to uncover user needs that might have been overlooked in the initial qualitative research, as users themselves may not be aware of [40].

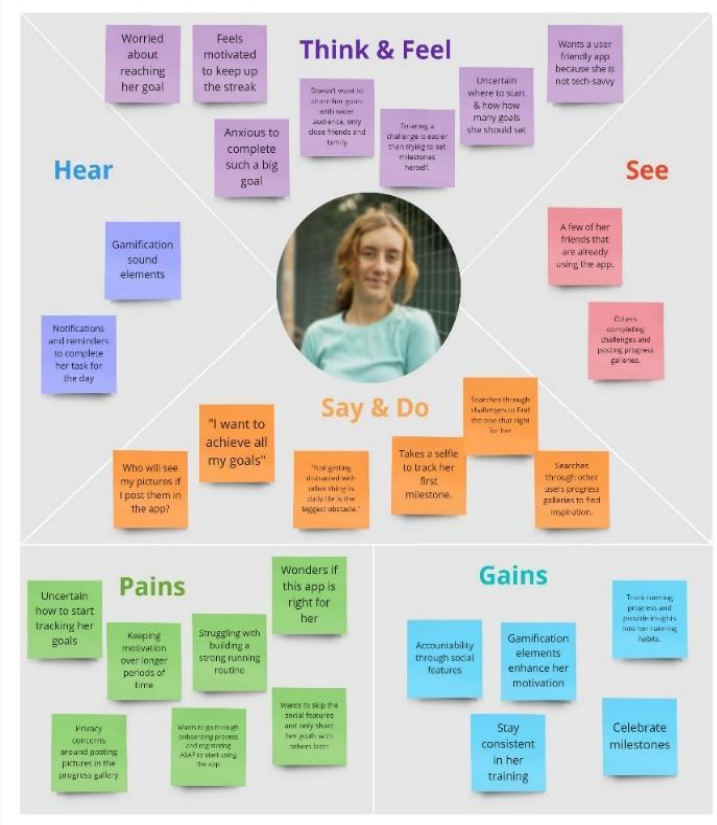

Figure 10: Empathy Map

4.4.5 Problem Statement

Using the Persona, a problem statement (Figure 11) was developed which provides a clear description of the problem, while keeping the focus on the user, their situation, motivation and expected outcome [41].

Figure 11: Problem Statement

5. Design

This chapter delves into the process of translating user research findings into actionable design strategies.

5.1 Key Research Insights and Design Implications

Current research findings were thoroughly examined to create a comprehensive summary of user research and extract the most important insights. The areas analysed were the literature review, market research and qualitative and quantitative analytics. Some key design ideas include implementing a strong onboarding process, integrating notifications, reminders, and helpful articles. Progress should be monitored by breaking down the journey to small manageable steps [1] and celebrating milestones [10]. Introducing gamification elements will make the application entreating to use and tracking goals not to feel like a chore [3]. Additionally, prioritizing a clean and intuitive UI is essential to prevent users feeling overwhelmed. While evidence supports the incorporating social features [24, 17], users should have the option to maintain privacy by choosing to keep their progress private or share it with only a few selected individuals.

Figure 12: Research Insights and Design Ideas

5.3 Design Process: Mood Board

In order to establish the character of a design and to identify the elements needed to create it, a mood board (Figure 13) was developed. Mood boards assist in defining a mindset or vision of the product. They contribute to development of ideas, and are a beneficial tool used to communicate, think, and share different views that emerge from the design brief while defining future products and trends [26, 28]. For the purpose of the project, numerous goal setting and gamification platforms have been identified and gathered, in addition to a proposal of a typography and colour palette to guide the design process.

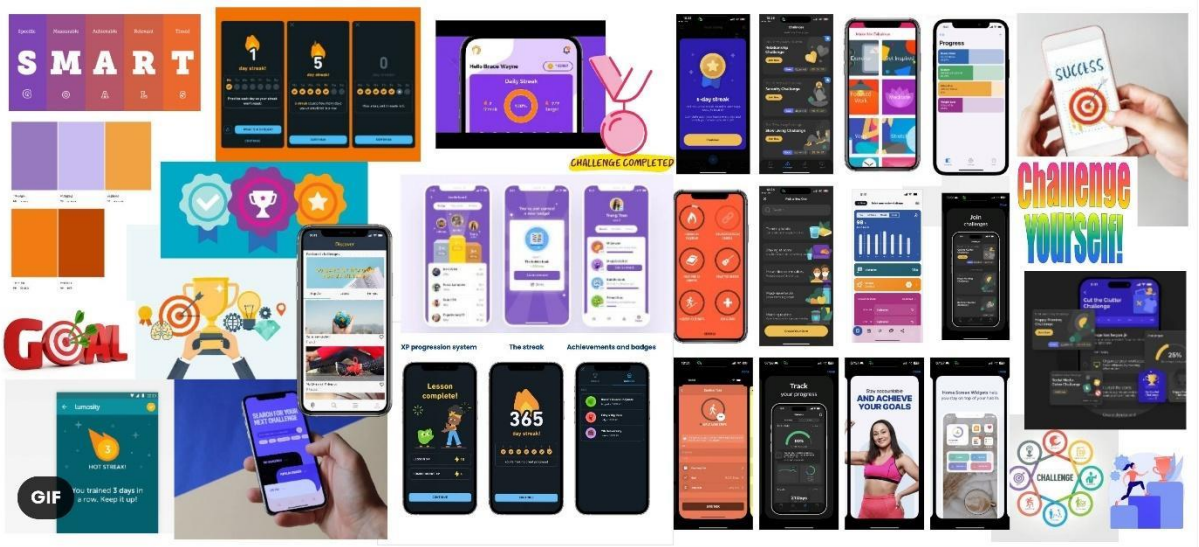

Figure 13: Progress Tracking Apps Mood Board

5.4 Sketching and Paper Prototyping

Taking into consideration all research insights, early concepts of paper prototypes were created (Figure 14), presenting an iterative method for refining the concept of a progress tracking application [42]. The objective was to define user flows of the product, breaking down user journey into tasks, from setting the goal, joining a challenge, sharing the goal with others, and finally creating a progress tracking gallery. These sketches and low-fidelity prototypes enabled the experimentation with different layouts and design elements in order to identify optimal design solutions for the application.

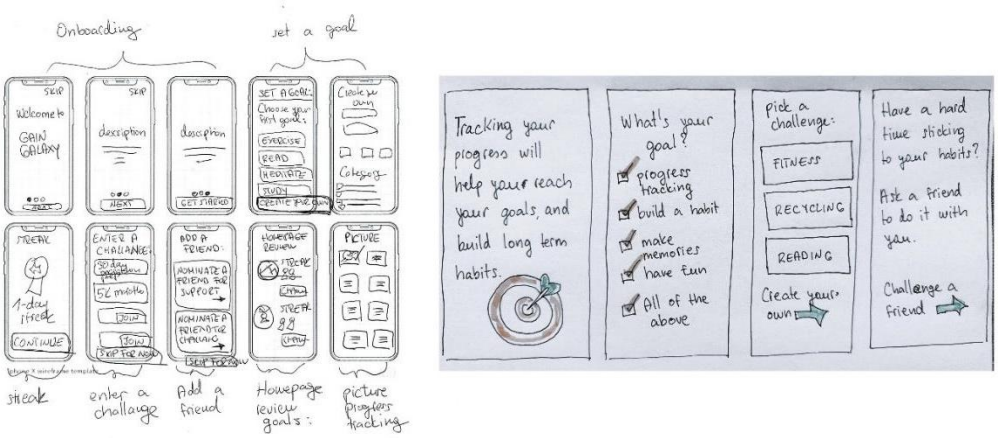

Figure 14: Examples of Paper Prototyping

5.5 Digital Prototype

Two prototypes were developed, prototype A with social features of inviting a friend to participate in a challenge, and prototype B with tracking progress with personal photographs.

Onboarding Process

The app's onboarding process encompasses the first three screens, which serve as the user's introduction to the applications functionalities and features. The onboarding process was kept short and concise, offering users the option to bypass it with a "skip" button. The initial screen displays the logo and welcomes users, followed by a screen that introduces the application as a progress tracking platform. Next each prototype had an additional screen where it introduces one of the application's key features. In prototype A this is social features (Figure 15), and in prototype B this is progress tracking with photographs (Figure 16).

