“Let’s grab a match!”: Exploring ways to enhance engagement and consistency in sports for Gen Z and millennials

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ABSTRACT

Motivated by personal experience navigating recreational sports systems in Toronto, this thesis explores how digital design can support sustained recreational sports participation among Gen Z and millennials. Using the Double Diamond methodology and iterative prototyping, the research investigates how principles from behavior change theory, gamification, and Self-Determination Theory (SDT) can inform digital interventions to enhance motivation, accessibility, and social engagement in recreational sports. Through a portfolio of four exploratory prototypes including community-building initiatives, motivational gamification strategies, and personalized goal-setting platforms, the project critically examines how UI/UX design can influence initial and ongoing participation. Findings highlight the importance of autonomy, peer support, and playful engagement in sustaining sports motivation, while also revealing the limitations of short-term interventions and the broader structural barriers beyond digital solutions. This research contributes to the growing discourse on digital activation in recreational sports by offering design insights for future tools that seek to support sustained participation through flexible, user-centered, and socially supported experiences.

Keywords: Recreational sports, motivation, consistency, gamification, digital pet, Self Determination Theory, app design

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GLOSSARY

Accessibility
Refers to informational and logistical accessibility; the ease with which motivated players can find partners, identify play spaces, and organize sports activities.

Accountability
The responsibility of individuals or groups to report, explain, and be answerable for their actions, particularly in the context of setting and achieving sports participation goals.

Activation
The initial phase of engagement where individuals transition from intention to action, marked by beginning participation in a recreational sports activity.

Consistency
Regular and ongoing participation in sports activities over time, with an emphasis not only on frequency but also on perceived improvement in mental, physical, and social competence.

Engagement
The degree of active involvement, emotional investment, and participation individuals exhibit in recreational sports or related activities.

Motivation
The internal processes that initiate, direct, and sustain behavior toward achieving a goal; in this context, motivation refers to the psychological drivers that encourage sustained sports participation (Ryan and Deci).

Participation
Purposeful, active involvement in sports-related physical activities, such as playing or competing (Scheerde, Vanreusel and Taks).

Play
Spontaneous and voluntary activities undertaken for enjoyment, exploration, and

intrinsic reward, often without the primary aim of competition or performance (Deterding, Dixon and Khaled).

Sports

Organized, competitive, and rule-governed physical activities that involve individual or team-based participation, often aiming at performance outcomes but also offering opportunities for social interaction and personal development (Caspersen, Powell and Christenson).

Structure

The organized framework, including rules, roles, and guidelines, that shapes how sports activities are delivered and experienced.

Sustained

Maintained over an extended period; in this study, sustained participation refers to continued involvement in sports over multiple months or years without significant dropout.

AI USAGE

We acknowledge using AI tools for surface-level improvements of our text, including grammatical correctness and improving readability. We did not use AI tools to arrive at or formulate any contributions or solution directions, nor did we use AI to generate or modify any images/video/other media presented in this thesis.

The AI tools tested and used are Chat-GPT (3.5,4,4o,o3,4.5) and Deep Seek – R1. We have verified and edited the manuscript and take full responsibility for the content of this thesis paper.

ACKNOWLEDGEMENT

Thomas: Heyyy, I think its time to thank everyone?

Kunal: I mean this paper wouldn't have been possible without the invaluable guidance of Professor Adam Tindale and Professor Kate Hartman.

Thomas: Absolutely! Their constant support, insightful feedback, humor, and critical 'whats', 'whys' and 'hows' made this research exciting and comprehensive.

Kunal: No doubt. A big thank you goes to Professor Alexis Morris for that impromptu stairway conversation which made us rethink our research objectives! All the faculty members and courses we've been a part of; the knowledge and skills we gained were incredibly valuable.

Thomas: Not to mention the Digital Futures cohort! The inspiration and motivation we drew from the amazing people in that group played a crucial role in keeping us going. We couldn't have asked for a better group.

Kunal: A special thanks to my family for always supporting my endeavors and encouraging me to push my boundaries. And, of course, a heartfelt thank you to you, Thomas this research journey has been a lot of fun, and I've learned so much from working together.

Thomas: The pleasure is all mine! It was an insightful experience, researching and writing this paper while balancing a love for recreational sports. Thank you too. We made a great team! I'd also like to thank my family for their unwavering trust and love, which kept me motivated throughout this process.

"Every time you play a sport, there's always something, a perfect shot, a killer kick, a rush, that makes you want to come back for more."

- Anonymous study participant

1. INTRODUCTION

> *Kicking or throwing balls, riding horses in a circle, or inflicting damage on others might look like irrational pursuits. But that's precisely the point: whether watched or performed, they guide the participant clear of the formal limits of bureaucracies and into areas where the outcomes of situations are wholly unpredictable; the opposite of bureaucracies* (Cashmore 5).

Cashmore emphasizes the significance of sports participation, where individuals become the decision-makers in the moment of play, free from the constraints of structured systems even while abiding by the rules of sports. Sports offer an escape into unpredictability, allowing participants to experience spontaneity, agency, and the exhilaration of the unknown. This spontaneity is one of the reasons sports remain compelling. The rush of reacting in the moment, the need to strategize collaboratively, and the intense focus it demands creates a unique social, cognitive and physical engagement. At times, players become so engrossed in the game that external thoughts fade away, concentrating solely on the movement of the ball or strategizing a perfect comeback to score.

Exercise is any planned, structured, and repetitive physical activity aimed at improving or maintaining physical fitness. In contrast, sports are organized, competitive physical activities that adhere to specific rules and often involve social interaction and teamwork (Caspersen, Powell and Christenson). Additionally, sports extend beyond competition; winning and losing are not always the focus. They also serve as a means of social connection, mental resilience, and overall well-being. Research has linked sports participation to increased self-esteem, life satisfaction, and mental health benefits, including reduced levels of depression, anxiety, and stress (Eather, Wade and Pankowiak). Individuals engaging in team sports experience greater health outcomes than those participating in individual sport. Furthermore, participating consistently in sports often yields greater benefits particularly in social development, fostering interpersonal communication and a sense of belonging (Eather, Wade and Pankowiak).

1.1 Sports participation in Canada

A 2023 survey by Statistics Canada's Survey Series on People and their Communities (SSPC) revealed that 55% of Canadians aged 15 and above participated in some form of sports during the past 12 months, out of which, 83% engaged recreationally. The top four motivators for participation were physical health and fitness, fun and recreation, mental health benefits, and social interaction with friends, ranked in that order (Participation in Canadian society through sport and work). However, participation significantly declines with age, while 68% of individuals in Canada aged 5 to 17 engaged in sports only 27% people over the age of 18 participated in sports in 2024 (Canadian Fitness and Lifestyle Research Institute) suggesting a massive pitfall in participation levels.

These statistics served as an early inspiration for this research. They raised critical questions about why engagement in sports declines during adulthood, despite the well-documented mental, physical, and social benefits associated with consistent participation. These trends informed an exploration of the broader opportunity space: how might digital tools support individuals who are interested in playing recreational sports but face barriers to maintaining consistent participation?

Additionally, prior research has identified numerous barriers to sports participation among adults in Canada, including logistical challenges, lack of accessible information, and reduced community engagement (Gosai, Carmichael, and Carey). These insights further shaped the project's direction, leading to an investigation focused on designing interventions that could enhance motivation to play sports, logistical accessibility, and consistency in participation for interested recreational players.

1.2 The story behind collaboration

This project is rooted in our personal experiences as newcomers to Toronto. Both Kunal and Thomas shared a strong intrinsic motivation to participate in recreational sports, shaped by childhood involvement and a deep passion for recreational play. Kunal had actively competed in local table tennis tournaments, earning several awards,

while Thomas regularly engaged in a variety of sports with friends in his hometown, sustaining both his social connections and physical fitness.

Figure 1 - A visual representation of our personal challenges

However, after relocating to Toronto, they found it unexpectedly difficult to maintain regular sports participation. Kunal struggled with a limited awareness of where and how to play recreational sports in the city. Thomas, facing similar challenges, opted to join a local gym simply because it was more accessible. But without a familiar social environment, the experience felt monotonous and unsatisfying, leading to a gradual decline in his physical activity (Figure 1).

When discussing with one of the professors (figure 2), it struck upon Kunal and Thomas that since they are facing similar problems while participating in sports, collaborating to find a solution could be highly beneficial. Since Kunal and Thomas both have proven to work together well in previous projects, they decided to collaborate and chose to travel the same track for this thesis.

In addition to the shared personal motivations, their professional backgrounds uniquely equipped them to approach this challenge through a design-centered lens. Thomas, a trained industrial and interaction designer, brings a strong foundation in creatively exploring problems and developing thoughtful, user-centered solutions. Kunal, with a background in UI/UX design, contributes expertise in digital interaction design and user research.

Figure 2 - A visual representation of our discussion with one of our professors

1.3 Research summary

Problem statement

While digital platforms for fitness such as gym tracking apps, running logs, and cycling communities are widely available, few focus specifically on recreational sports

or on building structured, sports-based social networks. In the absence of dedicated systems, individuals often create informal groups to connect with like-minded players. However, these networks tend to be inconsistent, decentralized, and difficult to maintain over time.

Research in Human Computer Interaction (HCI) and sports psychology has predominantly focused on professional athletes, with limited attention given to recreational sports enthusiasts. However, recreational players have distinct needs, goals and challenges that differ from those of professional athletes. Traditional methods of motivation in sports primarily rely on performance metrics, which may not effectively engage recreational players (Postma, Reidsma and Delden).

This thesis explores creative approaches to sustain motivation and consistency among recreational sports participants, emphasizing strategies that address logistical barriers and go beyond performance-based data.

Research question

How can we design a platform for recreational sports participants that sustains engagement and motivation?

Scope and limitations

This project explores how User Interface (UI) and User Experience (UX) design can be applied to create more engaging, accessible, and socially supportive systems for recreational sports participation. It follows an iterative prototyping process to design digital platforms that support sustained, self-driven engagement. While broader structural barriers such as travel distance, personal schedules, and financial constraints are acknowledged as important, they remain outside the scope of this project. Addressing these challenges would require systemic, behavioral, and infrastructural changes beyond what UI/UX design alone can offer.

The focus is on Gen Z and Millennials between the ages of 19 to 43, individuals often in transition. Some are moving away from school, others are settling into new cities or countries for education or work, and many are early-career professionals trying to

balance life outside their jobs. In each case, consistent access to play and physical activity becomes more difficult, yet increasingly important. The project aims to design for this group, helping them stay active, connected, and motivated.

User interviews and usability testing, conducted in the later stages of the thesis, involved a small participant group of 3 to 7 individuals. This introduces limitations and potential biases in the findings. However, these participants were not intended to represent a statistically generalizable sample. Instead, their responses offered directional insights into motivations, barriers, and behaviors that informed Prototype 4 and its future directions. To support rapid iteration and testing, free and accessible tools such as p5.js, Firebase, Figma, and Wix were used. These enabled fast prototyping, user feedback collection, and documentation throughout the design process

Design decisions were informed by background research in behavioral science, gamification, and sports psychology, rather than through empirical evaluation of existing solutions. This underscores the exploratory and viability-focused nature of the project, it is not a longitudinal study aimed at measuring long-term behavioral outcomes, but a design investigation into speculative ideas that might increase sustained engagement in recreational sports.

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2. LITERATURE AND CONTEXTUAL REVIEW

2.1 Overview

Kunal: Alright, we need theories or strategies that have proven to keep people engaged long term in doing activities. We can use the same for our research.

Thomas: Right! I found this research paper that talks about Self Determination Theory which seems promising

Kunal: Hmmm so if you've got autonomy, competence, and relatedness, you're more likely to stick with an activity. Interesting!

Thomas: Oh, even Duolingo has made me stuck to it since a long time; I have a streak of 382 days on Duolingo. They turn boring stuff into something you want to do, thanks to challenges and social comparisons.

Kunal: And then there's goal setting, whether it's on Strava or Nike+, setting and tracking goals helps keep you on track.

Thomas: Yeah! Also, one of my friends has been using this app called Finch since more than a year and he still can't stop talking about this cute little bird of his. Such an idea can make our thesis take a flight!

Kunal: Ultimately, it's all about finding that balance between motivation, fun, and personal growth. Yo, Thomas, I think that's how you stay engaged in the long run! Enough talk, I am going for my table tennis session now. See you later!

2.2 Self Determination Theory

Self Determination Theory (SDT) is a psychological framework that helps researchers understand what drives behavior change and psychological development. It includes Basic Psychological Needs Theory (BPNT), which states that competence, autonomy, and relatedness are key to self-control, social connections, and overall well-being. Individuals are more likely to engage in and sustain activities when they feel in control of their choices (autonomy), capable of improvement (competence), and socially connected to others (relatedness) (Ryan and Deci). For example, in a sports context, autonomy is supported when players are allowed to choose which sport to participate in or set their own training goals. Competence is supported when athletes receive constructive feedback that helps them master new skills, such as improving a tennis serve or refining basketball dribbling techniques. Relatedness is reinforced when team members build friendships and feel a sense of belonging through group practices, shared victories, and mutual encouragement.

Individuals engage in sports and physical activities for both intrinsic and extrinsic reasons, which ultimately affect sustained participation. Intrinsic motivation drives individuals to participate because they find the activity enjoyable, fun, and personally rewarding. However, extrinsic motivation driven by external rewards such as improving physical appearance or enhancing performance in other activities also plays a role in sports participation. While extrinsic goals do not inherently contribute to well-being or enjoyment, research suggests that when external motivations are internalized and integrated, they can lead to a more positive experience and improved well-being. For example, an extrinsic goal might be winning every match, leading to frustration if a loss occurs. However, by shifting the focus to personal growth, a player can redefine success as improving skills and gaining experience, making both winning and losing part of a fulfilling journey (Richard, Geoffrey and Patrick). This internalized approach aligns with SDT, helping individuals stay engaged in sports in a way that enhances long-term motivation and well-being.

2.3 Gamification and its role in motivation

What is gamification?

Using game design elements such as rules, challenges, points, leaderboards, rewards, etc. in a non-game context is termed as gamification (Deterding, Dixon and Khaled). Game-full design follows a structured approach with rules and clear goals, unlike playfulness, which is more open-ended and unstructured (figure 3). The three commonly embedded game elements, namely, achievement and progression elements, social elements and immersion elements have been linked to promote user engagement and user satisfaction (Bitrian, Buil and Catalan, Enhancing user engagement: the role of gamification in sports).

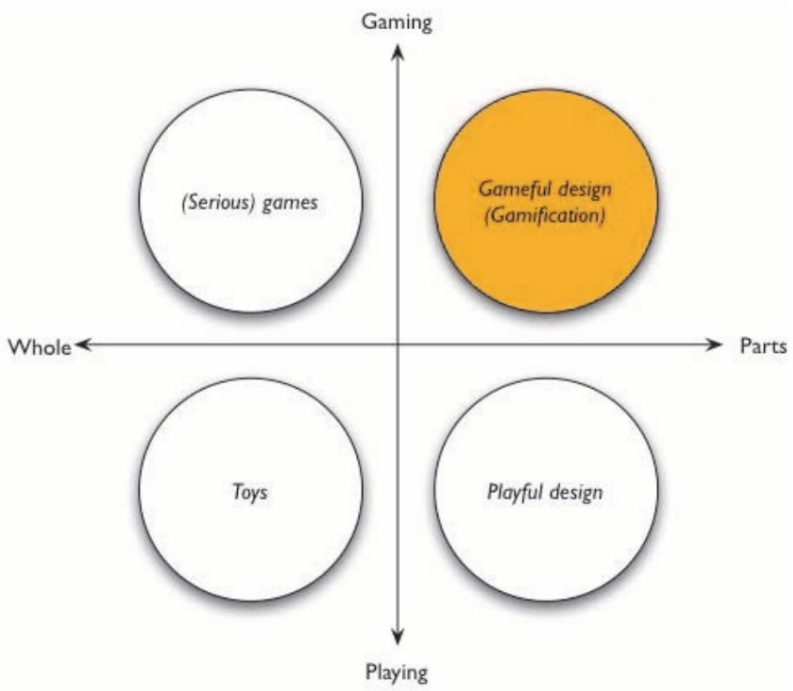

Figure 3 - "Gamification" between game and play, whole and parts. Reference (Deterding, Dixon and Khaled)

In the book 'Reality is broken', Jane McGonigal suggests that games or game elements can provide solutions to real world issues. By creating engaging environments and promoting community collaboration, games could evoke intrinsic motivation and encourage individuals to tackle personal or societal challenges.

"Games make individuals happy because they often require hard work, work that people willingly choose, and nothing else makes people happier than a good hard work."

However, while game elements improve motivation and engagement, Jane also emphasizes that gamification should be used thoughtfully ensuring that the goals are meaningful and aligned with the well-being of the user (McGonigal).

Drawing from this, we critically examined three widely used mobile applications Zombies, Run!, Duolingo, and Finch that rely heavily on gamified elements to drive user engagement in fitness, education, and self-care respectively. These platforms were selected for their broad adoption and for their diverse use of persuasive strategies, such as streaks, narrative immersion, and digital companionship.

Case Studies: Zombies, Run! Duolingo and Finch

Zombies, Run!

Zombies, Run! is a fitness app utilizing narrative-driven game elements to enhance user motivation and engagement. Through its use of storytelling, the app encourages users to complete missions while running, which are embedded within a larger narrative of survival in a zombie apocalypse. The app uses several gamified features, such as audio storytelling, time pressure through random zombie encounters and post-run rewards in the form of supplies to develop a virtual township. These immersive elements provide intrinsic motivation by making the activity itself enjoyable and rewarding (Mönninghoff). The app promotes users' autonomy by allowing individuals to select the length of each mission, with the narration then spacing out accordingly. Notably, the app deliberately avoids leaderboards and rankings which can demotivate users especially if they are recreational runners (Mönninghoff). These design choices align with BPNT principle of autonomy while supporting our focus on recreational players. Introducing autonomy-related features maybe a key factor to enhance long-term motivation.

However, research has also shown limitations in the long-term impact of Zombies, Run!. While they initially boost physical activity and mental well-being, sustaining user engagement over time often requires deeper social integration and community-building features (Farič, Potts and Rowe). Apps that focus primarily on individual storytelling experiences may not fully address users' need for relatedness, a key component of sustained motivation according to BPNT. Additionally, the requirement for a paid subscription to access all features may pose a barrier to sustained use for some users. These considerations suggest that while Zombies, Run! has strengths in initial user engagement, incorporating social connectivity and addressing cost barriers could further enhance its effectiveness in promoting long-term physical activity.