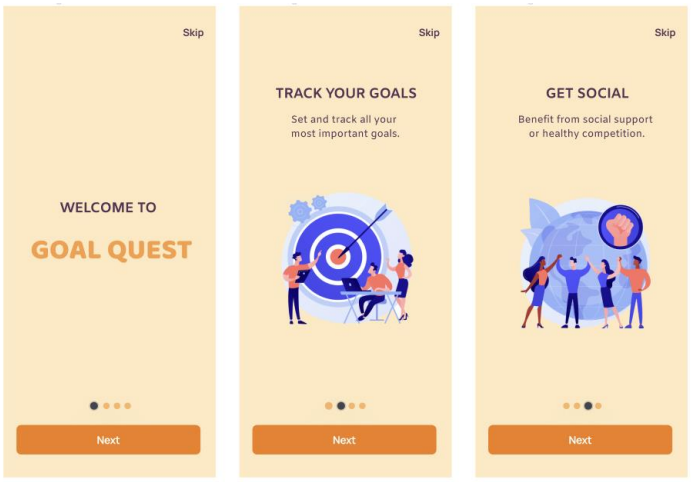

Figure 15: Prototype A - Onboarding Process

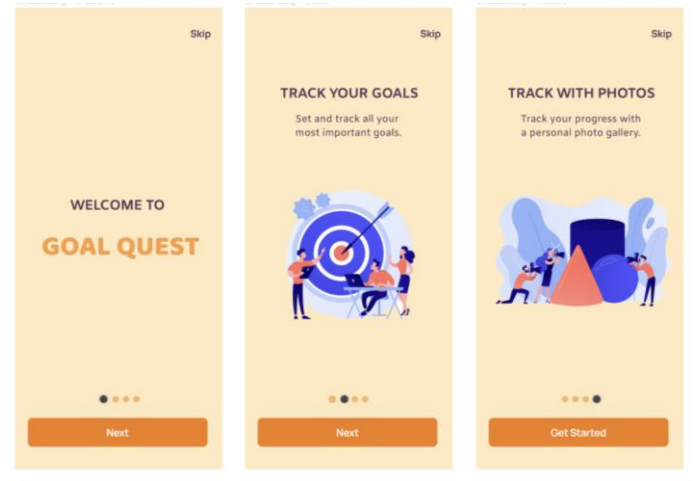

Figure 16: Prototype B - Onboarding Process

Set a goal and Join a Challenge

After the onboarding process, users are prompted to set a personal goal, from a range of categories such as, reading, exercise, business, relationships and more. This process is the same for both prototypes. The following screen presents users with a list of potential challenges that relate to the goal they choose for themselves, such as a “30-day Running Challenge.” When users select a challenge, the next screen presents an overview of what that challenge encompasses with a ”Join Now” button at the bottom of the screen. Following this action, users will get a message that confirms and celebrates their enrolment in their first challenge. After this message users will be reverted back to the challenge overview, which now displays the status of the challenge as ”Joined”.

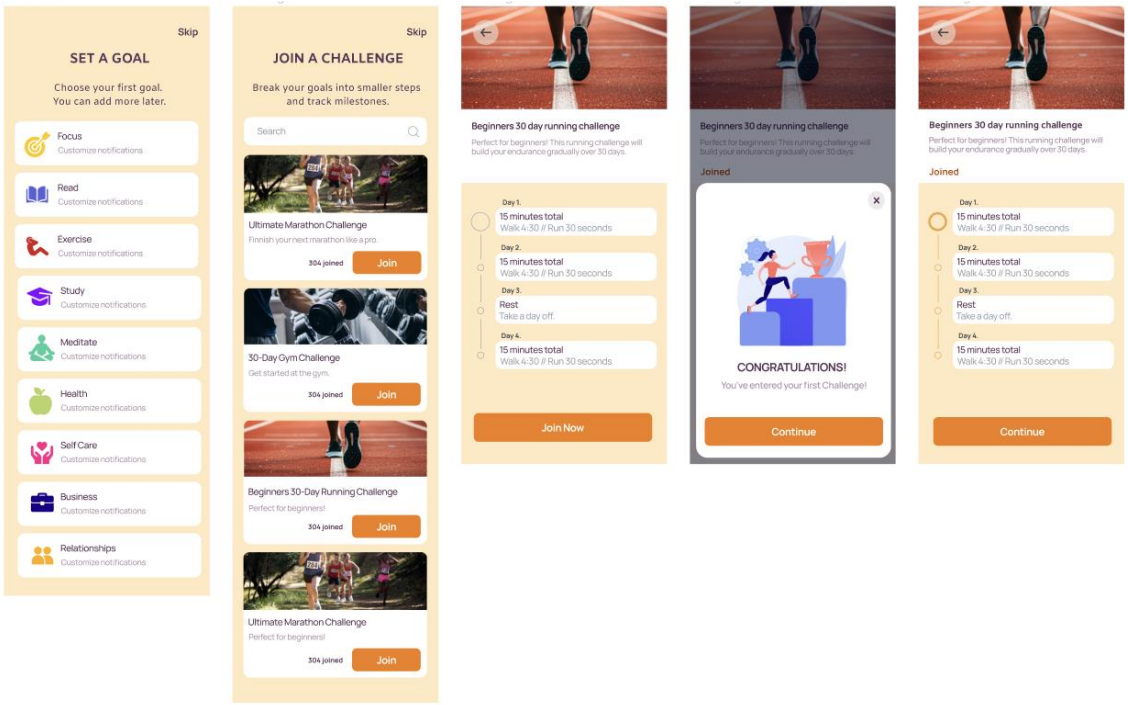

Figure 16: Prototype A and B - Set a Goal and Join a Challenge

Prototype A – Social Features

Prototype A (Figure 17) encompasses two different social features: nominating a friend for support or inviting a friend to partake in a challenge together. Accompanied by a short description of each option, so users have more insight which one is more suited for them. After they select one of the options, they are presented with a list of challenges they have previously joined in the application. They then proceed to click on a "share" button, redirecting them to their device's sharing interface. Following this action, users will get a message that confirms and celebrates their choice to share a challenge with a friend. Encouraging users to feel proud of what they've accomplished and to connect with others in the application.

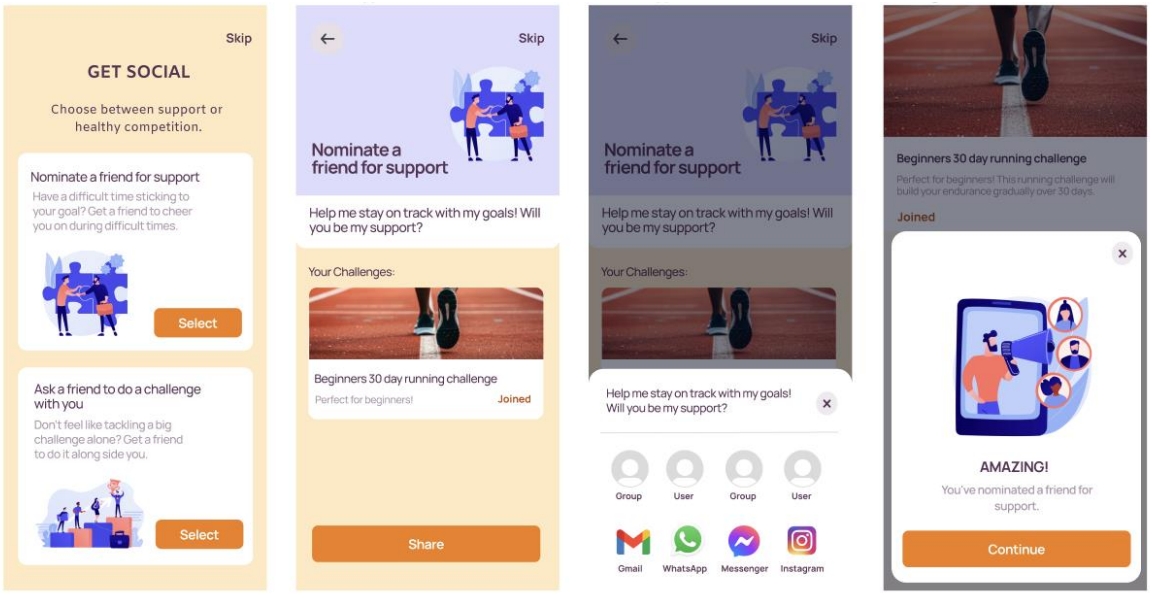

Figure 17: Prototype A – Social Features

Prototype B - Progress Tracking with Photographs

In the prototype B (Figure 18) users are presented with an option to create their own progress gallery. Accompanied by a brief description that explains the process of tracking milestones with photographs, and an option to share the gallery with others or keep private. Additionally, the same screen features a "Get Inspired" section, where users can peruse other individuals' progress galleries and get inspired to do the same. In order to stay consistent within the application, after users have created their gallery and uploaded their first photograph, they will get a message that confirms and celebrates their first progress gallery.