Duolingo

Duolingo's use of gamified elements such as gamified characters and rewards, effectively keeps users motivated and committed to their language-learning journey by adopting persuasive principles from the Persuasive System Design (PSD) framework (Oinas-Kukkonen and Harjumaa). Certain gamified elements were more effective persuasive wise such as the use of streaks and leagues (Kastelli and Takacs). A report showed while a few individuals preferred a platform without the use of streaks and hearts in the app as it affects the quality of learning, the use of streaks was the biggest external motivator for sustaining consistency among participants who supported gamified elements in the app (Rus and Cederberg). Streaks are most effective when they involve social comparison, allowing users to track progress alongside their friends. This creates a sense of accountability and encourages users to maintain their streaks to stay engaged with their social circle. This aligns with BPNT principle of social relatedness, as the app leverages peer recognition as a motivational driver.

However, Duolingo's gamified elements also introduce potential drawbacks. The daily streak system, although motivating for many, can compromise user autonomy by pressuring individuals to engage with the app even when they may not meaningfully wish to, simply to avoid breaking their streak. This shift from intrinsic motivation to obligation can lead to guilt-based engagement rather than genuine interest in learning. Further, the social features, such as friend challenges and visible rankings, can generate a sense of negative social comparison. Users who fail to keep up with friends or complete challenges may perceive themselves as unreliable or less competent,

which could erode intrinsic motivation and diminish the overall sense of personal accomplishment. On the other hand, users who do all the work while achieving shared goals as compared to others can generate feelings of annoyance and frustration (Golub).

Finch

Gamification is not always focused on streaks and leaderboards. Unlike Duolingo, the mental health and self care app Finch, uses a digital pet to encourage users to complete daily tasks to earn rewards. This is achieved by taking care of the pet as it grows, bridging emotional and personal connection which showed a positive effect on user engagement. The action of taking care of something important evoked feelings of ownership and responsibility while the reciprocation of digital pet with care and affection strengthens the emotional connection (Krasteva). Moreover, the app allows the users to complete bite sized goals that enhance motivation and sense of accomplishment. This aligns with BPNT principle of competence, emphasizing how completing smaller tasks contributes to the pet's well-being, reinforcing the user's sense of achievement and sustaining engagement.

While Finch's nurturing approach encourages emotional connection, it also raises concerns around overstimulation and dependency. Some users report that the app's frequent notifications and gamified interface can feel overwhelming, making self-care activities feel more like chores rather than intrinsic habits (Hamilton).Additionally, the emotional attachment to the digital pet may lead to an over reliance on the app itself, with users focusing more on caring for their virtual companion than developing real-world self-care practices (Internet Matters).These factors suggest that while Finch successfully taps into emotional motivation, it may inadvertently undermine autonomy and long-term well-being if users become too dependent on external digital rewards.

Together, these case studies reveal that while gamified systems can successfully boost short-term motivation, they often fall short in supporting behavioral consistency over time. The overuse of streaks, external rewards, or emotional pressure like guilt through digital pets or competition through rankings, can undermine intrinsic motivation and user autonomy over time. Our analysis showed that many apps prioritize engagement metrics over user well-being, often neglecting the importance of

meaningful social connection or personalized pathways to users' success. These critiques reframed our understanding of effective gamification, rather than applying one-size-fits-all strategies, our design approach focused on creating adaptable systems that support autonomy, offer positive feedback without coercion, and promote social accountability without negative comparison. This critical review became a foundation for designing a more balanced and sustainable experience in our own prototypes.

How does gamification affect sports motivation?

Sports and physical activity platforms such as Nike + and Strava use game elements such as badges, rankings, progress bars, and social features to motivate individuals to perceive exercise or sports as an interesting and fun activity (Bitrian, Buil and Catalan, Gamification in sport apps: the determinants of users' motivation) . Achievement-oriented elements (e.g., medals and difficulty levels) promote competence, while social elements (e.g., competition and cooperation) enhance relatedness (Larsson). However, while external motivation (e.g., points, levels, tangible rewards) can initiate user engagement, studies suggest that it must eventually transition into internal motivation, where the user finds value and interest in the activity itself (Zichermann and Cunningham.).

While individual fitness apps often focus on personal motivation and progress tracking, sports require gamified solutions that emphasize social dynamics, cooperation, and shared goals. Research by Birnstiel et al. highlights that relatedness and competence are key motivational drivers for athletes, supported by social interaction, skill development, and collective achievements. Effective gamification in sports should integrate virtual teams, shared challenges, and collaborative goal setting, while maintaining players' autonomy through personalized goals. Furthermore, a careful balance between competition and cooperation is necessary to sustain engagement and positive team dynamics (Birnstiel, Steinkamp and Morschheuser). These insights inform the design of gamified sports platforms by emphasizing the need for integrated motivational structures that support both individual and social participation.

2.4 Digital avatars and virtual pets as gamified elements

While gamification elements such as leaderboards and rewards have been shown to boost motivation, another emerging gamification element is the use of digital companions such as digital avatars and digital pets.

In one notable experiment, researchers conducted a 14-week study in which participants' step counts were linked to a digital pet: a virtual fish in a tank. The game, Fish'n'Steps, demonstrated positive behavior changes, as 14 out of 19 participants increased their daily activity levels, showing how a virtual pet's growth and well-being could serve as motivation (Lin, Mamykina and Lindtner).

A study by Ramsay, Jin, Maes, and Picard compares engagement levels of participants between a digital pet and a digital avatar. The study tracked 21 college students using Fitbits and divided them into two groups: one interacting with a virtual pet and the other with a digital avatar representing themselves. The results indicated that participants who engaged with their own digital avatar showed higher levels of motivation and attachment than those with digital pets. One possible explanation could be that users see avatars as a direct representation of themselves, making it more personal. However, the paper also suggests a more 'cuter' pet that allows customization, individuality and variety of choice could demonstrate a greater impact on the engagement levels of the user (Ramsay, Jin and Maes).

The concept of digital characters and virtual pets gained popularity with the release of Tamagotchi in 1996 in Japan, a handheld digital pet that captivated children worldwide in 1997. The concept was first conceived by a Japanese mother to her children as an alternative to a real-life pet due to limited space. The word Tamagotchi comes from the word 'tamago' which means egg in Japanese. This ties to its concept of the virtual pet being hatched from an egg when you first engage with the device. The toy consists of a hand-held liquid crystal display screen, depicting a cartoon like creature enclosed in brightly coloured plastic enclosure with tiny buttons. The buttons allowed interactions with the pet that consisted of feeding, cleaning, and taking care for the digital pet, creating a sense of responsibility and attachment. However, its addictive

nature led to unintended consequences. Many parents found it distracting for children, and several schools even banned the device due to its negative impact on focus and classroom behavior. These backlashes ultimately contributed to Tamagotchi's decline. (Bloch and Lemish).

Despite its downfall, Tamagotchi's core concept of behavior reinforcement through digital companionship are being reintroduced and tested even now. One such evolution is Bandai Corporation's Digimon Fitness Band, launched in 2021. This device expanded upon Tamagotchi's interactive elements by incorporating fitness tracking, where a user's step count influenced the growth and evolution of their Digimon character (Vital Hero) However, our personal experience with the Digimon Fitness Band highlighted significant drawbacks including inaccurate tracking and poor app and band integration. Overall, it had a complicated system of setting up and interacting with the band and the app, which would have been the same for their target audience - individuals of the age group 8 and above, but the digital characters were intriguing.

Figure 4 - Left: Tamagotchi interaction; Middle: Digimon Fitness Band interaction; Right: Digimon Fitness Band app

Gamified elements boost motivation, particularly digital characters create a sense of responsibility and attachment, which can be leveraged to reinforce consistent sports participation. This aligns with SDT principles of competence and relatedness, making users feel accountable for their virtual characters' well-being.

Figure 5 - The Tamagotchi Cemetery (Cherrell)

However digital pets and avatars also introduce potential psychological drawbacks. Users may begin to associate their performance with the state of the avatar, leading to guilt or anxiety when they are unable to meet activity expectations. For instance, when a digital pet appears sad or unhealthy due to missed activity, the interaction may shift from being playfully motivating to emotionally manipulative. This type of guilt-based reinforcement can undermine user autonomy, a key principle in Self-Determination Theory, and risk turning the app into a source of pressure rather than support.

2.5 Goal setting and progress logging in sports

Goal setting is defined as objectives individuals aim to accomplish within a specified timeframe (Weinberg). It is widely recognized as an effective strategy to enhance focus, motivation, and persistence in athletes and recreational players alike. Edwin and Gary highlight that specific, measurable and attainable goals enhance intrinsic motivation by fulfilling self-determination needs (Locke and Latham). A specific goal clearly defines the intended outcome, reducing ambiguity and providing a concrete target. For example, "playing table tennis twice a week" rather than simply "playing more sports." A measurable goal includes quantifiable criteria that allow individuals to track progress and determine success, such as setting a target to play five matches or to attend three practice sessions within a month. An attainable goal ensures that the objective is realistically achievable given the individual's current resources, skills, and circumstances; for instance, aiming to join a local recreational league rather than aspiring immediately to compete at a professional level.

Similar mechanisms are widely integrated into activity tracking applications such as MyFitnessPal, Strava, and Nike Run Club, where users set daily, weekly, or long-term targets for steps, calories, or distance covered. Logging data regularly allows users to observe their behavioral patterns and make informed adjustments. Research shows that individuals who frequently log their weight or workout data in the initial stages of their journey are more likely to meet their long-term goals. Additionally, self-monitoring increases accountability, helping individuals recognize patterns and reflect on progress (Gordon, Althoff and Leskovec).

However, not all goals set within tracking apps are successfully achieved. Studies indicate that easier, incremental goals tend to be more sustainable, while ambitious, difficult-to-attain goals often lead to lower engagement rates in apps. Additionally, while tracking tools enhance external motivation, they may not always lead to long-term commitment. A study analyzing user behavior in a mobile activity tracking application found that users are more likely to stop using the app once they have achieved their primary intent or goal, such as weight loss. However, these users might return to the app when their original intent resurfaces, such as gaining weight back (Lin, Althoff and Leskovec).

Goal-tracking platforms can sometimes encourage obsessive behaviors, causing users to focus more on meeting numbers than enjoying the activity itself. Metrics like step counts, calories burned, or weekly totals can shift attention away from the joy of playing toward rigid goal-following. This overemphasis may lead to unhealthy habits such as overexertion, compulsive tracking, or feelings of failure when daily targets are not met (Mazlan).

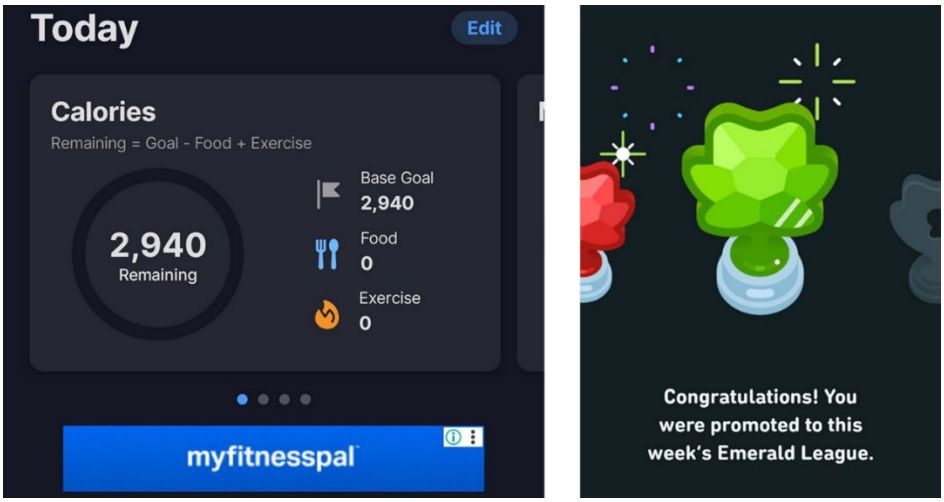

Figure 6 - Numeric and visual feedback in MyFitnessPal (left) and Duolingo (right)

The design of feedback systems also plays a crucial role. While numerical scores dominate most tracking apps, visual feedback such as progress illustrations, narrative milestones, or playful metaphors may better support autonomy and competence by emphasizing growth and experience rather than raw outputs. Without careful design, quantitative goal-tracking can undermine autonomy, making users feel externally controlled by the app rather than intrinsically motivated by personal growth and enjoyment.

3. METHODOLOGY AND METHODS

3.1 Double Diamond

This study adopts the Double Diamond as a methodology, which is a well-established design framework developed by the UK Design Council (figure 7), to guide the research and iterative prototyping process (Design Council). The Double Diamond consists of four stages:

1. Discover: Understanding the problem by experiencing the issue or engaging with individuals affected by it
2. Define: Narrowing down the problem through insights gathered from discovery
3. Develop: Exploring potential solutions and testing different interventions
4. Deliver: Refining and implementing the most effective solution.

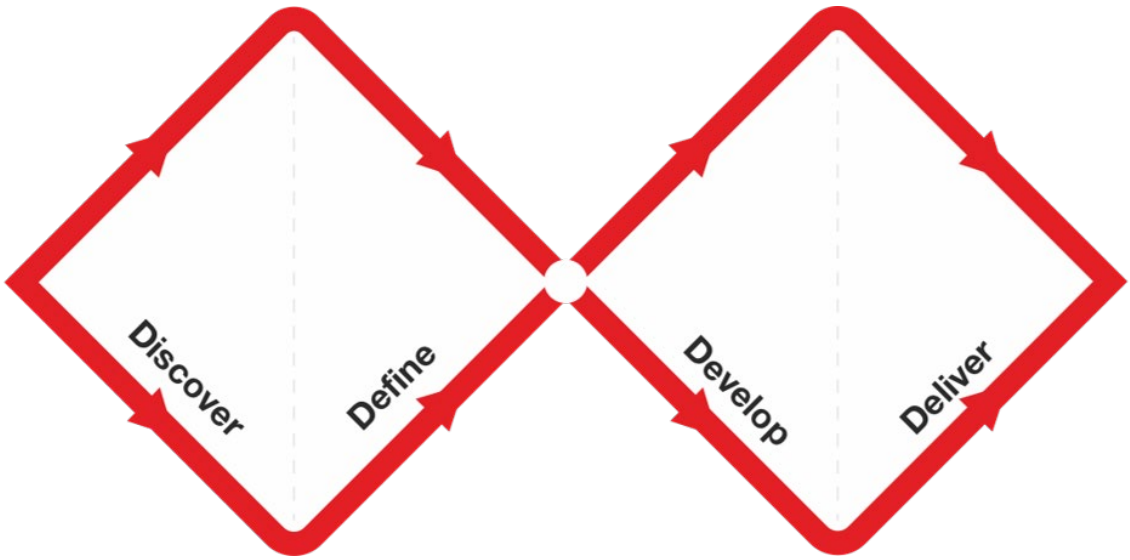

Figure 7 - The Double Diamond by the Design Council

However, we adapt the original Double Diamond by omitting the Deliver stage, as this thesis focuses on exploring potential design solutions rather than final implementation. This approach also leaves room for future research and development

(figure 8). Given that sports participation is shaped by complex psychological, social, and logistical factors, this methodology enables both broad problem discovery and focused exploration (Tschimmel).

Within the Define phase, we conducted a structured analysis of diary study findings by categorizing barriers into extrinsic, intrinsic, and systemic levels. This helped frame design opportunities for the Develop phase. Our research question emerges from defining the problem space and hypothesizing a direction. We incorporated both user interviews and usability testing within the Develop phase to support rapid iteration and feedback. We develop four prototypes through the iterative prototyping methods

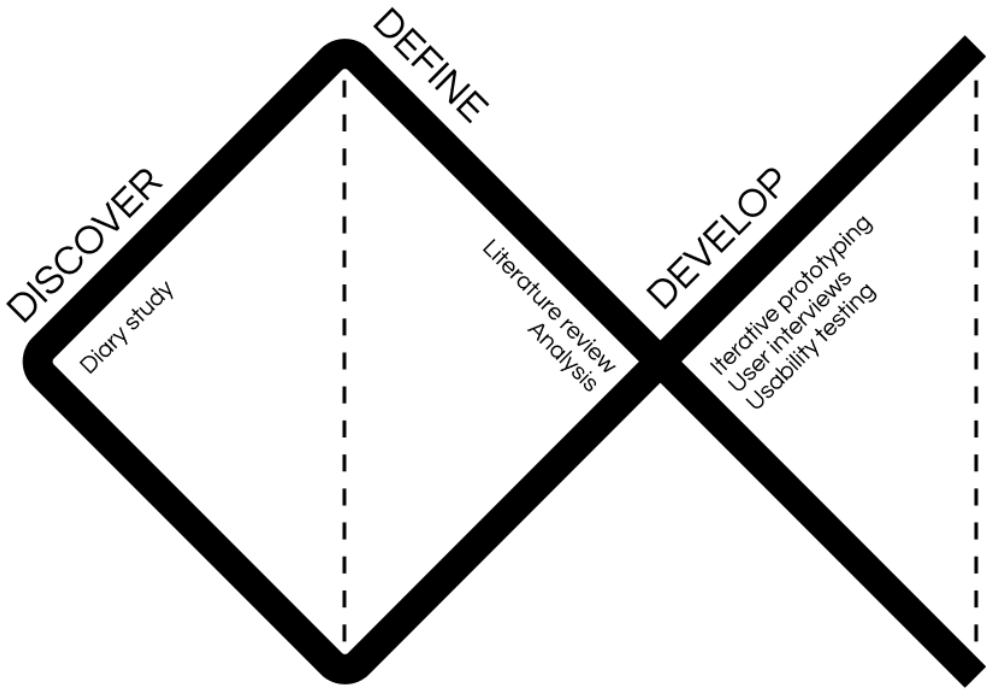

Figure 8 - Adapted double diamond

3.2 Diary study (Discover)

Diary study is a qualitative user research method where participants self report activities, interactions, and experiences over a period ranging from few days, weeks, to a month or longer (Flaherty). It provides contextual insights into real-world experiences, allowing to document frustrations, motivations, and systemic barriers over time. This method was especially relevant because sports participation is an ongoing experience, not a single event. By documenting engagement in different sports at different venues over time, the study highlights inconsistencies, accessibility issues, and behavioral patterns.

3.3 User interviews (Develop)

Semi-structured user interviews were conducted to assess the findings from the diary study and gain diverse perspectives on sports participation. This method was chosen because, while we had some prior knowledge of the subject, specifically the barriers to sustaining sports participation, deeper qualitative insights were needed to understand what drives people to play sports and what gets in their way. These included users' motivations, barriers, attitudes, opinions, and preferences. Using a semi-structured approach allowed participants to share personal experiences while also addressing specific research questions related to motivation, community engagement, and the role of digital tools in sports participation. As recommended by Chauncey Wilson in Interview Techniques for UX Practitioners – A User Centered Design Method, we structured our interviews such that one researcher hosted the interview, while the other took notes and managed recording equipment and other technology. This ensured a smooth process and accurate data collection (Wilson).

3.4 Iterative prototyping (Develop)

Given the exploratory nature of this research, iterative prototyping is placed within the Develop phase of the Double Diamond, but it also supported continued discovery. This process involved developing multiple prototypes through repeated cycles of ideation, creation, feedback, and revision. Rather than treating "Develop" as a single

step, we adapted it into four distinct but interconnected activities (figure 9), each emphasizing continuous user feedback and critical reflection. (Sharp, Rogers and Preece). These findings informed the design of subsequent iterations, blurring the boundary between discovery and development. However, for the purposes of this thesis, iterative prototyping is primarily framed within the Develop phase, as it focused on testing and refining design responses.

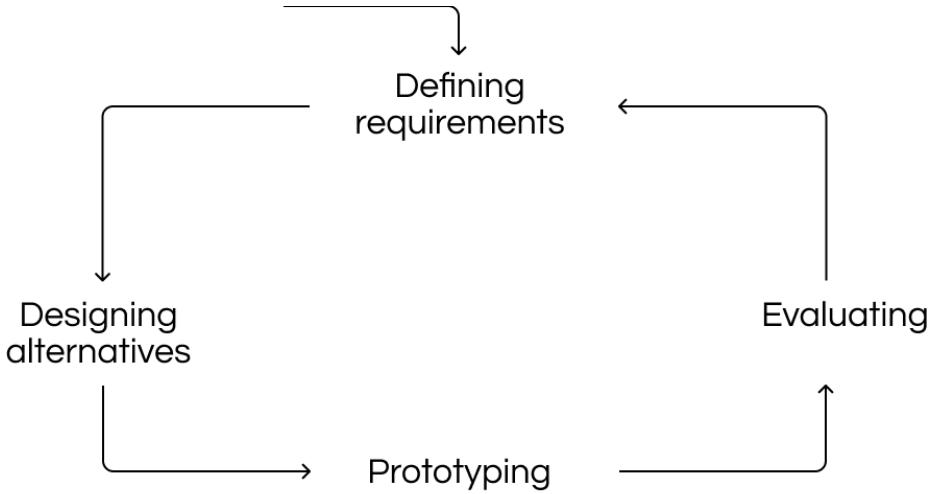

Figure 9 - Visual representation of an iterative prototype cycle adapted from (Sharp, Rogers and Preece)

The adapted framework includes:

1. **Defining requirements** – Identifying and refining the specific problems to be addressed based on previous research and findings.
2. **Designing alternatives** – Generating multiple possible solutions through ideation that align with the defined requirements.
3. **Prototyping** – Creating interactive representations of the most promising ideas to test their feasibility and user engagement.
4. **Evaluating** – Testing and analyzing the prototypes to gain insights, which then inform refinements for the next iteration.

3.5 Usability testing (Develop)

Usability testing involves observing real users as they interact with a prototype or system, allowing researchers to identify pain points, usability flaws, and areas for improvement. This method is particularly relevant in human-centred design, as it ensures that the final solution is not only functional but also intuitive and engaging (Rubin and Chishnell).

Usability testing was conducted to evaluate and refine the user experience (UX) of prototype 4, rather than to validate the core conceptual framework. Within the scope of a master's thesis, usability testing provided actionable insights into the clarity, engagement, and intuitiveness of the prototype, ensuring that the designs were grounded in real user experiences even if their long-term behavioral impact remains an open question for future research.

4. RESEARCH PROCESS

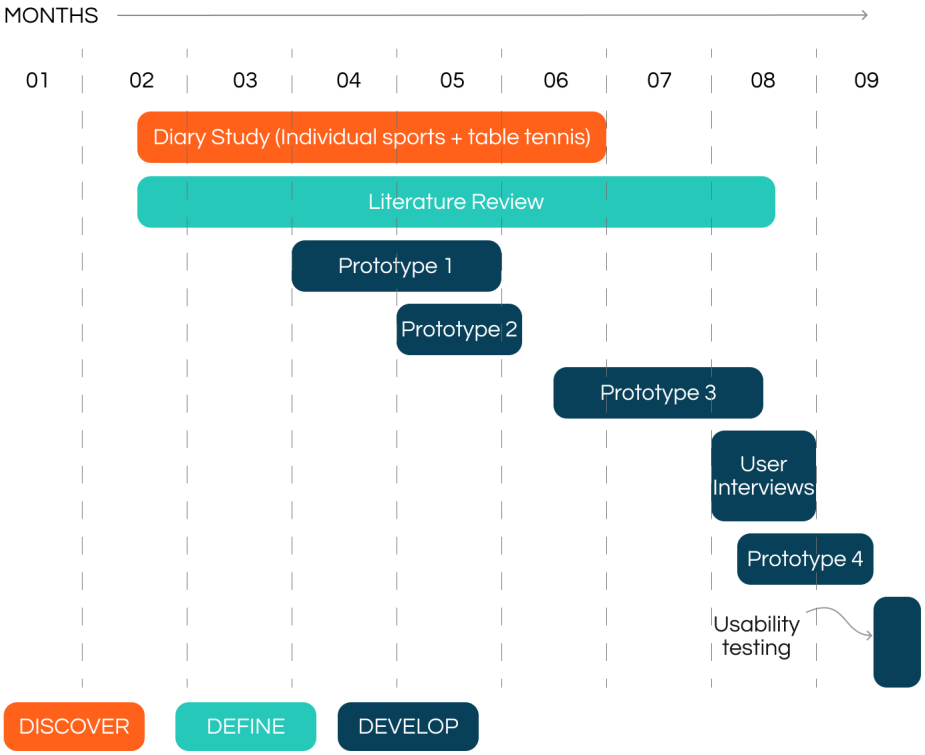

Figure 10 - Research timeline

4.1 Diary study

Procedure

To examine the existing system of recreational sports participation in Toronto, we conducted a diary study. The study spanned over four months and involved seven different sports, namely, badminton, pickleball, squash, table tennis, golf, lawn bowling, and basketball. Each sport was played at a different venue within a 20 km radius from downtown Toronto, reflecting what we considered a realistic travel distance (approximately 1.5 hours) for regular recreational participation. For each sport, we visited the venue once, capturing a single full play experience to document the access, booking processes, equipment availability, and social engagement opportunities. Venues included private clubs, community centers, and free public parks. Booking methods varied across locations, encompassing online reservations, phone-based

bookings, walk-ins, and drop-in systems. Equipment status also differed. At some venues equipment was provided free, at others it was available for rental, and occasionally, users were required to bring or borrow their own gear.

The diary study includes an observation matrix ranging from pre-booking a sports venue to post-playing. The observations include all 'actions' taken at every stage, all physical/digital 'touchpoints' with the system and mental 'thoughts' during that stage. Actions helped us understand frustrations in performing a certain activity; touchpoints helped us understand if the system comprises of user-friendly components; the thoughts helped us analyze our emotions and feelings as a user of the system. Finally, every entry lists key insights and learnings obtained which helped us in defining the core research question.

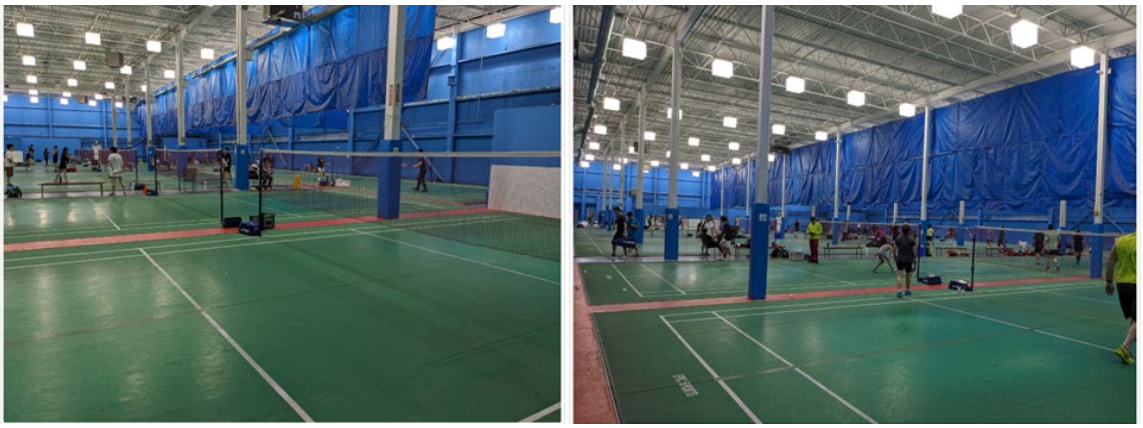

Figure 11 - Images from our diary study - 'Let's play badminton'

Sample Diary Study Excerpt: Playing Badminton

A session of playing badminton at a community center.

- **Actions**: We shortlisted a venue after online research, completed a booking through a website, coordinated logistics, traveled via public transport, and engaged in an hour of play with occasional breaks.

- **Touchpoints**: The booking website, navigation tools, reception desk, and on-site facilities (e.g., courts, storage areas) shaped our interactions throughout the experience.

- **Thoughts and Emotions**: Before booking, concerns about complex reservation systems were expressed ("Do I have to call every place to enquire?"). During travel, the long commute led to fatigue ("This journey is so long... Why can't the court come to me?"). On arrival, observing a vibrant community of players sparked excitement and validation of the effort ("This is definitely the right decision!"). During play, practical concerns arose, such as wondering whether break times counted against booked court time.

Key Insights from the Experience:

- Booking processes, although smoother online, were time-consuming and required advance planning.

- Travel distance significantly affected perceived accessibility and spontaneous participation.

- Social barriers remained: despite a lively environment, no organic communication with other players occurred.

- The availability and quality of facilities were satisfactory, but minor issues such as poor lighting slightly affected gameplay.

This sample illustrates how the diary study method helped capture layered insights across logistical, emotional, and social dimensions of the recreational sports experience. Full diary study tables and additional entries for other sports are provided in Appendix A.

Observations

As we experienced the system of playing sports, we discovered it was frustrating and demanding to search for places to play every time we had to play a sport. We searched online for venues based on the sport we wanted to play, but the process of searching, learning about each venue and deciding on one was time consuming and frustrating. When we wanted to play squash at a Community Centre, we found that we were booked for the wrong day due to a misunderstanding which happened during the

phone call booking process (online booking was unavailable). The availability of equipment was also a major factor in deciding which sport to play. It was often unclear whether a venue, especially community centers, provided equipment, making it difficult to plan. As we were interested in exploring multiple sports, we had to either find an online community of individuals that belonged to that sport or book a court/place hoping that we might find players once we got there which worked only occasionally. On the other hand, inviting just friends limited the chances of playing because of a smaller number of individuals and difference in interests.

A pivotal moment occurred during a table tennis session at a community center where we were informally introduced to a local WhatsApp group of over 100 recreational players. Several long-time members of this group, familiar with the neighborhood and its sports spaces, helped us easily find and access table tennis venues across Toronto. The community leader played an active role in organizing sessions and coordinating players. The group showcased a supportive environment, with members enthusiastically sharing equipment, mentoring beginners, and even offering rides to and from venues.

However, while this community temporarily solved issues related to access and equipment, it exposed other challenges:

- **Lack of Structure:** Unregulated entry to the WhatsApp group led to frequent spam, miscommunications, and difficulty coordinating sessions.

- **Motivation irregularity**: Not all members were consistently engaged, and participation rates fluctuated based on social momentum.

- **Dependency**: A few individuals bore the responsibility for sustaining activity, making the system vulnerable to burnout.

While this served for only one sport, a community of individuals made us feel satisfied and enabled us to go out and play!

Analysis

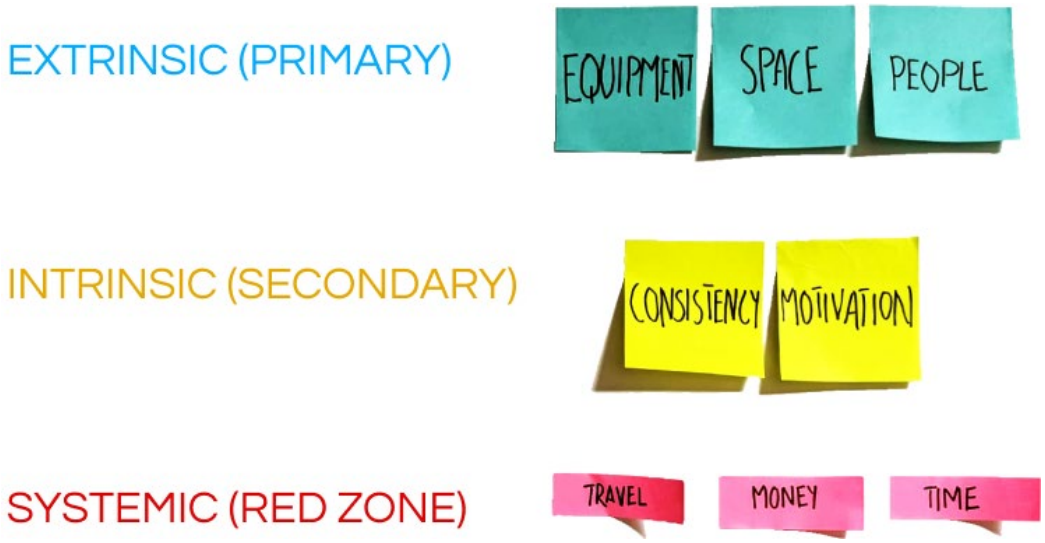

Figure 12 - Three factors that affect participation in sports

The study revealed three factors affecting sports participation: finding players, finding and booking spaces and finding equipment if one did not own one. Ultimately, factors such as travel distance, personal schedule constraints, and the cost of participating in sports emerged as additional challenges that influenced decisions to engage in sports.

We map out these three levels of problems (figure 12) as extrinsic (finding people, space and equipment), intrinsic (consistency and motivation) and systemic (travel, time and money). We term the systemic level as the 'red zone' because this thesis does not intend to place an enquiry here as we believe it needs to be studied from a lens other than that of sports motivation. This might involve an overall change of behavior. Hence, we claim it out of scope for this thesis.

4.2 Iterative prototyping

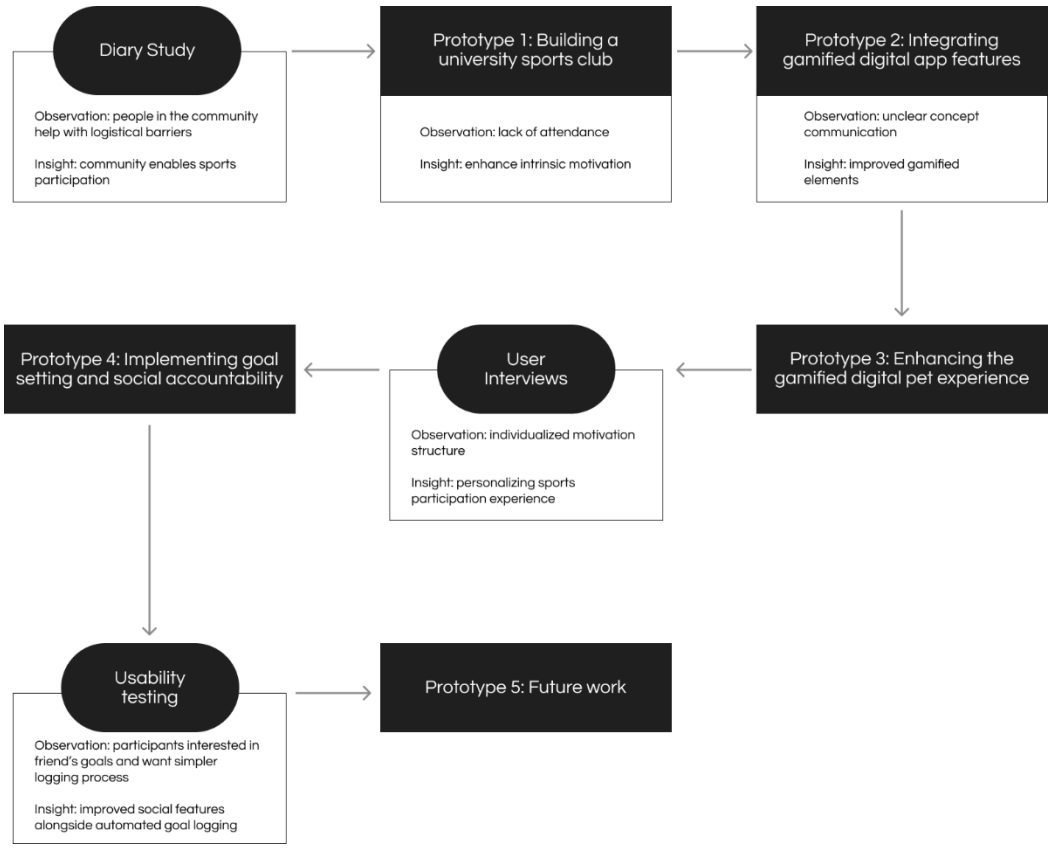

Figure 13 - Iterative prototyping flow for this thesis

The iterative prototyping process followed a structured cycle of hypothesis/objective generation, prototyping, user feedback, and refinement (figure 13). Each iteration began with insights gathered from the preceding research phase whether from diary studies, user interviews, or thematic analysis and translated those insights into design hypotheses. Rapid prototypes were then developed with each prototype designed to test specific motivational mechanisms.

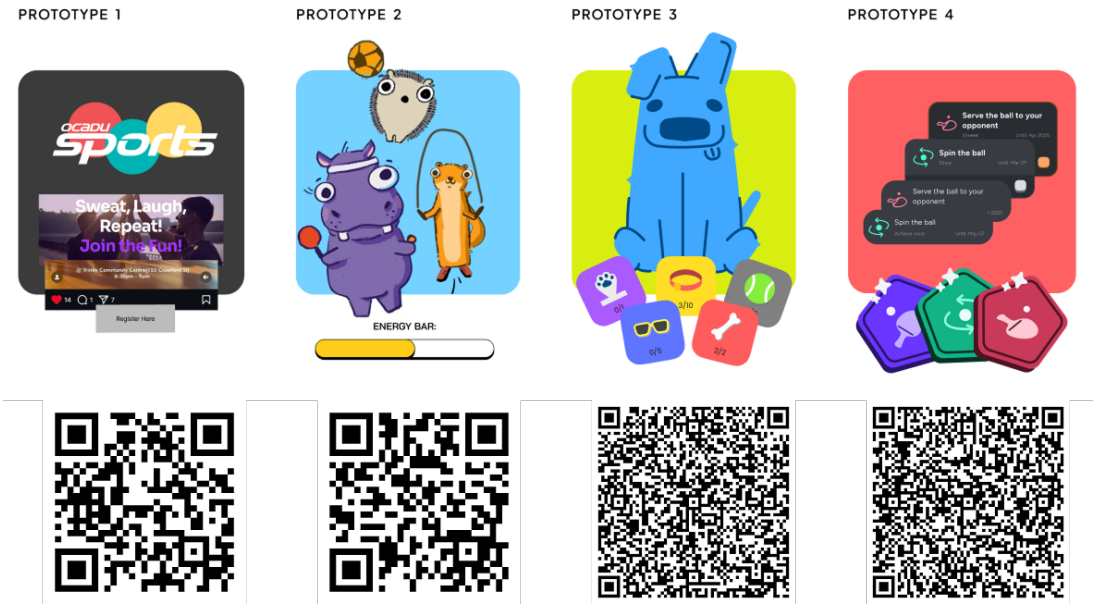

Figure 14 - All prototype images with QR code to access

Prototype 1: Building a university sports club

Objective

Insights from the diary study revealed that successful participation in recreational sports often depends on access to equipment, spaces, and people. In response, we created a university sports club, OCAD U Sports Club, to test whether removing these logistical barriers through a centralized, community-driven system could enable more consistent engagement.