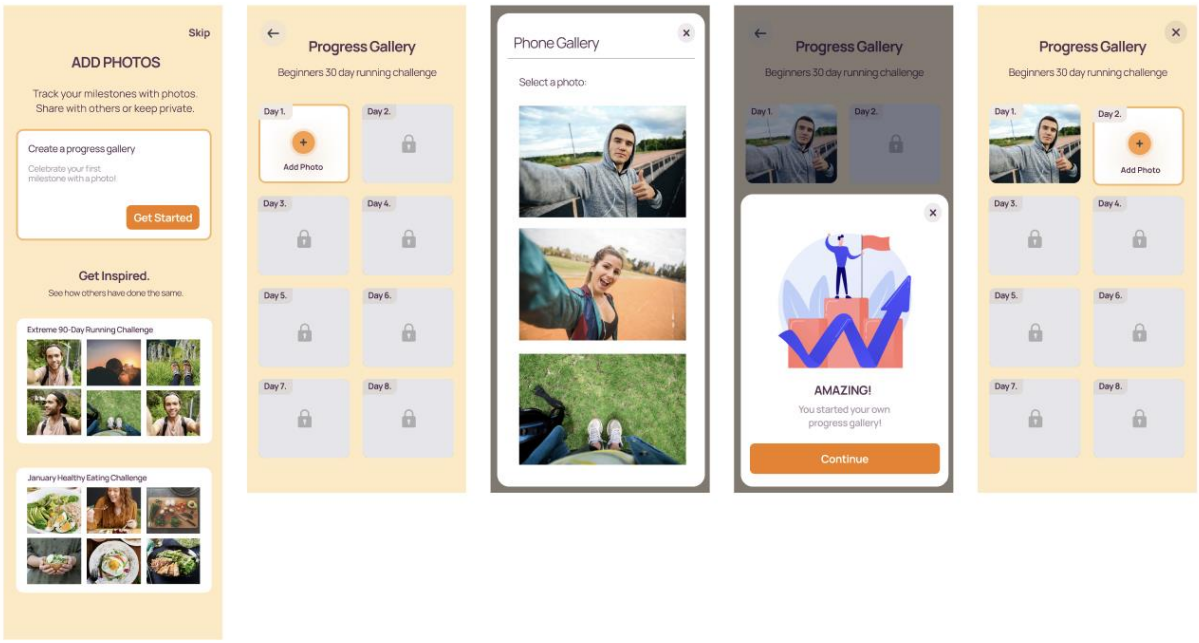

Figure 18: Prototype B - Progress Tracking with Photographs

6. Testing, Prototyping, and Iteration

Prototype evaluation represents the final phase in the development of a successful product. It is imperative to ensure that the developed application aligns with users' needs and preferences [43]. Feedback was collected from the target audience regarding the UI, design, and usability aspects. Throughout the user testing phase, participants interacted with the prototype, while observation, attentive listening, and note-taking was employed to record data insights. Based on the received feedback, the prototype was iterated and further developed. The involvement of users in the design process is crucial for the development of a product that meets user preferences [43].

Participants were recruited from the initial online survey that was distributed at the beginning of the study. Those who expressed interest in participating in further stages of the research were contacted and invited to take part in the usability testing.

6.1 Usability Testing

The chosen usability testing method involves observing and evaluating user behaviour while they interact with the product and accomplish a series of specific tasks. The primary objective of this usability testing was to observe how users engage with the product, identify challenges they encountered, and to understand their thinking process. To accomplish this, users were encouraged to disclose the reasoning behind their actions, as well as their frustrations and overall experience with the product [43].

The documents prepared for the testing were the following: a test script, consent form, *System Usability Scale* (SUS) questionnaire [32] and a modified *Intrinsic Motivation Inventory* (IMI) scale [33]. The SUS Scale [32] is a widely recognized standardized questionnaire that's used to evaluate perceived usability of a digital product. The scale consists of ten questions, measuring effectiveness and efficiency of the product and users' satisfaction. The IMI scale [33] is a motivation measurement tool intended to assess participants' experience related to a targeted activity. It is commonly used in lab experiments related to motivation and self-regulation. For this study, a subscale of IMI was used, specifically the *Task Evaluation Questionnaire*. This subscale consists of twenty-two questions and is used to measure intrinsic motivation through four categories: interest/enjoyment, perceived choice, perceived competence, and pressure/tension.

6.1.1 Pilot Testing

Prior to the initial usability testing session, a pilot test (Figure 19) was conducted in order to identify flaws and note areas for improvement in the test procedures and materials. The process of pilot testing helps fine-tune usability testing, leading to more reliable results. Testing was conducted with two participants.

Pilot Usability Testing		
Participant ID	**LI56**	**GG98**
Usability Testing Oservations		
Prototype A	• Wants to skip the onboarding process	• Thinks the goals set are brilliant • "I'd use the app because I already do one or two things" • Likes the color palate, UI and illustrations • "I like the take on the challenge with a friend as it's more fun doing any challenge with a friend"
Prototype B	• Easy to use • App feels friendly	• **"I already use a photo gallery to save photos of my progress with health so I think it's great"**
Post Testing Questions		
What did you like about the app, and what did you dislike?	• Very easy to access • Easy to choose options • "Because its just a test, I haven't seen the app run yet, so I cant say it there's anything that I don't like yet"	• It's a fantastic way to set goals • **I like that there's many different types of goals to set up and that it plans out your challenges for each day.** • I like the take on the challenge with a friend as it's more fun doing any challenge with a friend • The gallery is great for **tracking** weight loss and **looking back at where you were and where in life you are now** • I'd use the app
Was there anything that you expected to see in the app, that wasn't there?	• Can think of anything, doesn't expect nothing else that what's already there • "I just saw the screen and then okay, it was everything there"	• "Not that I can think of"
Do you prefer prototype A or prototype B, and why?	• personally prefers prototype B, because doesn't like to share too much with others and prefers to keep to himself. • "I prefer to create things on my own and then inspire myself with my photos and everything."	• Likes B, but A as well because thinks it's great for motivation
In prototype A, did you choose a social feature of support or to challenge a friend? Why did you choose that specific one?	• Prefers the option to challenge a friend, because it seems more fun option, and doesn't like asking for help.	• Challenge a friend • **Because i enjoy healthy competition as it motivates me more. It becomes a game.**

Figure 19: Pilot Usability Testing

6.1.2 Usability Testing – First Round

First round usability testing (Figure 20) was conducted with a total of four participants. Several important insights were noted. The testing provided insight into user pain points, functionality of features and task competition. Highlighted are the issues identified during the testing process and the subsequent prototype iterations aimed at addressing these challenges.

- Gallery privacy concerns: users tended to skim through the text and were not aware that the gallery could be kept private. A modification in the UI is required, where users can easily switch between two settings: “Private” or “Public”.

- Alternative method to tracking milestones: some users mentioned that instead of tracking their progress with photographs, they would like to see an alternative option as well, like taking personal notes.
- Allow for more exploration within the application: one participant felt that the app was too straightforward and lacked opportunities for exploration. To address this, both UI and usability tasks should be modified in order to encourage participants to discover new features on their own.
- Clarification of social features: one user noted that the two social features are very similar in what they do. Even after getting familiarized with their descriptions, they still couldn't differentiate them. The new prototype will have to address this problem.
- Filtering challenges: improvements need to be made with filtering challenges, where users mentioned they would prefer more sorting options.
- Colour scheme: feedback on the visual design of the app highlighted the need for improvements in text visibility against the background colour.