The club allowed students to stay updated of events both digitally and physically. The club was promoted through multiple channels, including a website, Instagram, and university emails, and was introduced at the Student Life Fair, where students voted on their preferred sport. Based on student preferences, badminton was selected as the first organized event.

Ideation

During the ideation phase, we explored several potential solutions to encourage individuals to participate in sports. These included creating WhatsApp and Facebook

groups for students to self-organize games and directly connect with peers who shared similar interests.

We ultimately decided on establishing an official university-affiliated Sports Club, as it offered several advantages. First, a recognized club provided institutional credibility and trust, making students more likely to participate. Second, it allowed for both physical and digital engagement under an organized framework. Third, forming a community within the larger university setting created a sense of belonging, which was expected to increase accountability and sustained participation. By integrating both in-person activities and online communication, the club aimed to provide an accessible platform for students to engage in sports more effectively.

Prototyping

To promote the club a website and Instagram page were developed to facilitate communication and event promotion. Additionally, the club was officially registered on the university's website, ensuring visibility among students. University-wide emails were sent to increase awareness. The club's first engagement initiative, The Fun Run, was designed as an accessible and informal event to attract student participation. This comprised two events spaced across a duration of two weeks (once every week). Despite extensive digital promotion through website and Instagram (figure 15), the event saw no student turnout. This outcome underscored the need for a more targeted and engaging outreach strategy beyond online promotion alone.

As part of ongoing efforts to assess student interests and invite them to future activities, the club set up a booth at the Student Life Fair (figure 16). This initiated direct engagement with students and provided valuable insights into their sports preferences. A voting system was introduced, allowing students to indicate their preferred sport for future events (figure 16). Badminton emerged as the most popular choice, leading to the organization of the club's structured Badminton event.

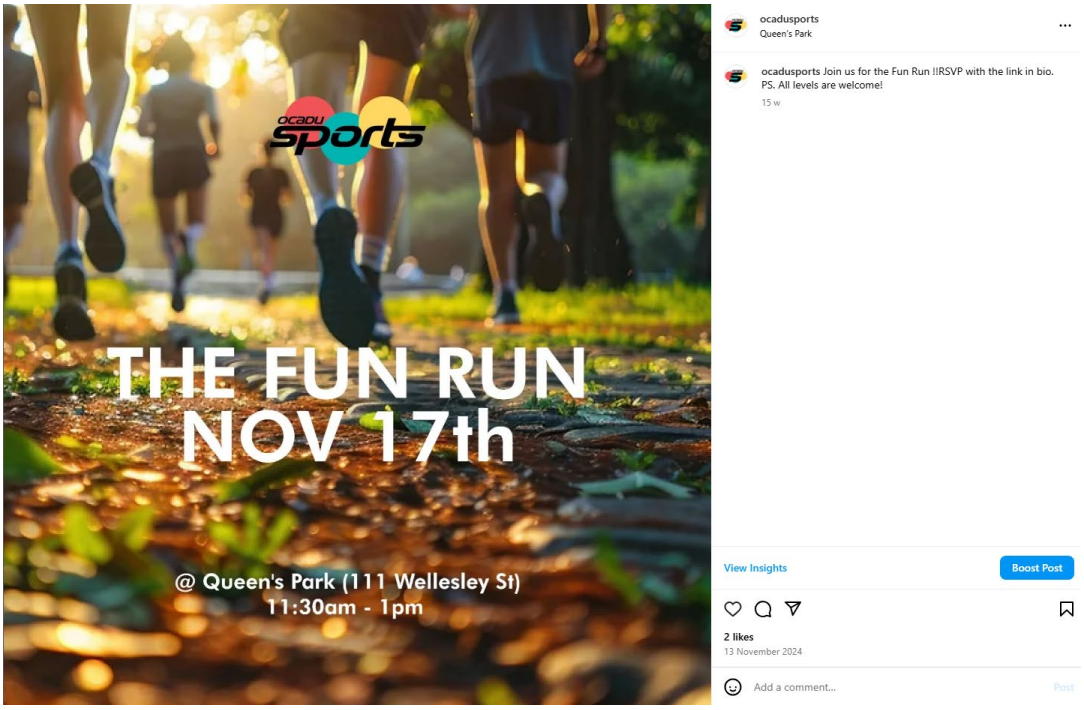

Figure 15 - The Fun Run Instagram post

Figure 16 OCADU Sports Club table at the Student Life Fair; Right: Sports interests of people at the Student Life Fair

Badminton event planning and execution:

The selection of a suitable location for the badminton event was a critical factor in ensuring its success. We required a venue that could accommodate enough players, provide necessary equipment, and offer a safe and accessible environment. After researching various community centers with badminton facilities, we identified Trinity Community Recreation Center as an appropriate option due to its accessible location and availability of free equipment. The center operated on a pass system, allowing up to

24 players to access the facility on a first-come, first-served basis for a scheduled two-hour session, held two to three times a week.

Before announcing the event, we chose to visit the venue ourselves to assess its suitability and identify potential challenges. During our first visit, we found only seven people in queue, which allowed us to easily collect passes and play. This positive experience led us to believe that the venue would be a viable option for our club's event. However, after announcing the event and during the next visit with other university students of the OCADU sports club, we encountered a different situation.

Figure 17 - Badminton event Instagram post

We officially announced our first badminton session through an Instagram post, which successfully generated interest in our club (figure 17). However, this session was scheduled at a different day and time than our initial visit. To our surprise, the venue was overcrowded, as a result, no one from our group was able to participate in the session. Notably with over 10 positive responses from our post on Instagram only 2 people showed up for the badminton event.

Although this outcome was disappointing, it provided valuable insights that informed important design and feature decisions for future prototypes, helping us address issues of accessibility and availability in subsequent events.

Evaluation

Challenge or Observation	Underlying Factors	Recommendations
High positive online interest but low physical turnout	Online engagement did not translate into real-world commitment; cold weather during October-November discouraged participation	Use structured communication channels like Discord, mailing lists, and Eventbrite to create stronger commitment. Send event reminders and confirmations closer to event dates.
Gap between digital interest and attendance	Social media "likes" are low-effort actions; perceived risk of non-enrolment (venue overcrowding, unclear rules) reduced actual attendance	Provide clearer event guidelines (e.g., guaranteed spots vs. first-come-first-served). Foster informal pre-event interactions (e.g., online pre-chats or group meetups).
Lack of established group identity	Students may be more inclined to join well-known, reputable groups. Its newness reduced credibility	Collaborate with existing university clubs or sports associations to lend credibility and social proof. Leverage peer endorsement strategies.
Overcrowding and venue capacity limits	Unexpected turnout variations: students assumed limited spots would prevent participation	Implement a structured RSVP system through Eventbrite or Discord sign-ups. Communicate transparent capacity limits and waiting lists.
Burden of continuous event organization	Reliance on a few organizers; diverse sports interests among students complicated event planning	Create a distributed leadership model by assigning volunteers to manage different sports. Establish rotating event themes to balance diverse interests and reduce organizer burnout.

Table 1 - Prototype 1 evaluation

While forming a university sports club addressed logistical barriers like organizing space, providing equipment, and coordinating players, these efforts alone did not sustain participation. The low turnout despite clear opportunities suggests that external facilitation is not enough but an internal drive to engage in sports must also be present. It was also observed that this protype wasn't sustainable as it depended on the people organizing events. Inconsistent scheduling and unclear communication may have contributed to disengagement, but the deeper issue appears to be a lack of intrinsic motivation to prioritize sports participation. This realization led us to shift our focus to explore and enhance the motivational factors that help drive individuals to engage in sports consistently through a self-sustaining system.

Prototype 2: Integrating gamified digital app features

Objective

The limited turnout for the university sports club highlighted a deeper challenge: even when external barriers were removed, motivation to take the first step remained inconsistent. This led us to explore how digital tools could activate initial engagement and create momentum that could be sustained over time. This prototype specifically focused on how interactive game elements might encourage users to begin participation.

Ideation

Following the iterative design approach, we focused on generating an extensive brainstorming session that explored novel and inspired concepts (figure 18). Ideas included location tracking, posting memories as stories, conquering courts, character battles, social, physical & mental (SPM) score to name a few. Adopting the learnings from the analysis of diary study, we conducted an affinity mapping session and color coded to systematically evaluate the ideas based on their impact on extrinsic, intrinsic, or systemic factors (figure 19). The ideas that have an impact on extrinsic problems an individual might face while they participate in sports are marked in blue, intrinsic impact ideas are marked in yellow and systemic impact ideas are marked in red. This helped us filter ideas such as sports dating, memory wall of previous play sessions, digital pet or digital avatar, e-commerce platform for skills, leveling up mechanism, making a sports portfolio, personal AI motivator that focused solely on intrinsic motivation which was the primary focus of this prototype.

Figure 18 - Feature ideation

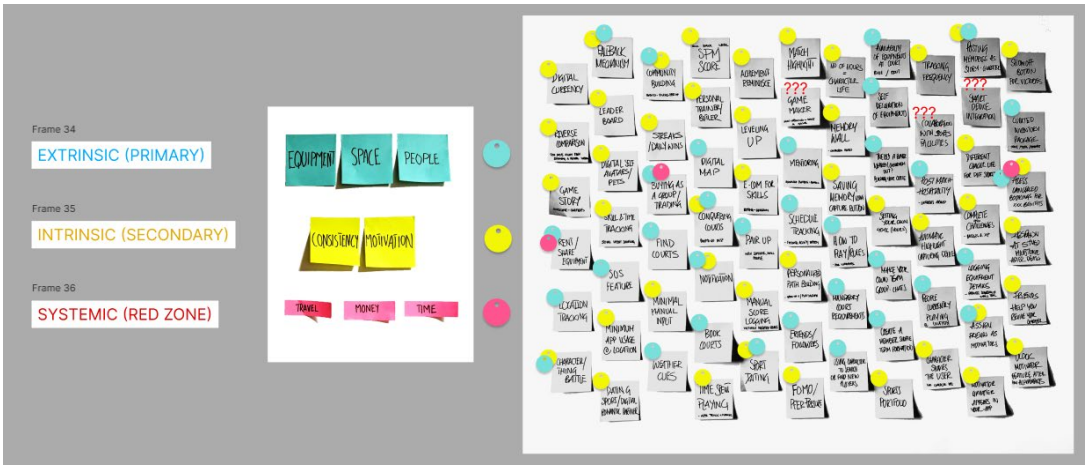

Figure 19 - Categorizing features as solutions into three buckets: extrinsic, intrinsic and systemic

Prototyping

This prototype aims to explore how integrating a gamified digital pet system could sustain sports participation by leveraging minimal interaction points to examine solely on the experience between the user and the digital pet where users engaged in sports while passively influencing their virtual pet. To bring this idea to life, we developed a web-based application using P5.js, hosted on Firebase (refer Appendix H). The prototype was tested through a demonstration session within the cohort and faculty, allowing for an evaluation of user engagement and behavioral responses.

App mechanism and user interaction

Participants began by scanning a QR code to access the prototype, where they were presented with the choice of three digital pets, a hippopotamus, a squirrel and a porcupine (figure 21). These animals were selected to provide visual variety and appeal. Once a pet was chosen, its energy bar appeared at five percent, indicating a tired state. To increase the pet's energy, participants were instructed to dock their phones at a designated station and engage in a sports activity for two minutes.

The app utilized the phone's accelerometer to determine whether it was stationary or in motion. Keeping the phone still while playing sports resulted in an increase in the pet's energy, while movement gradually depleted it back to zero. The docking station ensured that the phone remained stationary during play, reinforcing the idea that their physical activity directly influenced their pet's well-being. Additionally, the pet's expressions and attitude changed at four distinct intervals, visually reinforcing user progress and engagement. Upon returning to their phones after the session, they observed the pet's energy bar increase to eighty-five percent, with the pet displaying different expressions and behaviors at every twenty percent increment.

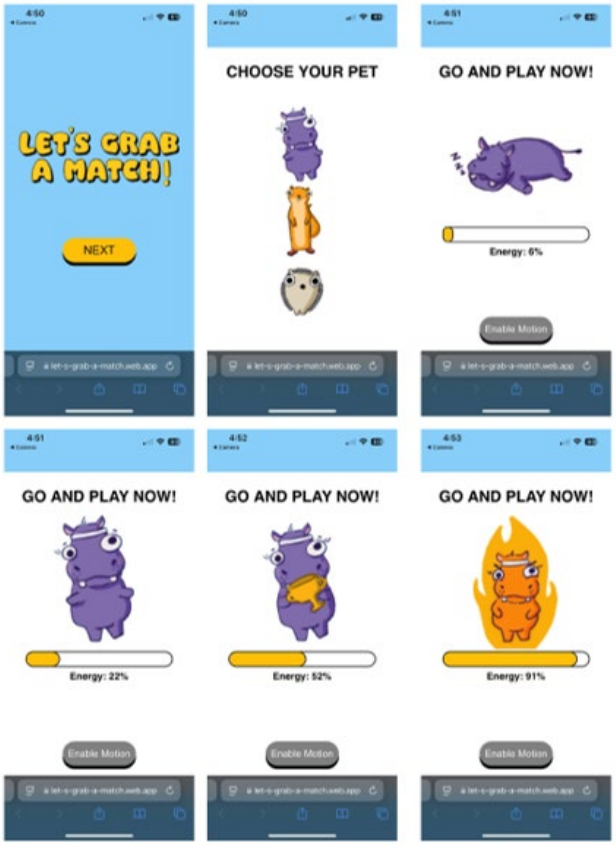

Figure 20 - (Top Left): Onboarding, (Top Middle): Choosing a pet, (Top Right): Pet with low energy, (Bottom Left): Pet with normal energy, (Bottom Middle): Pet with high energy, (Bottom Right): Pet with full energy

Figure 21 - (Top Row): Hippo, (Middle Row): Squirrel, (Bottom Row): Porcupine

Space design and sports activities

The sports activities were tailored to fit the constraints of an indoor university setting. One option was a modified version of table tennis, played on a study table without a net, using racquets and a table tennis ball. The second activity was a creative variation of football, where participants sat on office chairs with wheels and attempted to score with a small ball in a designated makeshift goalpost area (figure 22). These adaptations ensured that participants could engage in sports while accommodating the available space.

Figure 22 - (Top): Two people playing sitting football, (Bottom Left): People interacting with their phone at the docking station, (Bottom right): Prototype Poster

User feedback

User responses to the prototype were largely positive, with eighty percent out of 20 participants actively engaging with the digital pet and the activity. Many found the system intriguing and attempted to decode how the pet's energy bar increased, with some speculating that motion sensors or cameras were tracking their movements. This suggested that people wanted autonomy as they were trying to control this new to understand mechanism. This response demonstrated the effectiveness of the perceived tracking mechanism, even though the system relied purely on coding rather

than physical sensors. However, some users attempted to manipulate the system by shaking their phones to artificially increase the pet's energy, revealing a potential flaw in the engagement validation process. While most participants enjoyed the experience and focused on having fun, a few misinterpreted the prototype as a new sport rather than an interactive app, suggesting that clearer communication was needed to convey the intended purpose of the system.

Evaluation

Challenge or Observation	Underlying Factors	Recommendations
80% of participants actively engaged with the digital pet and related physical activities	Gamification and personalization enhanced user motivation and participation	Further enhance the visual and behavioral design of the digital pet to deepen emotional attachment and engagement from the outset.
Strong user focus on fun; minority showed competitive behaviors	Different user motivations: some prioritized enjoyment, others competitiveness	Allow users to personalize their experience paths (e.g., casual vs. competitive modes) to accommodate varied motivational styles.
High interaction with the energy bar and digital pet	The perceived tracking system created an illusion of physical interactivity and agency	Make the energy bar and pet reactions feel more connected to real-life play,
Some participants misunderstood the app as a new sport rather than a digital support tool	Lack of clear communication about the prototype's purpose and intended use	Strengthen onboarding and instructional design to clarify the role of the app as an enhancer of sports participation, not a standalone sport.
Users suggested collaborative features involving multiple pets and players	Desire for social interaction and collective goals	Introduce social play features, enabling users to connect and collaborate through their digital pets, fostering relatedness and sustained engagement.

Table 2 - Prototype 2 evaluation

While the evaluation demonstrated strong engagement with the digital pet system, it is important to contextualize these results within the prototype's intended scope. The demo was purposefully designed for one-time use to test the immediate effectiveness of the interaction mechanism, rather than to encourage sustained engagement. No features aimed at long-term retention were incorporated at this stage. As a result, the positive responses primarily validated the viability of the core concept, rather than its ability to support ongoing participation. Recognizing this limitation

informed the next phase of development, which focused on embedding progression and social features necessary for sustained sports participation.

Prototype 3: Enhancing the gamified digital pet experience

Objective

This prototype builds on the previous prototype by retaining key features like the digital pet for motivation and the tracking mechanism that strengthens user engagement. The previous prototype was displayed at an exhibition, where participants had the opportunity to play and experiment with the app, effectively addressing logistical challenges by providing space, equipment, and playing partners. Since users enjoyed the digital pet concept and found it motivating for sports participation, this next iteration expands its capabilities by integrating features to help users find playing partners, available spaces, and necessary equipment in the real world, alongside the existing pet mechanics.

Ideation

To develop these features, we first defined the key objects within the app by creating 'instances' which are nothing but templates that outline essential data and attributes. Each instance contains metadata (required information) and optional attributes. For example, a pet instance includes name, age, and basic properties, while additional features like clothing and accessories can be incorporated based on user activity. This structured approach helped us design a scalable system, ensuring that every element, whether a pet, a playing session, or a sports venue could be dynamically managed (refer to Appendix J for detailed instances).

As part of the Define phase of the Double Diamond methodology, we also developed user personas (figure 23) to better understand the needs, behaviors, and challenges of potential users. User personas play a crucial role in iterative prototyping, allowing us to refine design decisions based on specific user motivations and pain points. We formulated two primary user personas for this app:

1. The Sports Group Instigator – A user who enjoys organizing and managing a sports community but faces challenges such as matching players with similar skill levels and keeping the group engaged despite inconsistency issues.

2. The Sports Enthusiast – A user who loves meeting new people through sports and is motivated by regular group play. Their goals include finding inspiration in an active community and showcasing their Pickleball skills to new players.

These user personas were inspired from our diary study. A similar group structure including a group of people who initiated play sessions and another group who were enthusiasts prevailed. By incorporating these personas into the design process, we ensured that the app would cater to both organizational and recreational needs, making it more effective in sustaining sports participation.

Considering these user personas, we next designed the information architecture (figure 24) of the app to support seamless sports participation and motivation. The architecture ensures that users can easily find courts, organize play sessions, and track their engagement, reinforcing both the logistical and gamification aspects of the platform.

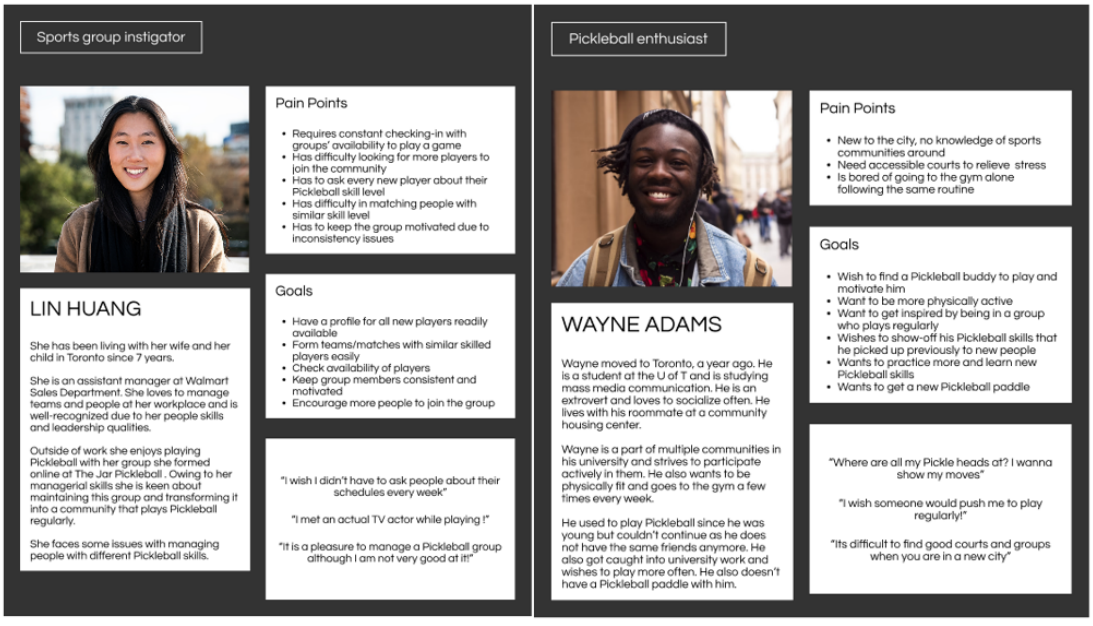

Figure 23 User personas

For this version of the app, users create a ‘session’, which starts when they arrive at the playing location and ends after they finish. A session is triggered by scanning a QR code at the location to confirm arrival and is completed by scanning the QR code again when leaving. However, before starting a session, users must pre-plan and register by selecting a court, inviting friends, and choosing a time and date. The session in this app is not booking directly with the facility instead its planning an event. Sessions can also be shared with friends or users can join existing sessions created by others in the app.

To make court selection easier, the app provides a court-finding feature, listing courts based on favorites and proximity. While this does not address systemic challenges in facility availability, it enhances the user’s ability to find courts efficiently within their existing options. To enhance usability, our app ensures that users can view detailed court listings, including images, ratings, and available facilities.

Beyond logistical improvements, this prototype also expands the role of the digital pet to enhance intrinsic motivation. Gamified elements, such as clothing and accessories, serve as rewards for user achievements. Any activity on the ‘play’ side of the app (session registration, court finding, inviting friends, or playing a sport) directly impacts the ‘pet’ side. For example, if a user invites 50 people to play over a certain period, their pet might unlock new accessories or clothing. This integration ensures that motivation and real-world sports participation remain connected, making the experience more engaging and rewarding.

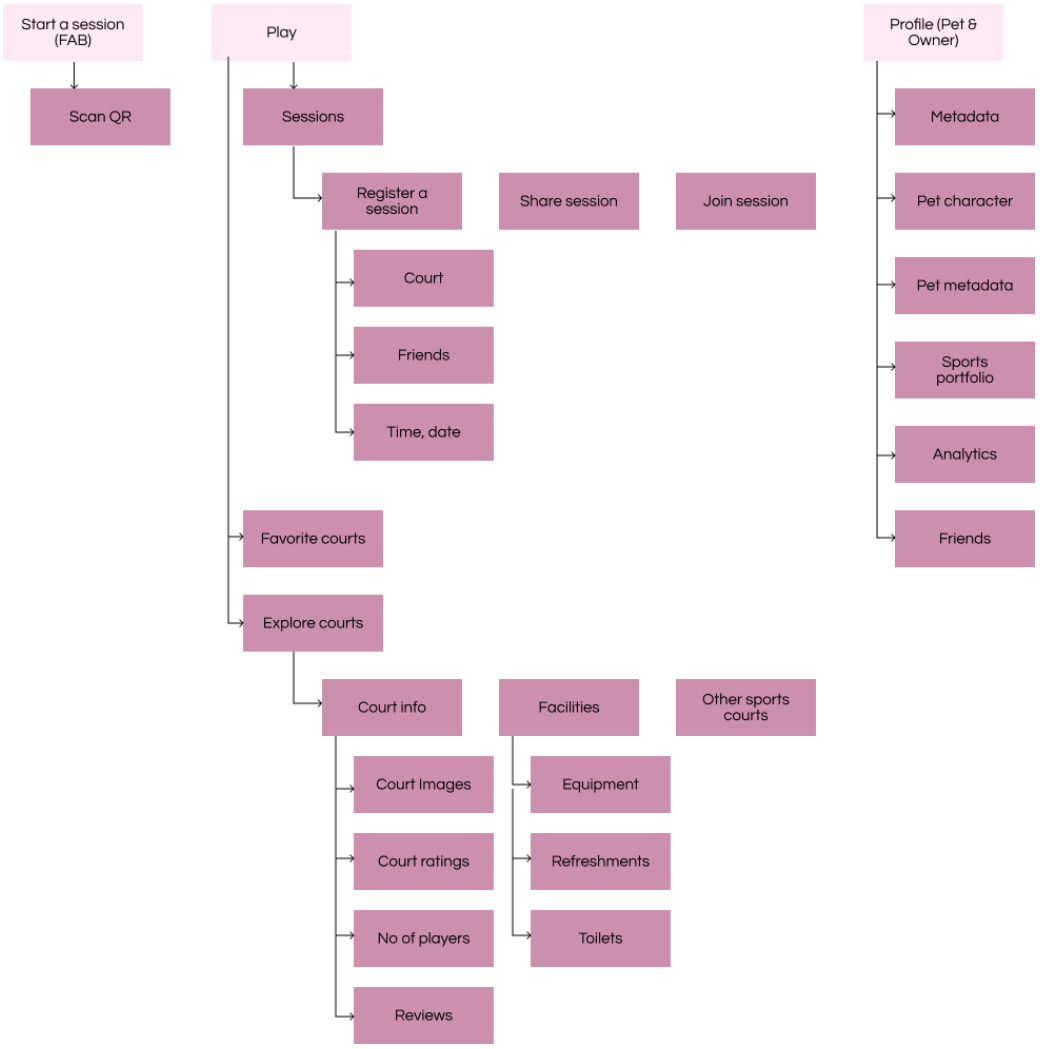

Figure 24 - Prototype 3 information architecture

UI/UX Explorations

With the information architecture established, the next step was the ideate phase which included designing the digital pet and its environment within the app. Since the pet serves as a key motivational element, its design and behavior significantly influence user interaction and engagement. The way users perceive, care for, and relate to their pet determines the effectiveness of the gamification system in reinforcing sports participation.

We explored various possibilities for the pet's form such as an animal, a fictional character, or an abstract entity (figure 25). To ensure that the pet felt intuitive and emotionally engaging, we based our decision on user familiarity and relatability. Given

that dogs are common household pets, many users already have experience taking care of them, making them a natural and easily understood choice. To ensure neutrality and inclusivity, we designed a simplified, breed-neutral dog in Procreate, avoiding potential biases and making it universally relatable. The final design (figure 27) features rounded edges to evoke friendliness and approachability, along with a neutral color palette to prevent attachments or aversions based on physical attributes. This standardization allows for customization through clothing and accessories, reinforcing gamification: To ensure that the digital pet effectively motivates users to play sports, we explored various ways to establish a meaningful relationship between the user and their pet. Research on gamification and behavioral psychology suggests that positive reinforcement, rather than punishment is more effective in sustaining motivation (Arbiter). Based on this, we designed a visual feedback system where the pet's environment, rather than the pet itself, reflects the user's engagement.

Instead of making the pet appear sad or neglected when the user is inactive (which could discourage participation), we designed the pet's living space to dynamically change based on engagement levels (figure 28). If the user plays sports consistently, the pet enjoys a spacious and interactive environment. However, if engagement decreases, the pet's space shrinks, visually signaling the need for action without creating negative emotions. Unlike the Tamagotchi model, where a neglected pet deteriorates, this system ensures that the pet remains alive and recoverable, reinforcing the idea that even one session of physical activity can restore balance.

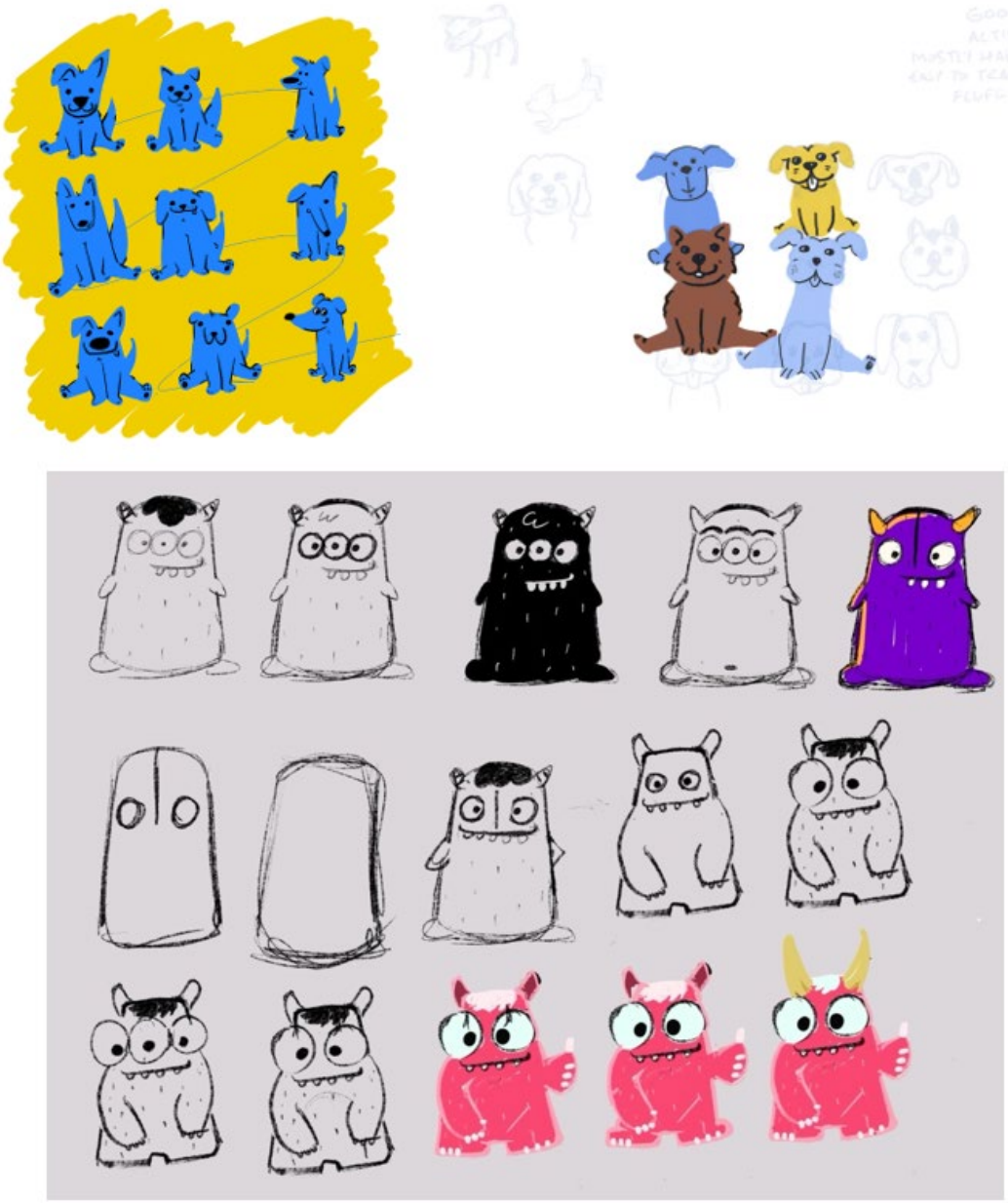

Figure 25 Pet Design Explorations

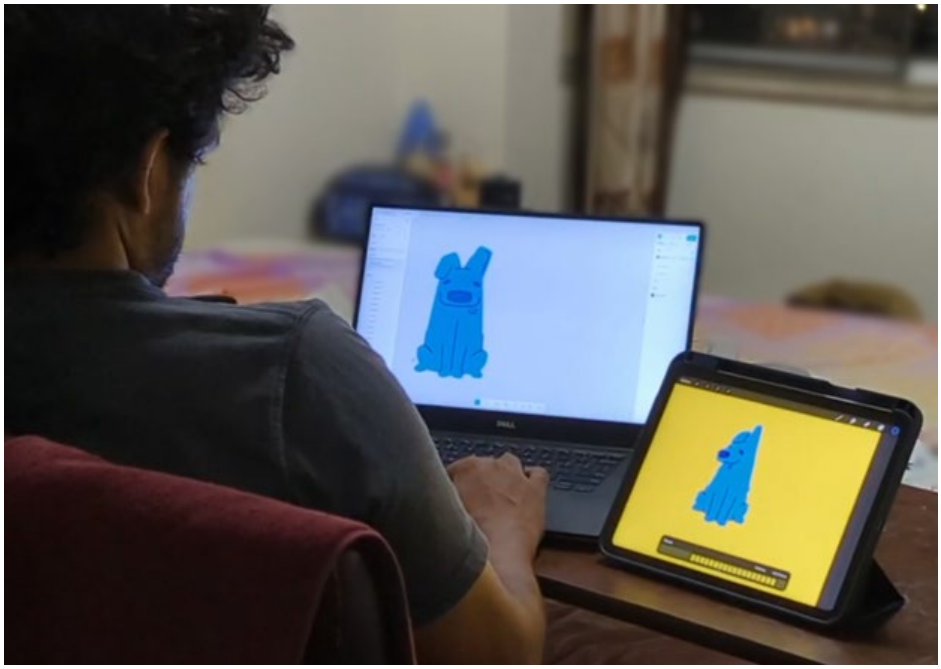

Figure 26 - A snippet from our pet design process

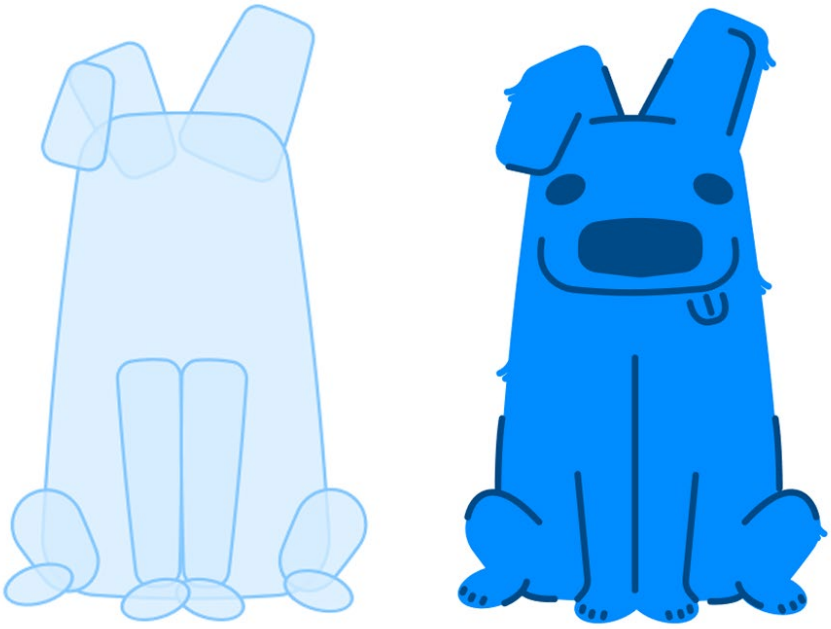

Figure 27 - Final pet design construction (left) and final pet design form (right)

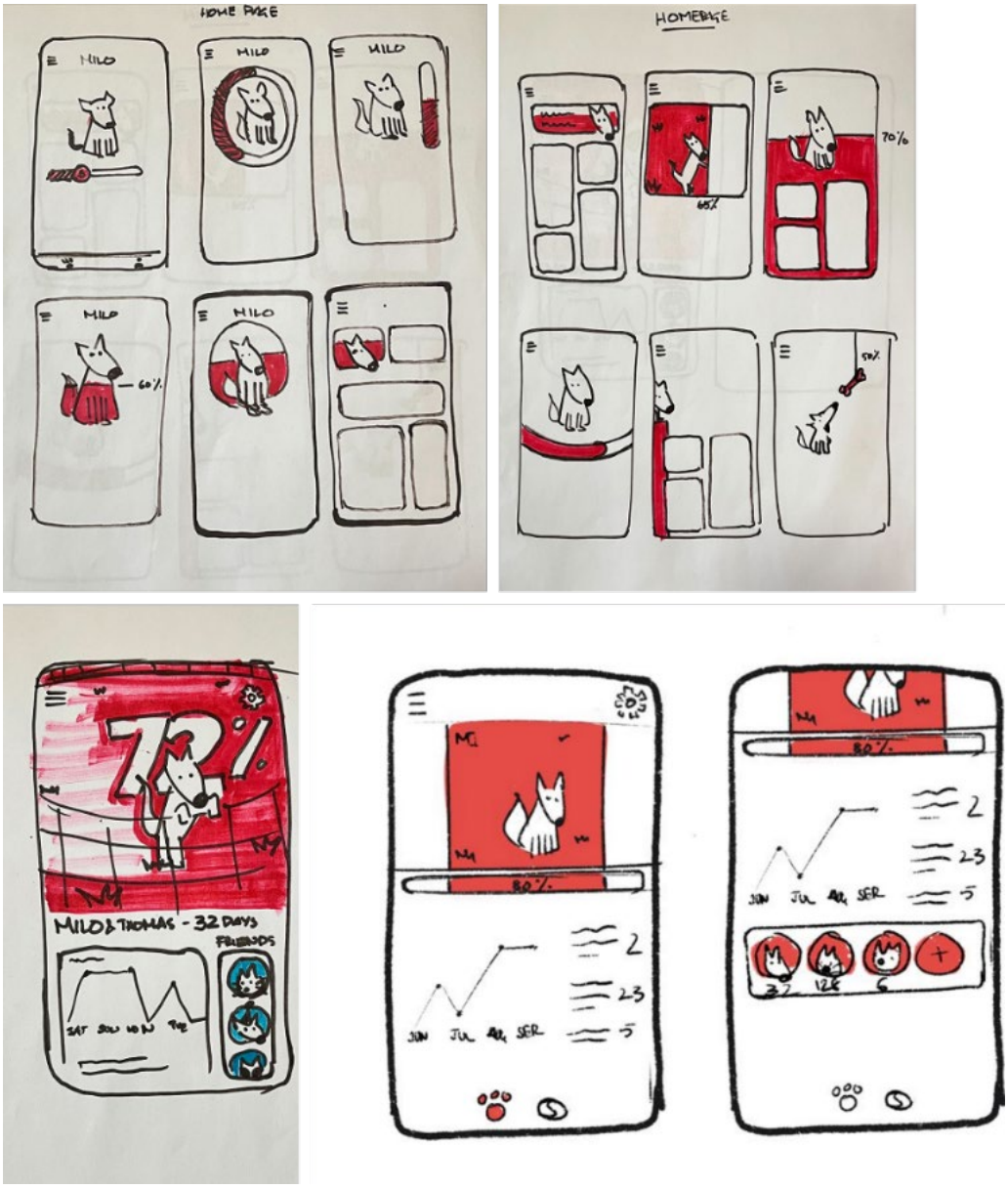

Figure 28 - Ideating on how the pet's environment changes according to user's play activity