Usability Testing First Round				
Participant ID	**HD31**	**TD43**	**LS12**	**MM04**
Usability Testing Oservations				
Prototype A	• **Doesn't see the difference between two social features** • Even after reading the summary think they are the same thing • Likes the category list, very visual	• The prototype is to forward, **there is not enough options for user to explore** the app my himself • Is looking for **"go back" button** to go to previous screens and read/ explore the screen again	• Doesn't usually likes the onboarding process of apps and gets tired after the first one or two screens. • Challenges remind his of social media	• **Think the app is based on exercise, doesn't realize there are other goals available** • Simple • Very easy start • Good skip button • Likes that they can **skip the social feature part, because doesn't always feel like being social**
Prototype B	• Would love it if there are **more examples of other peoples progress gallery's**, think this is really got inspiration • Really likes that different days are locked, so you have to complete in the order	• Enjoys seeing others progress galleries, thinks this is really nice feature	• **Wanders if its mandatory to track progress with photos** • **Would like to see other alternative options**	• **Doesn't feel comfortable sharing photos with others, wants to keep it private.** • **Would like to use it and keep to private and maybe share when comfortable with close friends and family.**
Post Testing Questions				
What did you like about the app, and what did you dislike?	• Thinks app feels welcoming to users • Straightforward • Likes the visuals, likes that there are icons next to goal categories, because **some icons can mean different things in different cultures so appreciates that both icon and explanation is there** • **Likes search button from the categories.** • Some places there is **orange text on beige background thinks it would not be readable for people with vision impairments** or color blindness.	• Likes the navigation • Features are simple • Buttons easily accessible • Doesn't like the photo sharing feature, doesn't want to share with others. • **Unaware of the options to keep the gallery private** • Good colors • simplicity • **Layout of challenges could be better - doesn't feel clean**	• Its not clear **weather the challenges are templates from the app or weather users created them themselves.** • **Wonders if he should filter challenges through region or location, or similar** • wants to skip the entire onboarding process • **Wonders if he can share not only on social media and messaging apps but also within the app itself.**	• "I like how streamlined it was" • Likes the option to **skip the onboarding process** • Likes to colors and UI, good setup • The app feels friendly and nice • **Dislikes the features to share with others, at the beginning would consider this maybe later in the goal journey.**
Was there anything that you expected to see in the app, that wasn't there?	• In the prototype B, progress gallery, would like to see **an option to add notes alongside photos.** • Thinks that she, with a lot of other people benefit from adding small bits of text as well, like "Good exercise day today".	• Can't think of anything	• He expected there to be a **screen where he gives app permission to access his phone gallery photos.** • **He expected for the second day, not to be available straight away after uploading his first picture, but rather after some time**	• She compared to other exercise apps, an think this one is nice and friendly, feels tame, she expected picture of people in the gym, and likes that she found **icons instead of pictures**
Do you prefer prototype A or prototype B, and why?	• Prefers prototype B, because she likes the aspect of taking photos and tracking progress in this manner	• Prefers to share with friends, so feels like porotype A is more for her.	• Prefers to nominate a friend to look after him and track his progress • **Doesn't want to use the photos as progress tracking, wonders if there's other way to do this.**	• Prefers the photo progress tracking, feels like its more for her personally
In prototype A, did you choose a social feature of support or to challenge a friend? Why did you choose that specific one?	• She choose to challenge a friend, because of the support she would get if somebody did the task alongside her • Thinks its a **good bonding experience** • **Enjoys people doing tasks beside her**, good for community	• Choose to challenge a friend, and **would even like to see a group of people do this together.** • **Maybe even to make friends** • Likes the accountability that comes with it.	• Feels like support works better for him personally, **he would share with a friend and get him to send reminders**	• She choose to challenge a friend, because she would rather do it alongside a friend then have someone just cheer her on. • She refers to app "Dualingo" which offer **an option to challenge a friend within the app** and would like to see more options like this

Figure 20: Usability Testing - First Round

6.1.3 Usability Testing – Second Round

A total of six users participated in the second round of usability testing (Figure 21), and several issues and user pain points were identified. Following the insights from the first round of testing, major changes were done on the digital prototype. The new iteration consists of a Prototype A, that is without any social features, and prototype B with social features. Considering this change, new tasks were created.

Usability Testing Second Round

Participant ID	MM04	MD90	LI17	SG55	DO94	EM90
Usability Testing Oservations						
Prototype A	• **Confused between challenge list and challenge overview, wasn't sure where to click join.**	• Had some trouble registering • **Took some time finding where to add a photograph** • **Confused about where to join the challenge.**	• User mentioned app feels really responsive, and good to use • Completed all tasks easily, took his time while reading and going through the app.	• Enjoys the app, would prefer to explore other options instead of exercise goals.	• Easley goes through the tasks • Likes the option to track progress with the user of photographs	• Likes the design and illustrations • Likes the way an "app feels" • Straightforward process of using the app
Prototype B	• Thinks app is easy to use • Likes the options to do challenges with others, but is not sure if he would send photos to friends.	• **Couldn't find the friends tasks, clicked on bottom navigation under "Friends"**	• **Took some time to join a challenge and look through challenge overview before joining the challenge.**	• **Wasn't able to register**, instead on entering his details, wanted to register through google.	• **Thinks social comparison is a good was to influence him to stay accountable** • **Likes that the app allows for competition between friends** • **Struggled to find where to see tasks from others in the challenge**	• **likes the feature of inviting a friend to do a challenge with, a refers to it "as a more way fun of doing any challenges"**
Time	• Prototype A: 1:06 min • Prototype B: 1:28 min	• Prototype A: 1:04 min • Prototype B: 1:26 min	• Prototype A: 1:03 min • Prototype B: 1:28 min	• Prototype B: 2:10 min • Prototype A: 0:40 min	• Prototype B: 1:14 min • Prototype A: 0:59 min	• Prototype B: 1:44 min • Prototype A: 0:51 min
Task Completion	• Prototype A: Task Completed • Prototype B: Task Completed	• Prototype A: Completed With Difficulty • Prototype B: Completed With Difficulty	• Prototype A: Task Completed • Prototype B: Task Completed	• Prototype B: Task Completed with Difficulty • Prototype A: Task Completed with Help	• Prototype B: Task Completed with Help • Prototype A: Task Completed	• Prototype B: Task Completed • Prototype A: Task Completed
Post Testing Questions						
What did you like about the app, and what did you dislike?	• Thinks app is easy to use, step by step • **"The app doesn't feel rushed"** • **"Everything is very explained"**	• Liked the option to share on WhatsApp, and other social media • Likes the overall idea of what the app does • Found the whole app confusing at times • Thinks that some features are unclear as what they do	• User likes that the app is very easy to use • Design is pleasing • Layout is very simple • Cant think of anything he dislikes	• Likes that app was easy to use • Likes color scheme and "skip" options • **Likes that there is an option to register through social media accounts** • **Dislikes that he can't use google to register** • Would prefer if there are different options to choose from, instead of just exercise.	• Likes that its straightforward • App feels fun • **Dislikes at times some thing were confusing, like seeing tasks from friends doing the challenge with her.**	• Likes the idea of tracking goals through an app like this • Likes that there are lots of different goals to choose from and that it helps you figure out what challenges to do every day. • Cant think of anything she dislikes
Would the option of doing a challenge with a friend make you more motivated to stick with your goals? Why?	• **Thinks that comparison would be good thing to help him stick to his goals**	• **Thinks that inviting friends would be an interesting idea and helps with motivating her.**	• **"Doing challenges with friend would make it more interesting and exciting"** • "Yes I can beat my friends on the task that would motivate me"	• "Any would be better with a companion, someone with the same are of interest" • Think doing a challenge with someone else, especially when it comes to well being, would be nice to have someone track their tasks.	• User feels that support of doing a challenge with someone works better for her, **and think she would feel more motivated this way**	• **Users stated that it would make her a little more motivated, because the process would feel more like a game**
Do you prefer prototype A or prototype B, and why?	• Prefers prototype B, because it adds motivation	• **Even though she prefers feature to share with friends, feels like prototype A is more for her.** • **Porotype A was easier to use**	• **Prefers porotype B, because finds it more inspiring.** • User is motivated by competition and thinks he would benefit from this kind of app features.	• **Prefers prototype B because the app feels more interesting, with additional features** • **Prototype A feels like it's missing something**	• Prefers prototype B • **Thinks that doing a challenge with someone from the same area of interests would be good so they can learn from each other and motivate each other**	• **Prefers prototype B, because doesn't think she would use this feature for all her goals, as some would like to keep private.**

Figure 21: Usability Testing - Second Round

6.2 Prototype Iteration

After conducting extensive usability testing, valuable insights into user behaviours, preferences, and pain points were gained. Following these findings, extensive modifications were conducted on the prototype and some new screens were added. These iterated prototypes were used in second round of usability testing and were used for quantitative data findings for this research paper. New prototype A is without any social features. Users set a goal, join a challenge, and track the progress with the use of photographs or personal notes. Prototype B encompasses social features, it follows the same process as prototype A, only now users are able to invite peers to do a challenge with them, and both parties have insight into each other's progress.

Prototypes A and B, follow a similar onboarding process, with one exception. In prototype B there is an additional screen that introduces social features (Figure 23), of inviting others to do a challenge alongside a user.