Prototype

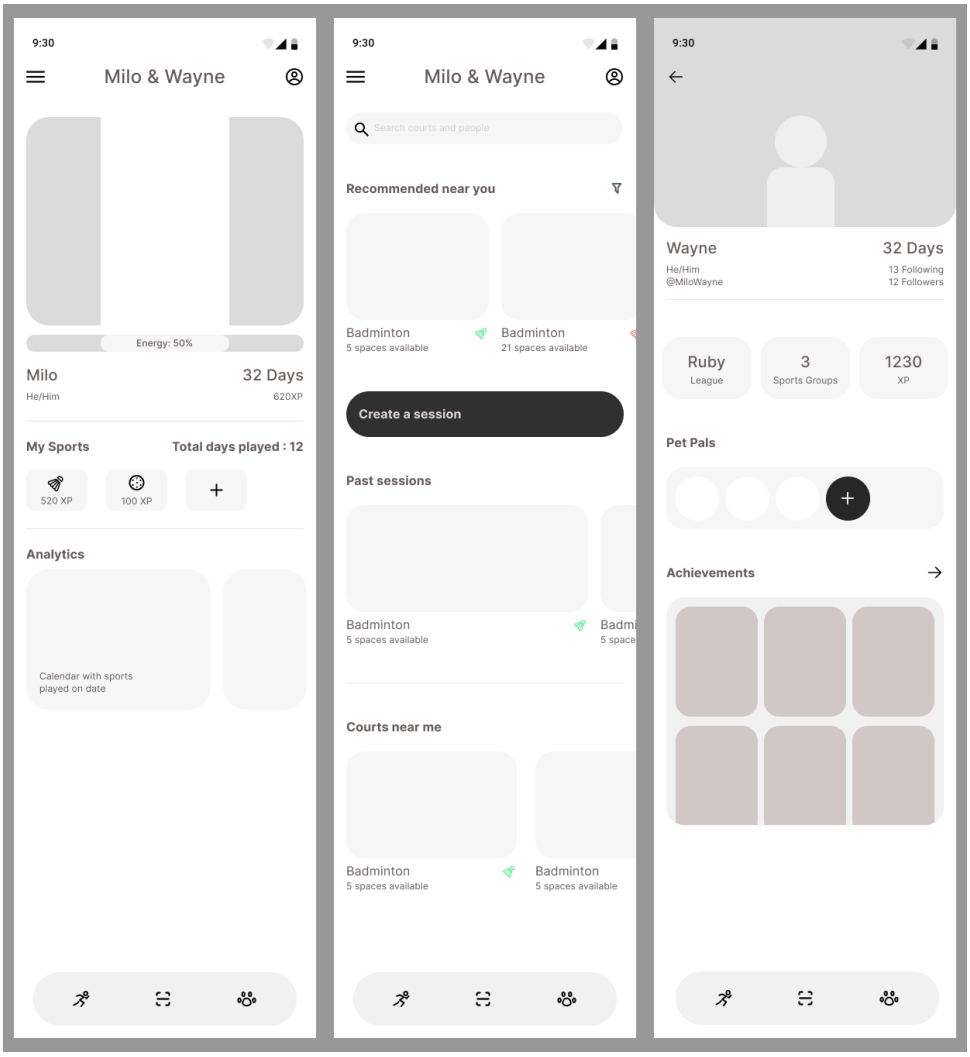

Figure 29 - Prototype 3 wireframes

The app design process involved creating wireframes (figure 29) to establish a clear and intuitive structure. We prioritized simplicity in hierarchy and navigation because it ensured that users could engage with key features effortlessly. The app is divided into two primary sections:

1. Left: The Play Section – Where users manage people and bookings.

2. Right: The Pet Section – Which responds to the user's sports activity in the play section.

To enhance usability, the play section features a Call-to-Action (CTA) button, prompting users to "Create a Session", allowing users to quickly plan their play session, select a court, invite friends, and save the session.

The pet section features a digital pet set against a dynamic background that expands, or contracts based on the user's sports participation. Inspired by classic cartoon humor, we designed an animation using Figma's prototyping tools (figure 30) where the pet playfully reacts to changes in space. When the user has been inactive, the background gradually shrinks, creating a lighthearted sense of urgency as the pet glances around, anticipating a playful squish. This animation is triggered upon app entry after periods of inactivity, adding an engaging and entertaining visual cue that subtly encourages users to stay active.

The pet includes collectible accessories (figure 31), unlocked through achievements, where rewards are revealed only after they are earned. This design sparks curiosity and keeps users engaged, motivating them to stay active and continue playing sports.

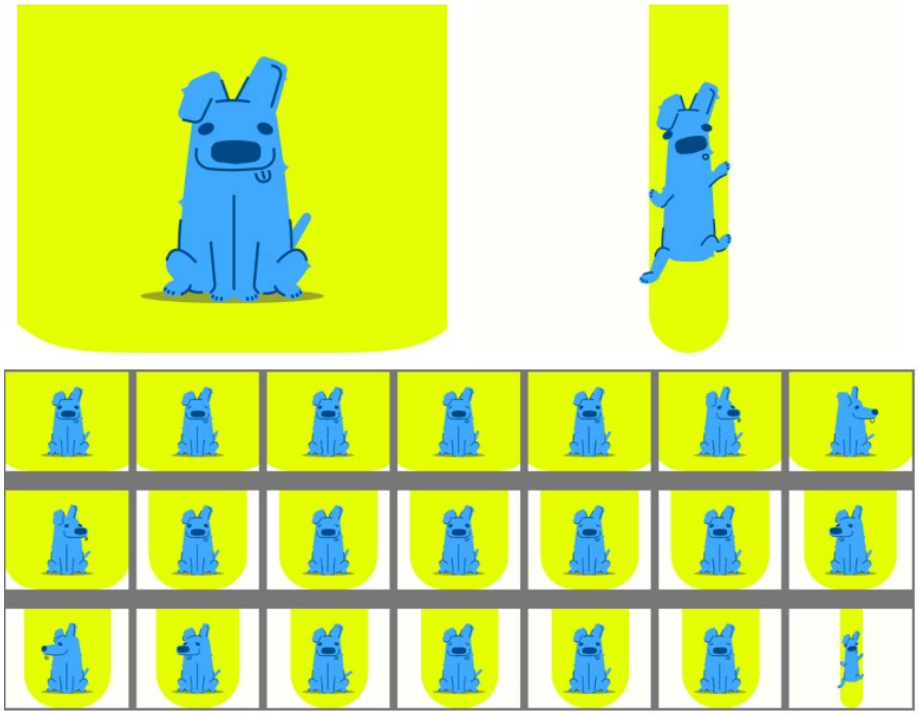

Figure 30 - Animation frames that depict the shrinking of the pet's environment due to user's low play activity

Figure 31 - Dog accessories (top left to bottom right): dog bone, tennis ball, paw-trophy, dog collar, sunglasses

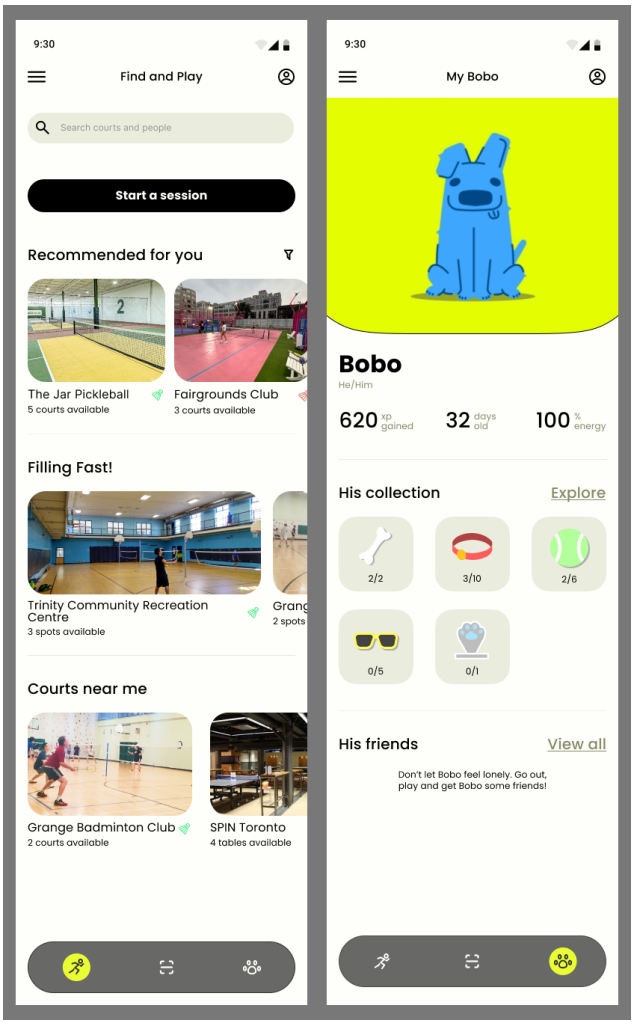

Figure 32 – Prototype 3 UI Design

The final UI design (figure 32) of the app is characterized by a bright yellow theme, emphasizing playfulness and energy, aligning with the pet's friendly and engaging aesthetic. A combination of soft and vibrant colors enhances approachability, ensuring a welcoming and motivating experience for users. A consistent design language is applied across all elements, from icons to navigation, maintaining intuitiveness and engagement. The progress numbers and rewards are strategically placed to encourage continued participation, reinforcing gamification.

Evaluation

User interviews were conducted to understand user behavior and preferences in sports participation. These interviews were not intended for testing Prototype 3 but served as an evaluation method by capturing insights into what drives long-term engagement. The findings from these interviews helped assess the relevance of the prototype's features and ultimately informed the direction of the final prototype, ensuring it aligned with user needs and motivations.

Our prototype primarily addressed autonomy and relatedness but lacked deeper engagement with competence-based motivation. While the digital pet system encouraged users to be active, it did not offer tangible ways to track skill progression, personal achievements, or long-term development which many users found more meaningful.

Recognizing this, we refocused our design strategy by leveraging SDT:

- Integrating goal-setting features that allow users to define their own milestones, whether related to consistency, skill mastery, or performance improvement.

- Implementing a logging system where users can track their progress over time, aligning with the need for self-improvement and competence.

This shift ensures that the platform is not just about participation frequency but about making each session meaningful and aligned with individual motivations.

User interviews

Semi-structured user interviews were conducted after Prototype 3. These insights were intended to inform the design of the prototype 4, ensuring it aligned with real-world motivational patterns.

Participants were selected based on pre-defined eligibility criteria: they had to be part of the Gen Z or millennial age groups (ages 19–43) and residing in the Greater Toronto Area. We categorized participants further based on their self-reported frequency of sports participation, ranging from casual to regular players. Recruitment followed a first-come, first-served approach to ensure timely scheduling within the project timeline. In total, seven participants were interviewed, representing a diversity of ages, genders, and sports involvement levels.

Notably, three of the seven participants were active table tennis players, a pattern that offered concentrated insights into the dynamics of community engagement, social motivation, and skill development within a specific sport context. As a result, the final prototype was situated more explicitly around the experiences and needs of recreational table tennis players.

Recruitment

Participants for the user interviews were recruited through a combination of in-person and online outreach to ensure a diverse pool of individuals engaged in recreational sports. Posters (see Appendix B) were displayed at sports clubs, community centers, public parks, and university campuses across Toronto, and were also circulated through digital channels such as Facebook groups and WhatsApp communities. Interested individuals accessed the study by scanning a QR code linked to an online eligibility form (see Appendix C).

Interviews

The interview phase involved three distinct activities. The first two activities generated qualitative data, while the third provided quantitative insights. This mixed-

methods approach offered a well-rounded understanding of participants' engagement with sports.

Activity 1 and 2

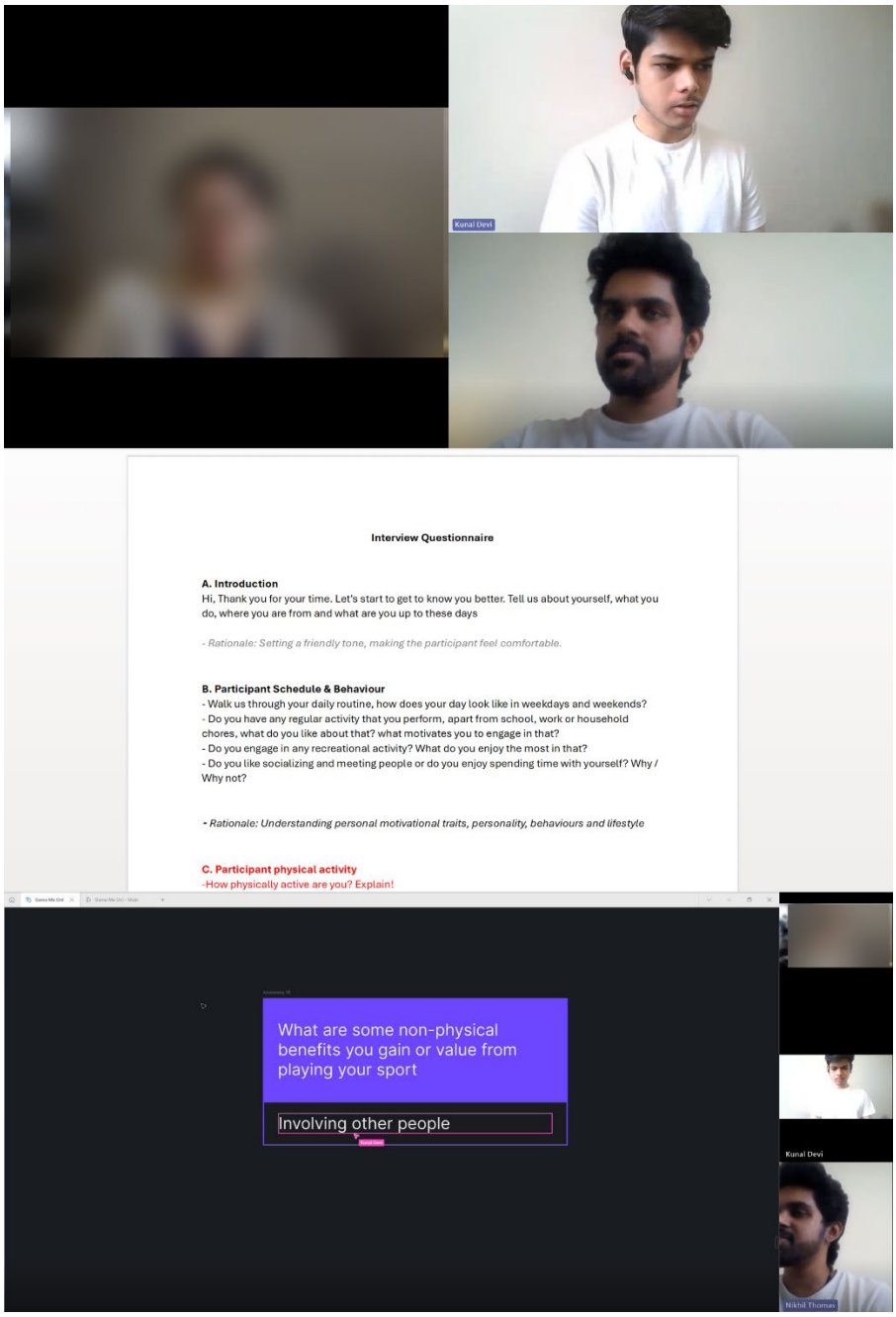

Figure 33 - User Interview screen capture for activity 1 and 2

The first activity was a semi-structured interview questionnaire designed to get to know the participant better and understand their involvement in sports (refer to Appendix D). This method enables the exploration of key themes while allowing participants to elaborate on their own perspectives. Also, the rich, descriptive data collected is well-suited for thematic analysis (Braun and Clarke), helping identify recurring patterns and meaningful themes.

The second activity was a thematic exploration of motivation of the participant aligned with Self-Determination Theory (SDT) to understand why individuals participate in sports and what sustains their engagement. Instead of an open-ended format, participants responded to a series of structured, yet adaptable prompts designed to assess their autonomy, competence, and relatedness in sports participation (refer to Appendix E).

Analysis

We employ Thematic Analysis, a structured four-step process: familiarizing with the data, generating initial codes, identifying and reviewing themes, and finally, defining and reporting these themes. A theme encapsulates a significant aspect of the dataset that aligns with the research question and emerges as a recurring pattern in participant responses. In our case, we focused on themes that would inform the design of a digital tool aimed at supporting long-term sports participation. The insights derived through this process directly shaped the final prototype of our study, ensuring our findings were both data-driven and aligned with our research objectives.