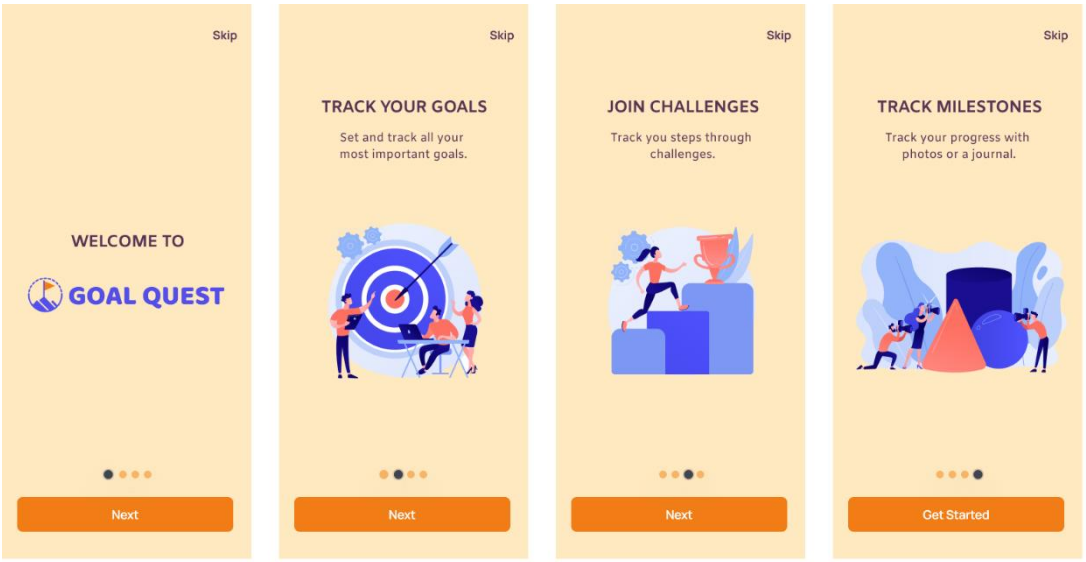

Figure 22: Prototype A without social features– Onboarding

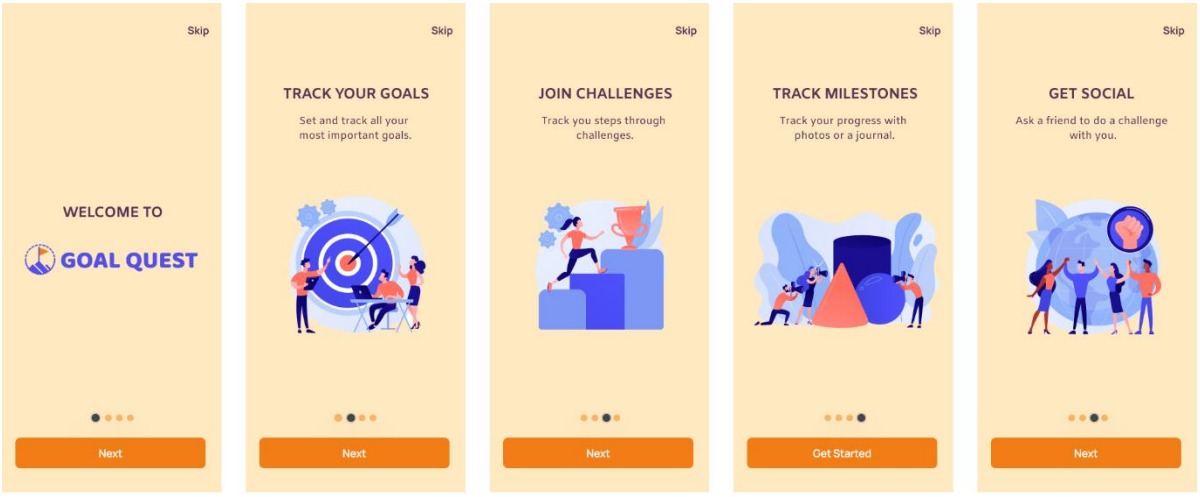

Figure 23: Prototype B with social features – Onboarding

Based on feedback from multiple users, it was determined that two social features in the previous version were too similar. In the improved prototype, these two features have been combined into one. Prototype B (Figure 24) now includes social features such as the ability to invite a friend to participate in a challenge. This involves selecting specific challenges and sharing an invite link through social messaging or social media applications.

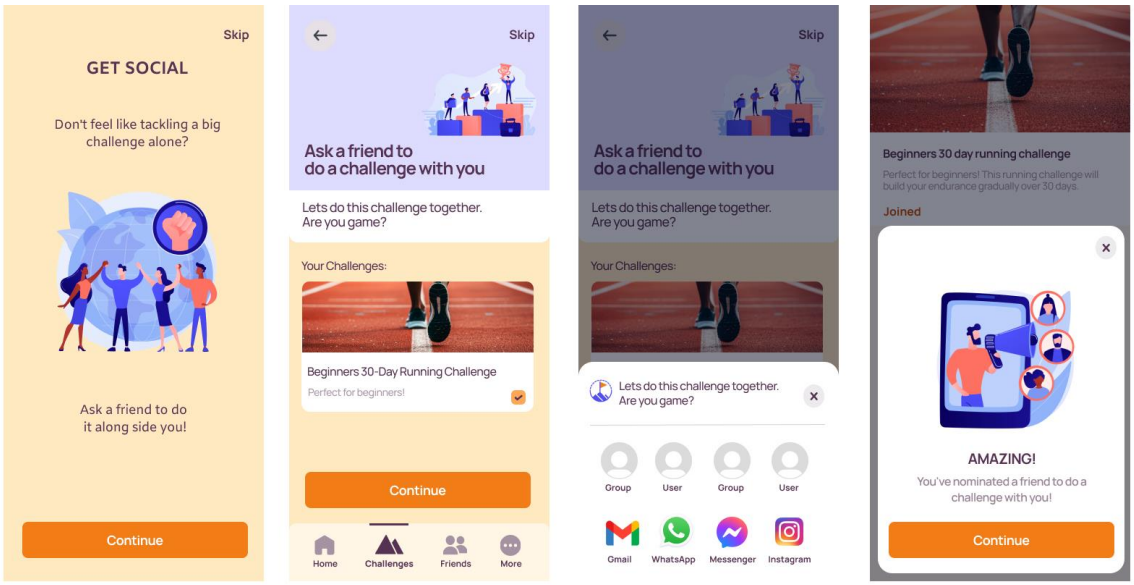

Figure 24: Prototype B - Social Features

The layout of both prototypes challenge overview follows a similar structure. With the exception that in prototype B, there is a section that shows all participants doing the challenge. This allows users to seamlessly switch between tasks and monitor each other's progress (Figure 25).

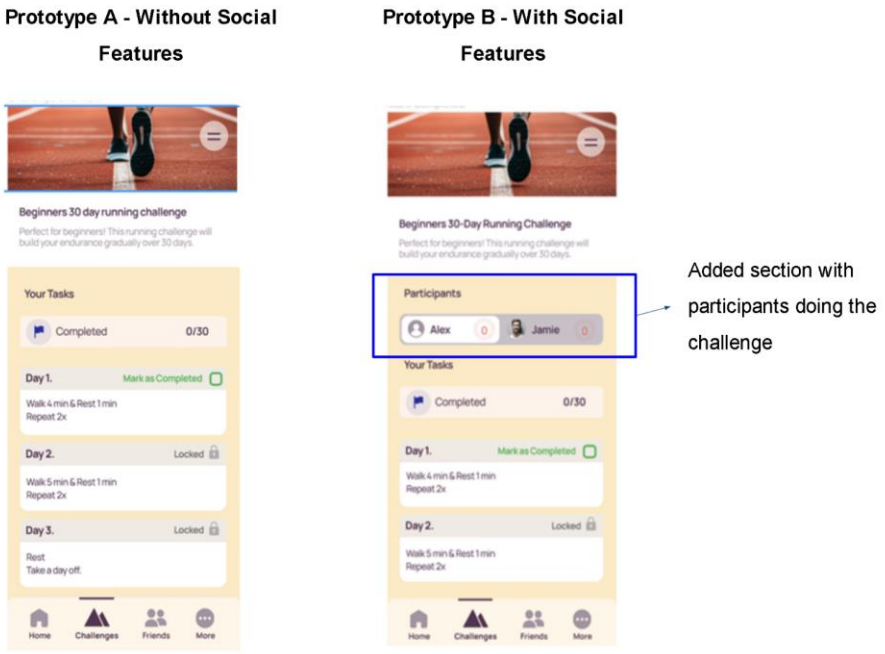

Figure 25: Prototype A and Prototype B Comparison

Additional Prototype Iterations

- Creating an account: two new screens were added where after the onboarding process, users create an account (Figure 26).
- Progress gallery removed: a number of users reported not being interested in tracking their progress with only photographs but also other alternative methods. Instead of a progress gallery, the UI was modified to introduce users to tracking milestones with either photographs or a personal journal (Figure 28).
- Challenge overview tasks: the layout and design of challenge tasks was modified to accompany the new features of adding either photographs or journal notes.
- Challenge sorting and filtering: additional features were added to help users search and find challenges more easily. Users are now able to sort and filter challenges.
- Homepage: a homepage was added that contains information about the user, and their progress. More specifically, how many goals they set, how many tasks they

completed, their best streak, and a list of all joined challenges and their progress within each challenge (Figure 27).