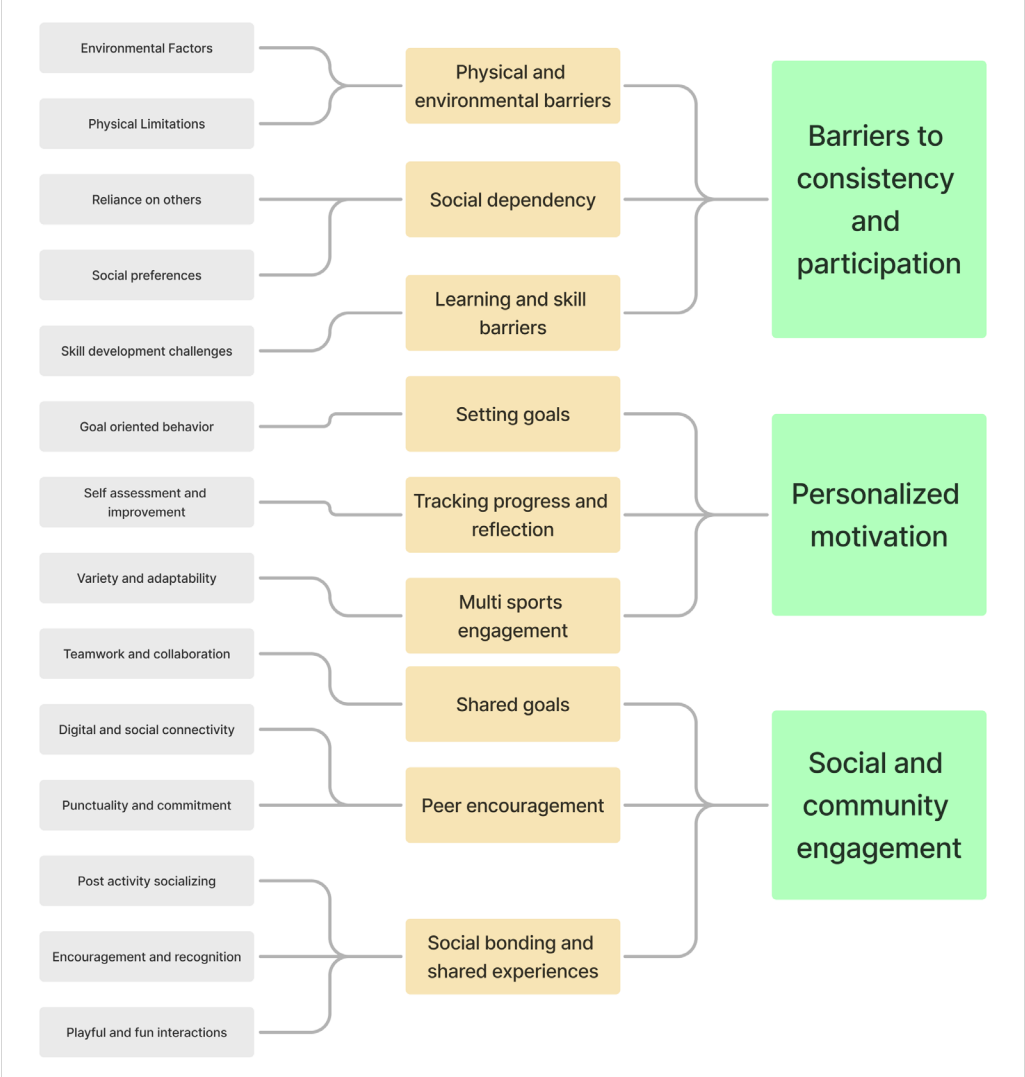

Figure 34 - Thematic analysis mind map

Final themes and sub-themes

The findings are structured into three primary themes: Barriers to Consistency, Personalized Motivation, and Social and Community Engagement. (For coding and examples, see Appendix F)

THEME 1: Barriers to Consistency and Participation

Participants cited a range of challenges that hinder sustained sports participation, including environmental factors (e.g., weather and access to facilities), physical limitations (fitness levels, injury concerns), and social dependency. For instance, one

participant noted, *"The gym is really all I have time to do now. It's not as fun, but it's what's manageable,"* reflecting how adulthood schedules and facility constraints shift sports participation toward convenience over enjoyment. Another shared, *"My friends are usually only free on weekends, so I stay indoors during the week,"* emphasizing reliance on social coordination.

THEME 2: Personalized Motivation

The interviews revealed that intrinsic motivation varies significantly across individuals. Participants set personal goals centered around skill improvement, fitness, or stress relief. As one participant expressed, *"I want to improve my forehand topspin, it's a small goal, but it keeps me going."* Another emphasized autonomy by saying, *"Doing new things is a mental exercise for me."* These insights confirmed the importance of designing goal-setting features that allow flexibility in defining success beyond rigid competitive outcomes.

THEME 3: Social and Community Engagement

Social relationships emerged as a powerful motivator for sustained participation. Many participants linked positive sports experiences to encouragement, peer recognition, and shared activities. One described, *"High-fives and going out for dinner afterward make it worth it,"* while another emphasized, *"I prefer competitive people who know it's still all for fun."* Digital platforms like WhatsApp groups were also repeatedly mentioned as vital spaces for maintaining social connections around sports: *"I frequently use WhatsApp groups, that's where everyone is organizing."*

Activity 3

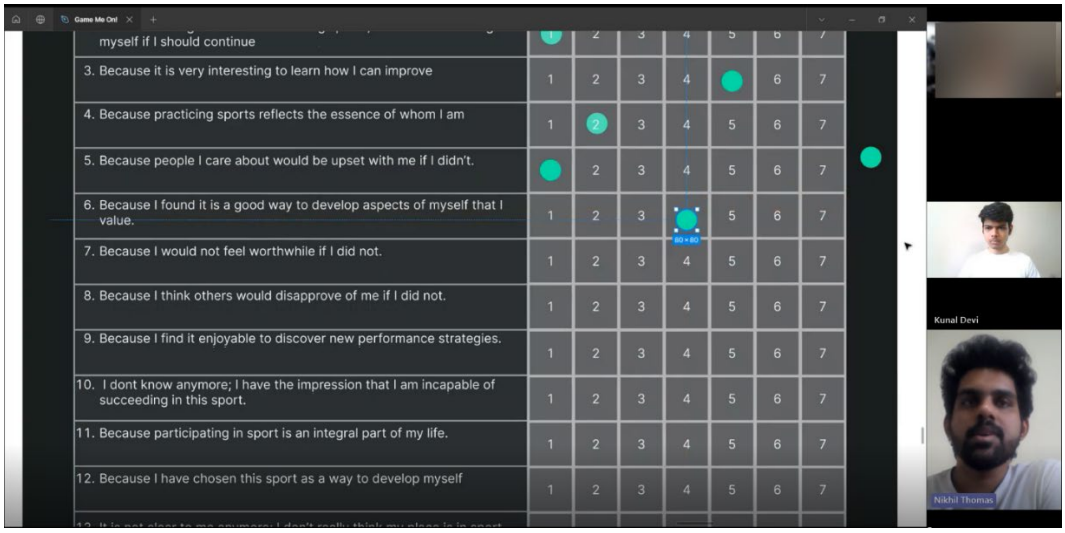

Figure 35 - User Interview screen capture for activity 3

Activity 3 utilized the Sports Motivation Scale-II (Pelletier, Rocchi and Vallerand) to measure different types of motivation for sports participation among the seven participants (P1–P7) (refer to Appendix G). Each participant responded to the question: 'Why do you practice your sport?' using 18 items (Q1–Q18), with their responses recorded on a Likert scale from 1 (least agreement) to 7 (highest agreement). The first table (table 1) presents the individual participant scores for each item, along with the mean (average) score and standard deviation (SD) for each item. The second table (table 2) consolidates these responses into six motivational categories: Intrinsic, Integrated, Identified, Introjected, External, and Amotivation, showing their respective mean and SD values across all participants.

The mean scores for individual items vary, with the highest being 6.3 (Q16: Because I feel better about myself when I do.) and 6.1 (Q6: Because I found it is a good way to develop aspects of myself that I value.), indicating strong agreement on those items. Conversely, Q8: Because I think others would disapprove of me if I did not, has the lowest mean score of 1.1, suggesting a general disagreement among participants. Standard deviation (SD) values indicate the degree of variability in responses, with Q8 having the lowest SD (0.4), meaning participants had similar responses, whereas Q16 had a higher SD (2.0), suggesting more variation in opinions.

	Q 1	Q 2	Q 3	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9	Q 10	Q 11	Q 12	Q 13	Q 14	Q 15	Q 16	Q 17	Q 18
P1	3	1	3	4	2	7	3	1	3	1	4	5	1	5	2	5	3	6
P2	3	1	7	7	2	7	2	1	5	2	2	5	3	5	6	7	7	4
P3	3	1	5	2	1	4	2	1	5	3	2	3	4	3	2	5	4	3
P4	5	1	5	5	1	7	2	1	6	2	4	7	1	6	5	7	6	7
P5	3	1	7	7	2	6	1	1	7	4	7	7	1	1	1	7	7	3
P6	5	6	7	3	4	6	1	2	6	4	7	6	1	3	2	6	6	5
P7	7	1	6	5	1	6	5	1	7	1	5	5	2	3	1	7	7	4
Mean	4.1	1.7	5.7	4.7	1.9	6.1	2.3	1.1	5.6	2.4	4.4	5.4	1.9	3.7	2.7	6.3	5.7	4.6
S.D.	1.6	1.9	1.5	1.9	1.1	1.1	1.4	0.4	1.4	1.3	2.1	1.4	1.2	1.7	2.0	1.0	1.6	1.5

Table 3 - Activity 3 Individual participant score

	Intrinsic	Integrated	Identified	Introjected	External	Amotivation
P1	3.00	4.33	6.00	3.67	1.67	1.00
P2	6.33	4.67	5.33	4.00	3.00	2.00
P3	4.67	2.33	3.33	3.33	1.33	2.67
P4	5.67	5.00	7.00	4.67	2.33	1.33
P5	7.00	5.00	5.33	3.67	1.33	2.00
P6	6.33	4.33	5.67	4.00	2.67	3.67
P7	6.67	4.33	5.00	6.33	1.00	1.33
Mean	5.67	4.29	5.38	4.24	1.90	2.00
S.D.	1.40	0.91	1.11	1.01	0.76	0.92

Table 4 - Activity 3 Type of motivation scores

Among the six motivational categories, Intrinsic Motivation (Mean = 5.67, SD = 1.40) and Identified Motivation (Mean = 5.38, SD = 1.11) scored the highest.

Intrinsic motivation refers to engaging in sports for personal enjoyment, satisfaction, and self-improvement. A high intrinsic motivation score suggests that individuals participate in sports because they genuinely enjoy it and find it fulfilling rather than due to external pressures.

Identified motivation reflects participation due to personal values and a sense of importance. A high score here indicates that participants view sports as essential to their lifestyle, identity, or self-development.

Conversely, External Regulation scored the lowest (Mean = 1.90, SD = 0.76), indicating that external rewards, such as social approval or pressure, are not major factors in their engagement. The Amotivation score (Mean = 2.00, SD = 0.92) is also low, meaning that participants do not experience a lack of motivation or detachment from sports.

In summary, Activity 3 findings suggest that participants are primarily self-driven in sports participation, valuing personal enjoyment and self-improvement over external rewards or obligations. The consistency in intrinsic and identified motivation scores reinforces the idea that sports participation is deeply connected to personal values and fulfillment rather than external incentives.

Comparing results between qualitative and quantitative analyses

The qualitative analysis from Activities 1 and 2 and the quantitative findings from Activity 3 (SMS-II analysis) revealed complementary insights into participants' motivations and barriers for sports participation. Overall, users demonstrated strong intrinsic motivation, emphasized goal setting and personal growth, and cited social engagement as an important but voluntary enhancer. However, logistical challenges remained significant barriers to consistent participation. The following table (table 3) summarizes the alignment and key interpretations across the datasets:

Themes	Qualitative Findings	Quantitative Findings	Interpretations
Motivation	Self-driven, goal-oriented, personal growth emphasized	High intrinsic and identified motivation scores	Strong alignment; users motivated by enjoyment and personal improvement.
Social Interaction	Social engagement, seen as important for sustaining participation	Low external regulation scores (social pressure minimal)	Alignment when social engagement is voluntary; users value connection, but not pressure.
Logistical Barriers	Barriers like access to spaces and partners disrupt participation	Low amotivation scores; motivation remains intact	Structural challenges pose as a barrier, but intrinsic motivation is high

Table 5 - Comparison between qualitative and quantitative findings

Implications for the digital platform

Synthesizing the findings, this research proposes a design hypothesis: a digital sports platform that prioritizes personalized motivation and social support will better sustain long-term recreational sports participation. Rather than treating these elements as isolated features, the hypothesis positions them as interconnected pillars essential to motivating consistent participation.

- Prioritizing personalized motivation: Since users are primarily self-driven, the platform must include goal-setting tools, progress tracking features and personalized challenges that align with intrinsic motivation.

- Enhancing but not relying on social engagement: While community-building is important, it should support engagement rather than drive it, ensuring that users can still engage independently when partners are unavailable.

Together, these pillars informed the objective and design of Prototype 4, which sought to integrate personalized goal setting, social accountability, and structured participation support into a cohesive digital experience aimed at making people play sports consistently.

Prototype 4: Implementing Goal Setting and Social Accountability

Objective

Prototype 4 aimed to transition from a fixed gamification model toward a flexible, community-driven system that could support sustained sports participation. Building on insights from earlier prototypes and user interviews, the app enabled users to define personalized sports-related goals, track their progress, and engage in shared goal setting with peers to foster social accountability. By introducing customizable milestones, collaborative tracking features, and peer encouragement mechanisms, this iteration sought to strengthen both user autonomy and relatedness, moving beyond short-term motivation toward long-term engagement supported by community dynamics.

App features

To implement the learnings from the previous prototype and from the literature review we tabulated a set of features that was necessary in setting the stage for this prototype. The features of this app were determined based on user needs, gamification principles, and engagement strategies. The following table categorizes the app's core features, illustrating their purpose and contribution to user experience.

Category	Feature Name	Description
User Onboarding	Trash Toss	An interactive onboarding task that familiarizes users with the app's core features through a quick, engaging activity.
	Sign-up	Standard registration process for account creation.
	Profile	Users provide basic personal information to tailor their experience.
	Sports Profile	Users define their preferred sports, skill level, and availability to enable personalized recommendations.
Goal Setting	Goals	Users set sports-related objectives to stay motivated.
	Choose Goals	Predefined goal templates for quick and easy selection.
	Make Your Own Goals	Allows users to create personalized sports goals based on their preferences.

	Post Goals to Feed	Users can share their goals publicly for community support and motivation.
Activity Logging	Log Activity	Users record their sports sessions and check off the goals they have committed to
	Location of Play	Users can document where they played, enabling personal play history tracking.
	Date of Play	Logs the date of each session to monitor participation trends.
	People Played With?	Users can tag friends or log solo play sessions, helping them reflect on their social sports habits.
	Type of Play	Users categorize their sessions into Fun, Mentoring, Practice, or Match, providing insight into their engagement style.
	Completed Goals	Users check off sports goals they achieved during the session, reinforcing motivation.
	Achieved Something Else	Allows users to note unplanned achievements, capturing moments of unexpected progress.
Achievements	Achievements	Recognition system for milestone achievements in sports participation.
	Post Achievements to Feed	Users can share their achievements with the community for inspiration.
Social & Community Features	Motivate Friends' Goals	Users can encourage their peers by engaging with their goal posts.
	Friends	Core social feature that allows users to build their sports network.
	Add Friends	Search and add sports partners based on common interests and activity levels.
	Profile of Friends	View a friend's sports activity, goals, and achievements.
	Tight Circle	A dedicated list for frequently played-with friends, reinforcing recurring engagement.

Table 6 - Prototype 4 app features

Information architecture

The information architecture of the app (figure 36) was designed to streamline navigation and enhance user engagement by structuring content around key user actions: onboarding, goal setting, logging play sessions, and social interaction. The

architecture follows a hierarchical model, ensuring that users can access primary functions with minimal friction while maintaining clarity in navigation.

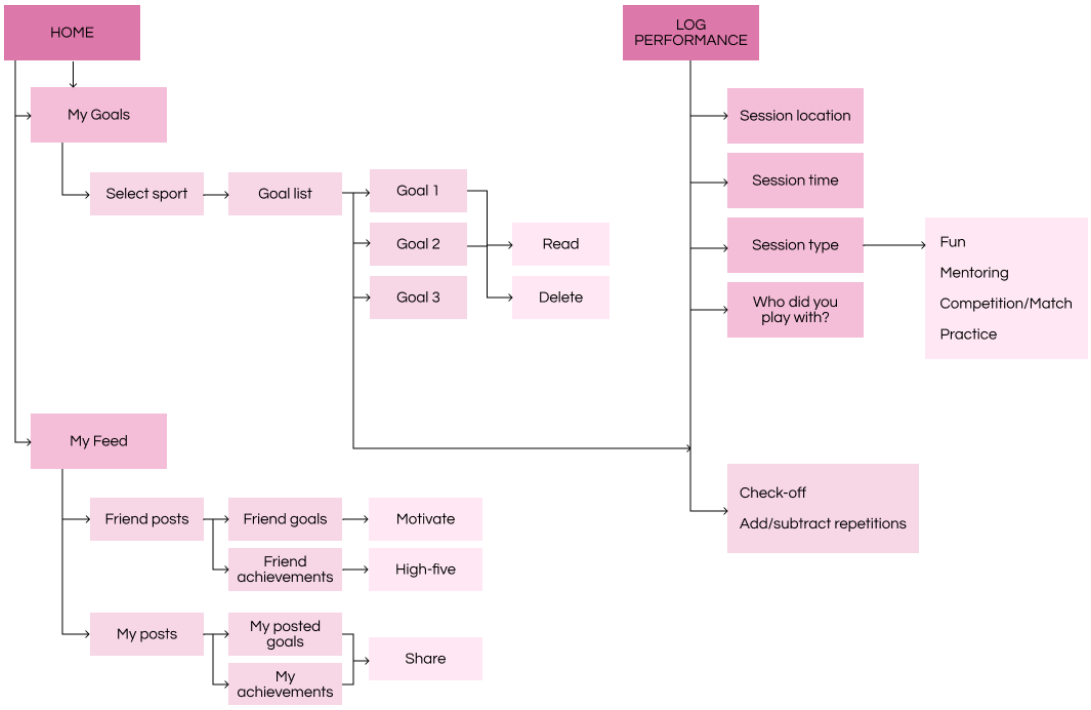

Figure 36 - Prototype 4 information architecture

Design language

Establishing a distinct design language was critical in shaping an experience that feels dynamic, engaging, and inclusive across different types of sports participants. The visual identity of the app takes inspiration from Neo POP (Cred) and Duolingo's playful gamification strategies (Duolingo Design), blending boldness with approachability. High-contrast elements, bold typography, and dynamic UI components enhance visibility and engagement, while rounded visuals, interactive feedback, and gamified elements create an environment that is engaging without being overwhelmed.

The five-color palette was carefully selected to evoke energy and motivation, while maintaining visual balance. A dark background ensures strong contrast, allowing vibrant hues to stand out, while monochromatic buttons provide clarity and accessibility. The interface integrates a combination of soft and vibrant colors to maintain approachability (figure 37), ensuring that users feel welcomed and motivated.