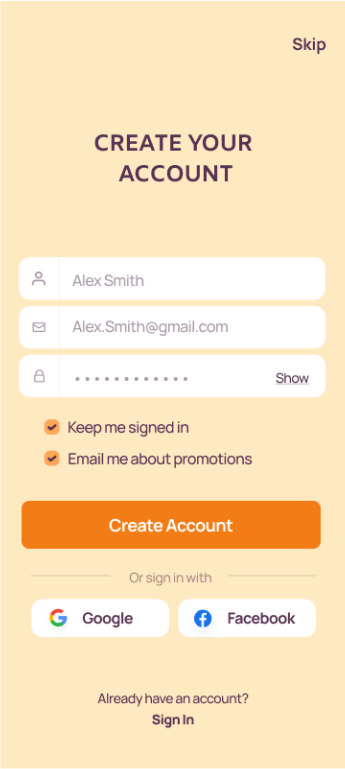

Figure 26: Prototype: Creating an Account

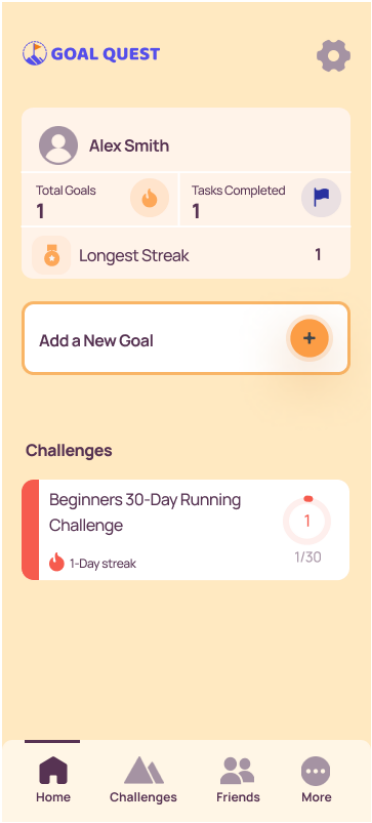

Figure 27: Prototype: Homepage

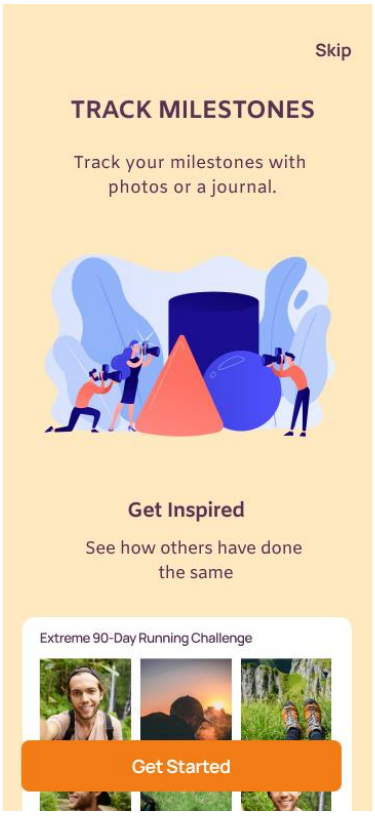

Figure 28: Prototype: Track Milestones

7. Results and Analysis

To validate or challenge the hypotheses, data analysis was conducted on the collected research insights. Which were obtained from qualitative and quantitative sources based on the second round of usability testing.

7.1 Observations of Task Performance

The following tables represent task success rate from moderated usability testing. Prototype A, task 1, was easily completed by three participants, two completed the task with some difficulty and one participant completed with help from the moderator.

Prototype A		
Task 1. Open the app and learn about what it does. Add your details and create an account. From a list of goals, choose “Exercise”. Join this challenge: "Beginners 30-Day Running Challenge". From the list of tasks, mark the first day as “Completed”. For the first day add a photo from the phone gallery. Go to Homepage.		
Participants	**Task Completion**	**Time Completion**
P1	Task Completed	1:06 min
P2	Task Completed with Difficulty	1:04 min
P3	Task Completed	1:03 min
P4	Task Completed with Difficulty	2:10 min
P5	Task Completed with Help	1:14 min
P6	Task Completed	1:44 min

Prototype B, task 2, was easily completed by four participants, one completed the task with some difficulty, and one completed with help from the moderator.

Prototype B		
Task 2. Open the app and learn about what it does. Add your details and create an account. From a list of goals, choose “Exercise”. Join this challenge: "Beginners 30-Day Running Challenge". Invite a friend to join a challenge with you, through WhatsApp. Open and see the tasks from a friend who’s doing the challenge with you. From the list of your tasks, mark the first day as “Completed”. For the first day add a photo from the phone gallery. Go to Homepage.		
Participants	**Task Completion**	**Time Completion**
P1	Task Completed	1:28 min
P2	Task Completed with Difficulty	1:26 min
P3	Task Completed	1:28 min
P4	Task Completed with Help	0:40 min
P5	Task Completed	0:59 min

P6	Task Completed	0:51 min

7.2 Qualitative Data Research Findings

Qualitative analysis, based on post-interview questions, was conducted through systematic content analysis [29]. This method enables the condensation of extensive textual content into categories using explicit coding rules. Categorizing or coding the data facilitates organization and preparation, making it suitable for further analysis [30].

Post-test interview questions:

Questions	**Type of Question**
What did you like about the app, and what did you dislike?	Open-ended
Would the option of doing a challenge with a friend make you more motivated to stick with your goals? Why?	Open-ended
Do you prefer prototype A or prototype B, and why?	Open-ended

The interview data was imported into *Dovetail* software in order to conduct thematic analysis. The process involved reviewing responses from all participants for each question, identifying noteworthy phrases or sentences, and assigning them a tag with the corresponding theme. Finally, a comprehensive review of the tags was conducted, which led to the drawing of most notable insights and conclusions.

Title	Content preview	Tags
What did you like about the app, and what did you dislike?	Thinks app is easy to use, step by step "The app doesn't feel rushed" "Everything is very explained" Liked the option to share on WhatsApp, and other social media Likes the overall idea of what the app does Found the whole app confusing at times Thinks that some features are unclear as what they do User likes that the app is very easy to use Design is pleasing Layout is very simple Cant think of anything he dislikes Likes that app was easy to use Likes color scheme and "skip" options Likes tha...	color scheme, confusing, confusing fetures, easy to use, enjoys the option to share, feels fun, good layout, likes the idea of the app, pleasing design, registering, skip button, tasks from a friend, unclear features
Would the option of doing a challenge with a friend make you more motivated to stick with your goals? Why?	Thinks that comparison would be good thing to help him stick to his goals Thinks that inviting friends would be an interesting idea and helps with motivating her. "Doing challenges with friend would make it more interesting and exciting" "Yes I can beat my friends on the task that would motivate me" "Any would be better with a companion, someone with the same are of interest" Think doing a challenge with someone else, especially when it comes to well being, would be nice to have someone track t...	prefers to do challenges with friends, social comparisson, social features would increse moti...
Do you prefer prototype A or prototype B, and why?	Prefers prototype B, because it adds motivation Even though she prefers feature to share with friends, feels like prototype A is more for her. Porotype A was easier to use Prefers porotype B, because finds it more inspiring. User is motivated by competition and thinks he would benefit from this kind of app features. Prefers prototype B because the app feels more interesting, with additional features Prototype A feels like it's missing something Prefers prototype B Thinks that doing a challenge...	motivated by social competition, prefers to do challenges with friends

Figure 29: Post-Test Interview Analysis Using Dovetail Software

The analysis of post-test interviews (Figure 29) showed that users were interested in social features for a progress tracking app. All six users interviewed said prototype B with social features would boost their motivation compared to prototype A. However, they found that the new features made the interface more complicated, affecting user satisfaction. Therefore, they favoured prototype A for its simplicity and straightforward flow. This preference was further validated by one participant who admitted that while prototype B's social features were motivating, they still preferred prototype A without any social features, due to ease of use.

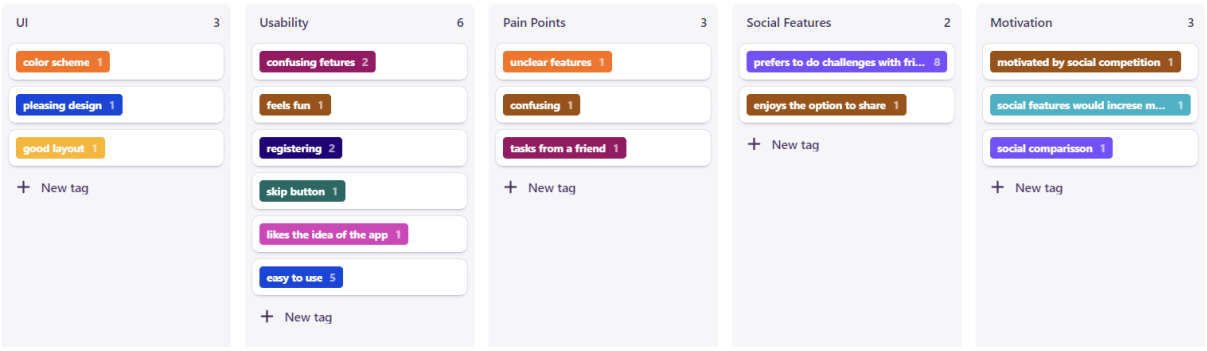

Figure 30: Summary of Themes from Post-Test Interview

7.3 Quantitative Data Research Findings

The goal of quantitative data analysis is to determine if there is a significant difference between the prototype A without social features or prototype B with social features. Results for the quantitative data from the usability tests came from two sources, the post-test SUS scale and post-test modified IMI scale. To summarize and organize information of collected data, descriptive statistics (Figure 31) were calculated for each prototype, and each scale. The following descriptive statistics were determined: mean, median and standard deviation.

SUS Prototype A

No	ID	Score
1	SG55	60
2	MM04	97.5
3	MD90	82.5
4	LI17	100
5	D094	92.5
6	EM11	97.5

Mean	**88.3333**
Median	**95**
Mode	**97.5**
Standard	**15.2206**

SUS Prototype B

No	ID	Score
1	SG55	77.5
2	MM04	97.5
3	MD90	67.5
4	LI17	100
5	D094	85.5
6	EM11	90

Mean	**86.3333**
Median	**87.75**
Mode	**N/A**
Standard	**12.3153**

IMI Prototype A

No	ID	Score
1	SG55	3.366
2	MM04	4.433
3	MD90	4.621
4	LI17	5.2285
5	D094	4.307
6	EM11	4.39

Mean	**4.39092**
Median	**4.4115**
Standard	**0.60229**

IMI Prototype B

No	ID	Score
1	SG55	3.957
2	MM04	4.483
3	MD90	4.328
4	LI17	4.383
5	D094	4.225
6	EM11	4.025

Mean	**4.2335**
Median	**4.2765**
Standard	**0.20665**

Figure 31: Breakdown of Descriptive Statistics in Excel

7.4 Validating H1

H1 stated that progress tracking applications with social engagement features will lead to higher levels of user motivation compared to applications without such features. Using quantitative data from the IMI scale, a Mann-Whitney U Test [27] was conducted in order to compare the differences between two independent samples of prototype A and B. A Mann-Whitney U test is used to compare the differences between two independent samples when the sample distributions are not normally distributed, and the sample sizes are small. The following null and alternative hypotheses are established:

H_0: Social engagement features will lead to higher levels of user motivation.

H_a: Social engagement features will not lead to higher levels of user motivation.

Determined significance level that was used for the hypothesis is 0.05, and sample sizes are n1= 6 and n2=6. The final result shows that the test statistic (11) is greater than the critical value (5), and therefore a failure to reject the null hypothesis. This implies that there is not sufficient evidence to say that social features will lead to higher levels of user motivation compared to applications without such features.

7.5 Validating H2

H2 stated that social engagement features promoting accountability (e.g., peer-to-peer goal sharing, progress updates) will positively influence users' commitment to goal attainment within progress tracking applications. A Mann-Whitney U Test was conducted using data collected from SUS usability scale. The following null and alternative hypotheses were established:

H_0: Social engagement features promoting accountability will influence users' commitment to goal attainment.

H_a: Social engagement features promoting accountability will not influence users' commitment to goal attainment.

Determined significance level that was used for the hypothesis is 0.05, and sample sizes are n1= 6 and n2=6. The final result shows that the test statistic (15.5) is greater than the critical value (5), and therefore a failure to reject the null hypothesis. This implies that there is not sufficient evidence to say that social engagement features promoting accountability will influence users' commitment to goal attainment.

7.6 Validating H3

H3 stated that users who perceive a high level of social support within progress tracking applications will demonstrate greater motivation and commitment to their goals. The quantitative data did not support this. However, all six of users interviewed stated that social features would boost their motivation and commitment to goal attainment.

8. Discussion

This research study evaluated the effectiveness of social features in a progress tracking application. The project adopted a double diamond design approach broken down into four stages: discover, define, develop, and deliver. A mixture of quantitative and qualitative research methods was carried out and a final usability test was conducted using two prototypes, one with social features, and one without.

All three hypotheses were disproved by the statistical analysis, providing evidence that the social features of progress tracking applications did not improve user engagement or increase user motivation. However, the qualitative data did not support this. All of the six users interviewed stated that prototype B with social features would increase their motivation, compared to the prototype A. The issue seemed to be that the new features disrupted user satisfaction, making the UI more complex. Resulting in users reporting they prefer prototype A, due to ease of use and straightforward user flow. This can be further validated by the statement from one of the participants, where they said that prototype B with social features would increase their motivation compared to a prototype A without such features. However, when asked which prototype they prefer, they stated that they preferred prototype A without any social features, due to ease of use.

These findings highlight the need for a more rigorous and systematic approach in the future, considering testing different social features and adopting various design strategies. In order to better evaluate the context of using social features in progress tracking applications.

8.1 Limitations

While the study disproved the effectiveness of social features, several limitations should be noted. The sample size used in the final usability test of the study was relatively small, comprising a total of six users. This limited sample size may not fully capture the diverse range of user experiences and preferences. Additionally, while the qualitative data provided valuable insights into user motivations regarding the use of social features, the small number of participants limits the depth of the analysis. A larger and more diverse sample could have provided richer quantitative and qualitative data, allowing for a more nuanced understanding of user attitudes towards social features in progress tracking applications.

Another noteworthy limitation is that the participants for testing were recruited through a circle of friends, family, and work colleagues. While this approach offers convenience and accessibility, it's also possible that biases were introduced into the study. Furthermore, factors such as individual

preferences, or the clarity of tasks assigned during the usability test may have also impacted user behaviour, potentially skewing the results.

8.2 Future Work

Various areas of future research stem from the findings of this paper. Even though quantitative results from the testing were not statistically significant, qualitative results revealed positive reaction to the idea of incorporating social features. To evaluate the effectiveness of these features in more depth, a study over a longer period of time would be required. This also includes employing larger and more diverse participant samples, to ensure the reliability and accuracy of research findings. Additionally, future studies could explore alternative design strategies for integrating social features into progress tracking applications. Through testing and refining different design iterations with diverse user groups, researchers can identify optimal design configurations that maximize user engagement and satisfaction.

References

[1] Harkin, B. et al. 2016. Does monitoring goal progress promote goal attainment? A meta-analysis of the experimental evidence. *Psychological Bulletin*. 142, 2 (Feb. 2016), 198–229. DOI:https://doi.org/10.1037/bul0000025.

[2] What is Goal Setting and How to Do it Well. Positive Psychology . Retrieved April 14, 2024 from https://positivepsychology.com/goal-setting/

[3] Anna Lurchenko. 2017. An Exploratory Study of Health Habit Formation Through Gamification. (2017). DOI:https://doi.org/ https://doi.org/10.48550/arXiv.1708.04418

[4] Hassan, L. et al. 2020. Gameful self-regulation: A study on how gamified self-tracking features evoke gameful experiences. *Proceedings of the Annual Hawaii International Conference on System Sciences* (2020), 1103–1112.

[5] Paula Bitrián, Isabel Buil, and Sara Catalán. 2021. Enhancing user engagement: The role of gamification in mobile apps. Journal of Business Research 132, (2021), 170-185. DOI:https://doi.org/10.1016/j.jbusres.2021.04.028

[6] Jamal Abdul Nasir Ansari and Nawab Ali Khan. 2020. Exploring the role of social media in collaborative learning the new domain of learning. Smart Learning Environments 7, 1 (2020). DOI:https://doi.org/10.1186/s40561-020-00118-7.

[7] Kaisa Väänänen-Vainio-Mattila, Minna Wäljas, Jarno Ojala, and Katarina Segerståhl. 2010. Identifying drivers and hindrances of social user experience in web services. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (2010). DOI:https://doi.org/10.1145/1753326.1753704

[8] Mitchell Gordon, Tim Althoff, and Jure Leskovec. 2019. Goal-setting And Achievement In Activity Tracking Apps: A Case Study Of MyFitnessPal. *The World Wide Web Conference* (2019). DOI:https://doi.org/10.1145/3308558.3313432

[9] Katarzyna Stawarz, Anna L. Cox, and Ann Blandford. 2015. Beyond Self-Tracking and Reminders. *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (2015). DOI:https://doi.org/10.1145/2702123.2702230

[10] Luís Filipe Rodrigues, Abílio Oliveira, and Carlos J. Costa. 2016. Playing seriously – How gamification and social cues influence bank customers to use gamified e-business applications. *Computers in Human Behavior* 63, (2016), 392-407. DOI:https://doi.org/10.1016/j.chb.2016.05.063

[11] Hyeongjin Ahn and Eunil Park. 2023. Motivations for user satisfaction of mobile fitness applications: An analysis of user experience based on online review comments. *Humanities and Social Sciences Communications* 10, 1 (2023). DOI:https://doi.org/10.1057/s41599-022-01452-6

[12] Kiemute Oyibo and Julita Vassileva. 2021. Relationship between Perceived UX Design Attributes and Persuasive Features: A Case Study of Fitness App. *Information* 12, 9 (2021), 365. DOI:https://doi.org/10.3390/info12090365

[13] Elias G. Carayannis and Vivienne Wei Liu Wang. 2011. Competitiveness Model—A Double Diamond. *Journal of the Knowledge Economy* 3, 3 (2011), 280-293. DOI:https://doi.org/10.1007/s13132-011-0038-7

[14] Desiree Creel. 2019. PolyXpress+: Using Social Networking to Enhance the User Experience of an Interactive Location-Based Storytelling Application. *California Polytechnic State University ProQuest Dissertations Publishing* (2019). DOI:https://doi.org/10.15368/theses.2018.156

[15] Susanna Paasovaara, Pradthana Jarusriboonchai, and Thomas Olsson. 2017. Understanding collocated social interaction between Pokémon GO players. *Proceedings of the 16th International Conference on Mobile and Ubiquitous Multimedia* (2017). DOI:https://doi.org/10.1145/3152832.3152854

[16] Xavier Fonseca, Geertje Slingerland, Stephan Lukosch, and Frances Brazier. 2021. Designing for meaningful social interaction in digital serious games. *Entertainment Computing* 36, (2021), 100385. DOI:https://doi.org/10.1016/j.entcom.2020.100385

[17] Frank Spillers and Stavros Asimakopoulos. 2014. Does Social User Experience Improve Motivation for Runners? *Lecture Notes in Computer Science* (2014), 358-369. DOI:https://doi.org/10.1007/978-3-319-07638-6_35

[18] Niels Van de Ven. 2015. Envy and admiration: emotion and motivation following upward social comparison. *Cognition and Emotion* 31, 1 (2015), 193-200. DOI:https://doi.org/10.1080/02699931.2015.1087972

[19] Stephen K Reed. 2021. *Thinking Visually*. Psychology Press.

[20] Hyerim Cho, Josh Smith, and Jin Ha Lee. 2019. Effects of motivation and tool features on online photo-sharing behavior. *Proceedings of the Association for Information Science and Technology* 56, 1 (2019), 377-380. DOI:https://doi.org/10.1002/pra2.59

[21] IMS Institute for Healthcare Informatics. 2015. Patient Adoption of mHealth: Use, Evidence and Remaining Barriers to Mainstream Acceptance.

[22] Scenario Mapping: Design Ideation Using Personas. NN Group. Retrieved April 30, 2024 from https://www.nngroup.com/articles/scenario-mapping-personas/

[23] UX Design Institute: The gold standard in UX education. *UX Design Institute*. Retrieved February 21, 2024 from https://www.uxdesigninstitute.com/

[24] Jaime Levy. 2015. UX Strategy. "O.

[25] Callum Bradley, Luis Oliveira, Stewart Birrell, and Rebecca Cain. 2021. A new perspective on personas and customer journey maps: Proposing systemic UX. International Journal of Human-Computer Studies 148, (2021), 102583. DOI:https://doi.org/10.1016/j.ijhcs.2021.102583

[26] Andrés Lucero. 2012. Framing, aligning, paradoxing, abstracting, and directing. Proceedings of the Designing Interactive Systems Conference (2012). DOI:https://doi.org/10.1145/2317956.2318021

[27] Mann-Whitney U Test - Statology. Statology. Retrieved April 15, 2024 from https://www.statology.org/mann-whitney-u-test/

[28] Huang-Ming Chang, Marta Díaz, Andreu Català, Wei Chen, and Matthias Rauterberg. 2014. Mood Boards as a Universal Tool for Investigating Emotional Experience. Lecture Notes in Computer Science (2014), 220-231. DOI:https://doi.org/10.1007/978-3-319-07638-6_22

[29] Pranee Liamputtong. 2009. Qualitative data analysis: conceptual and practical considerations. Health Promotion Journal of Australia 20, 2 (2009), 133-139. DOI:https://doi.org/10.1071/he09133

[30] Huang-Ming Chang, Marta Díaz, Andreu Català, Wei Chen, and Matthias Rauterberg. 2014. Mood Boards as a Universal Tool for Investigating Emotional Experience. Lecture Notes in Computer Science (2014), 220-231. DOI:https://doi.org/10.1007/978-3-319-07638-6_22

[31] Anna Lurchenko. 2017. An Exploratory Study of Health Habit Formation Through Gamification. (2017). DOI:https://doi.org/ https://doi.org/10.48550/arXiv.1708.04418

[32] Rebecca A. Grier, Aaron Bangor, Philip Kortum, and S. Camille Peres. 2013. The System Usability Scale. Proceedings of the Human Factors and Ergonomics Society Annual Meeting 57, 1 (2013), 187-191. DOI:https://doi.org/10.1177/1541931213571042

[33] Richard Ryan and Edward Deci. 1994. Intrinsic Motivation Inventory (IMI) [Measurement instrument]. The Intrinsic Motivation Inventory, Scale description.

[34] Anne Oeldorf-Hirsch and S. Shyam Sundar. 2016. Social and Technological Motivations for Online Photo Sharing. Journal of Broadcasting & Electronic Media 60, 4 (2016), 624-642. DOI:https://doi.org/10.1080/08838151.2016.1234478

[35] Luís Filipe Rodrigues, Abílio Oliveira, and Carlos J. Costa. 2016. Playing seriously – How gamification and social cues influence bank customers to use gamified e-business applications. Computers in Human Behavior 63, (2016), 392-407. DOI:https://doi.org/10.1016/j.chb.2016.05.063

[36] Jamal Abdul Nasir Ansari and Nawab Ali Khan. 2020. Exploring the role of social media in collaborative learning the new domain of learning. Smart Learning Environments 7, 1 (2020). DOI:https://doi.org/10.1186/s40561-020-00118-7

[37] Csilla Herendy. 2020. Using Traditional Research Methods in Contemporary UX Surveying. Lecture Notes in Computer Science (2020), 123-132. DOI:https://doi.org/10.1007/978-3-030-60114-0_8

[38] Barbara M. Wildemuth. 2016. Applications of Social Research Methods to Questions in Information and Library Science, 2nd Edition. ABC-CLIO.

[39] Affinity Diagramming: Collaboratively Sort UX Findings & Design Ideas. NN Group. Retrieved April 30, 2024 from https://www.nngroup.com/articles/affinity-diagram/

[40] Bruna Ferreira, Williamson Silva, Edson Oliveira, and Tayana Conte. 2015. Designing Personas with Empathy Map. International Conferences on Software Engineering and Knowledge Engineering (2015). DOI:https://doi.org/10.18293/seke2015-152

[41] Jeff Gothelf and Josh Seiden. 2016. Lean UX. "O.

[42] Isabella Hastreiter, Sascha Krause, Tim Schneidermeier, and Christian Wolff. 2014. Developing UX for Collaborative Mobile Prototyping. Design, User Experience, and Usability. Theories, Methods, and Tools for Designing the User Experience (2014), 104-114. DOI:https://doi.org/10.1007/978-3-319-07668-3_11

[43] Usability Testing 101. NN Group. Retrieved April 04, 2024 from https://www.nngroup.com/articles/usability-testing-101/