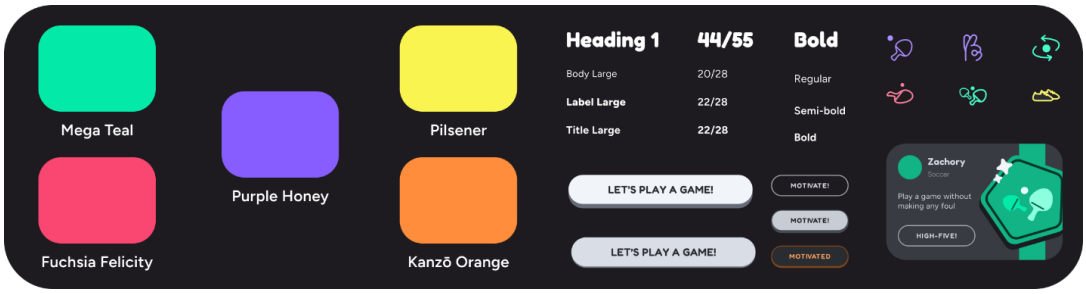

Figure 37 - Prototype 4 design language

Prototype

The prototype consists of four primary sections, each designed to facilitate familiarization, community engagement, and structured goal setting. Insights from Prototype 2 revealed that while digital pet interaction was intriguing individuals were interested in the activity and the experience of engaging in the sports. Research suggests that gamified onboarding has been shown to improve user retention (Heimburger, Buchweitz and Korn). This observation informed the design of the onboarding process, which aimed at physical participation by introducing an element of spontaneous play through gamified experience.

Onboarding

The onboarding experience introduced users to the app's core mechanics and experience the fun of physical play through "Trash Toss," a playful game using simple objects like a paper ball and a basket. Users were given one minute to throw as many times as they could, after which they logged their activity, capturing not just performance but also personal wins. Badges such as "So Close!" reinforced effort over perfection, emphasizing spontaneity, playfulness, and positive reinforcement. This onboarding framed goal setting and activity logging as accessible and rewarding, serving as a lighthearted entry point into the app's motivational ecosystem. The flow was initially developed through low-fidelity wireframes and later refined into high-fidelity designs consistent with the app's visual language.

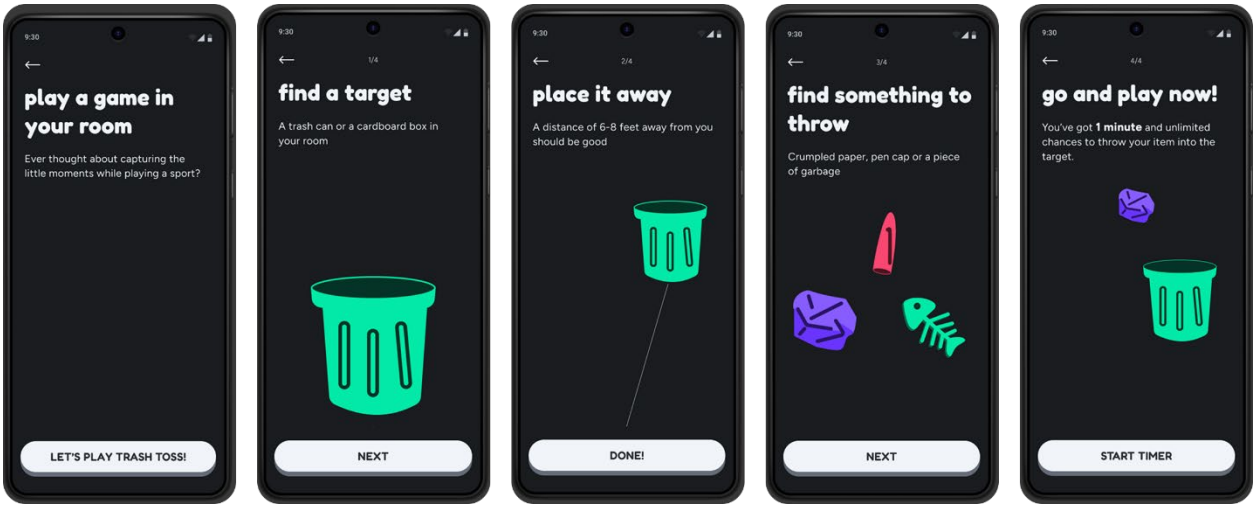

Figure 38 - Prototype 4 Onboarding collecting equipment and setting space to play Trash Toss

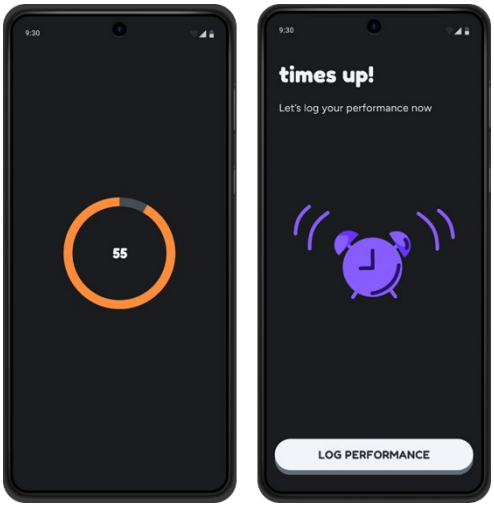

Figure 39 - Prototype 4 Onboarding 1 minute timer

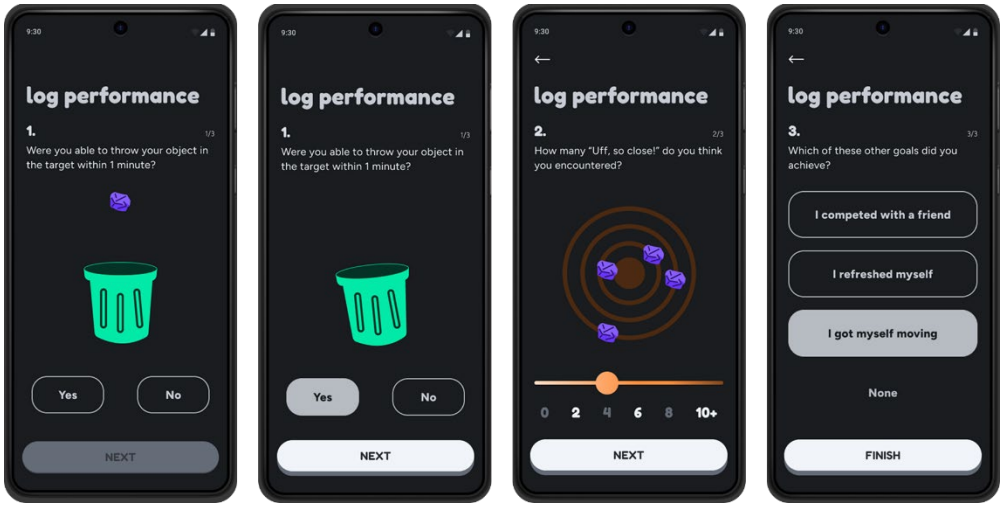

Figure 40 - Prototype 4 Onboarding logging Trash Toss

Figure 41 - Prototype 4 Onboarding achievements for Trash Toss

Homepage

The homepage acts as the central hub for user activity, balancing personal goal setting with community engagement to sustain motivation. Drawing from insights gained in Prototype 1, the design prominently features a social feed showcasing users' and friends' goals and achievements, complemented by interactive actions like “Motivate” and “High-Five” buttons. The top section prompts users to set personal goals, reinforcing individual autonomy, while the social feed fosters peer support and

accountability. This structure positions the homepage as both a motivational dashboard and a space for building ongoing community interaction.

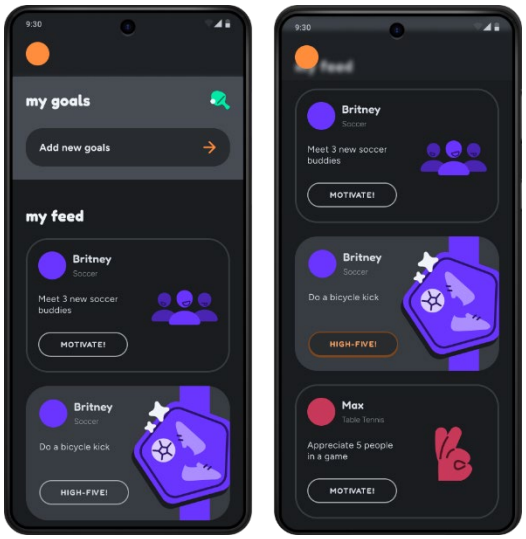

Figure 42 - Prototype 4 Homepage

Adding goals

Adding goals is a central user interaction, designed to align with Self-Determination Theory by granting users autonomy in defining their sports participation objectives. Based on Prototype 3 interview findings, which highlighted diverse motivational drivers from competition to social connection the app offers both predefined goal templates and the option to create custom goals. To promote focus, users can maintain up to three active goals at a time, encouraging manageable commitments. Goals can be shared publicly in the social feed or kept private, balancing the need for social accountability with respect for individual privacy.

Figure 43 - Prototype 4 Adding goals

Logging plays

The goal-logging process is structured to encourage consistent, intentional participation. The log button appears only when users have active goals, reinforcing purposeful tracking. Users are guided through a series of prompts such as location, date, play partners, and session type (Fun, Mentoring, Practice, or Competition) reflecting motivations identified in earlier user interviews. Upon logging, users can mark goals as achieved or select "I achieved something else," a feature designed to prevent discouragement and recognize alternative forms of progress, thereby sustaining engagement even when original goals are not fully met.

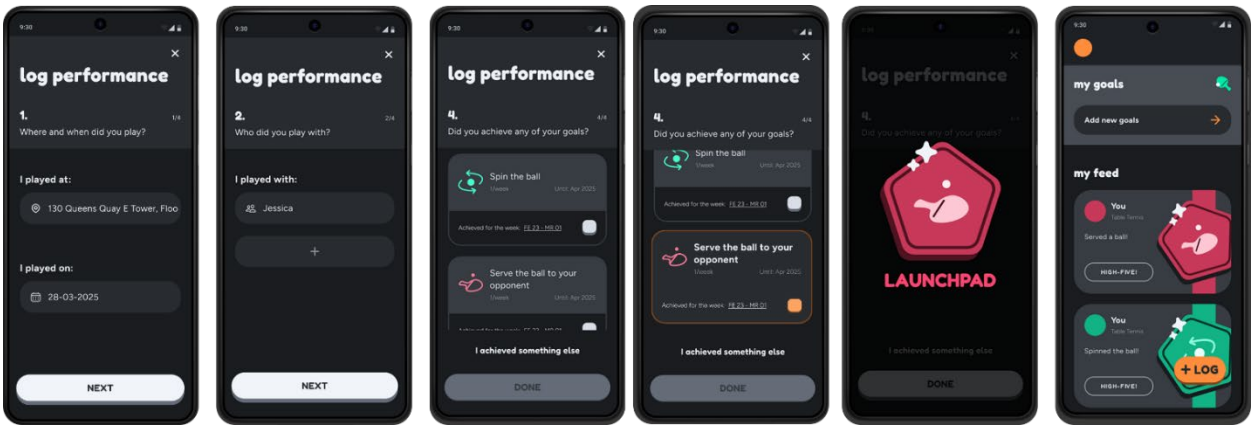

Figure 44 - Prototype 4 Logging session and receiving achievements

Usability Testing

Overview

The usability test involved three participants from Phase 2, who were table tennis players. Each session began with obtaining consent to record, followed by a brief introduction to the project and an acknowledgment of the participant's continued involvement. During the test, participants accessed the Figma prototype via a shared link and navigated through the interface while verbalizing their thought process. This think-aloud approach helped capture how users interpreted different elements and what they expected from the app. Observations were documented using notes and emojis to track engagement, ease of navigation, and any confusion experienced during interactions. Participants were asked direct questions such as whether text descriptions were clear or if buttons behaved as expected, ensuring that feedback remained focused on usability rather than personal preferences.

Results

One recurring theme across all participants was the balance between effort and reward. All participants expressed that while they appreciated features such as goal setting and logging, they felt that the input required did not always translate into meaningful output.

Participants provided feedback on both the interface design (UI) and the overall user experience (UX) of the prototype. On the UI level, users suggested incorporating more visible progress indicators such as calendar views, milestone tracking, and real-time feedback to better reinforce motivation and offer a clearer sense of achievement. On the UX level, several participants noted that the goal-logging process involved navigating through too many screens, which made the experience feel tedious rather than rewarding, potentially undermining sustained engagement.

Another significant finding was the contrast between the onboarding experience and the main app. Users responded positively to the interactive "Trash Toss" onboarding, appreciating its playful and spontaneous nature. However, they noted that this level of interactivity was missing from the core app experience, which felt more like

a task-driven system rather than an engaging, game-like environment. This suggests an opportunity to integrate more playful elements such as mini-challenges, social interactions, or interactive rewards into the main app to sustain engagement beyond onboarding. Participants also emphasized the importance of community, with many expressing that they would be more inclined to use the app if it helped them connect with players of similar skill levels, track friends' progress, or challenge others. While some features like the feed and friend profiles addressed this to some extent, users felt that these interactions needed to be more prominent and directly tied to their motivations for playing sports.

Onboarding

All participants responded positively to the interactive "Trash Toss" onboarding experience, enjoying its playful and engaging format. All participants actively engaged with the activity and appreciated receiving badges based on effort rather than performance. However, there was some uncertainty about how this onboarding experience related to the main app. When asked, all participants assumed that the app centered around playing small games with readily accessible materials, as they became highly engrossed in Trash Toss. This shift in focus away from the app's primary function of goal setting and logging reflected a similar pattern observed in Prototype 2, where users became more invested in secondary interactions rather than the core experience. These findings suggest that the onboarding experience should be redesigned to place greater emphasis on goal setting and logging, ensuring that it clearly introduces the app's main purpose and functionality.

Homepage

The homepage was well received for its focus on community and social engagement, but 2 participants noted areas for improvement in clarity and navigation. While they liked the idea of a social feed that displays friends' goals and achievements, they were also confused about how their own posts would appear to others. All participants did not immediately recognize that the names and goal cards on the feed belonged to their friends, suggesting a need for better visual cues or labels. Additionally, one participant expressed interest in seeing more personalized content, such as a calendar view for tracking their own progress and a clearer distinction between their

personal achievements and community interactions. The "Motivate" button was considered a useful feature, but users wanted more ways to interact with friends.

Adding goals

Two participants appreciated the flexibility of being able to set personalized goals or select from predefined templates, but opinions were mixed on the three-goal limit. One of the participants felt constrained by this restriction, suggesting that goals should be more dynamic, weekly-set or level-based rather than restricting them to a specific number. All found it unclear of the next step once a goal was committed. Additionally, one suggested incorporating video tutorials or guides to help them learn new sports techniques, aligning goal setting with skill development rather than just tracking participation. A recurring theme was the need for better integration between goal-setting and social engagement, with features like challenging friends or forming small accountability groups around shared goals.

Logging plays

The logging process was seen as both valuable and cumbersome. While every participant liked the ability to track their progress, all felt the process involved too many steps, making it feel like a chore rather than a seamless interaction. One participant noted that they would prefer fewer screens and a more streamlined logging experience while another participant suggested adding an automated or AI-assisted logging system to reduce manual input. All participants also wanted more motivational reinforcement after logging a session, such as receiving meaningful feedback or seeing data visualization of their progress. The "I achieved something else" option was well received, as it allowed users to log unexpected accomplishments without feeling restricted by predefined goals. One participant wanted an easier way to check off completed goals directly from the homepage, rather than having to navigate multiple screens.

Challenges and Next Steps

While Prototype 4 marked a significant shift toward integrating goal-setting and social accountability as mechanisms for sustained sports engagement, several challenges emerged that require deeper critical reflection.

Challenge or Observation	Description	Next Step
Minimal Social Accountability	While the app allowed users to "Motivate" friends and view their progress, these interactions remained largely superficial, without deeper structures such as accountability loops, check-ins, or peer challenges. Users lacked compelling incentives to return and actively re-engage with their peers.	Design features that facilitate meaningful engagement and shared stakes, such as co-owned goals, micro-group weekly challenges, or adaptive nudging based on mutual activity.
Self-Reporting Dependency	The prototype leaned heavily on self-reported inputs, such as goal logging and play session descriptions, introducing cognitive friction and recall bias. This reliance placed the burden of tracking on users, making spontaneous or informal participation harder to capture reliably.	Integrate passive or semi-automated tracking systems, such as calendar integrations, GPS-based check-ins, or ambient prompts, to streamline data collection and improve fidelity.
Autonomy and Community Fragmentation	Although the design offered personalized goal setting and a social feed, these experiences often felt lost. Users either focused on private goals or engaged superficially with peers but rarely experienced a fluid interplay between the two. The interface did not fully scaffold connections between self-directed motivation and collective participation.	Reconfigure the interface to support shared goal pathways and reflective prompts that highlight overlaps between individual and group efforts, such as surfacing friends with similar goals or collective participation trends.

Table 7 - Prototype 4 challenges and next steps

5. REFLECTIONS & LEARNINGS

5.1 Critical evaluation

This research adopted an exploratory approach to investigate strategies for sustaining recreational sports participation through digital design. While it generated valuable insights, several limitations emerged that must be acknowledged. The prototypes and testing primarily evaluated short-term engagement, emphasizing initial interactions rather than long-term behavioral consistency. As a result, without longitudinal data, the findings may reflect early enthusiasm more than sustained behavioral change. Future work must investigate whether initial enthusiasm translates into habit over time. Additionally, the researchers' positionality as international students new to Toronto influenced the project's framing, with a limited social network shaping the understanding of sports participation challenges. The study's geographical scope, confined to Toronto, further limits the broader applicability of its findings across different cities or rural contexts. Having flexible schedules allowed us to participate in sports activities with greater consistency compared to individuals balancing work, family, or other commitments, potentially biasing our perceptions of how accessible regular participation is for others. Familiarity with gamified platforms like Duolingo introduced a potential bias toward playful motivational strategies. All user interviews and usability testing were conducted online, which may have restricted observational depth and natural interpersonal interactions. Finally, prototypes were not tested during actual sports activities or within real sports environments, limiting the validity of the findings.

Despite these limitations, the project achieved positive outcomes. The prototypes successfully triggered real-world engagement, encouraging participants to engage in spontaneous physical activities, and demonstrating proof of concept for low-barrier motivational strategies. Playful interventions such as Trash Toss and the digital pet mechanism could lower barriers to participation. The research process maintained a structured and iterative methodology, moving from exploratory research into critical prototyping phases, consistent with best practices in UX and design research. Although sustained long-term engagement was not validated, the interventions scaffolded

immediate motivation and participation, offering a promising foundation for future studies aimed at supporting consistent recreational sports behaviors over time.

5.2 Learnings

1. **Motivation is personal and dynamic:**
   One person's reason to play might be skill-building; another's might be to connect socially or to relieve stress. And that motivation changes over time, the systems need to adapt to that fluidity.

2. **Community requires time and trust to build:**
   Just creating a group or platform doesn't make a community. People need to feel safe, seen, and supported before they consistently show up, building that kind of trust takes time, care, and shared experiences.

3. **Building on Self-Determination Theory will enable activation:**
   SDT helps us design for autonomy, competence, and relatedness, three pillars that support lasting, self-driven engagement. It's not about pushing users but supporting what already drives them.

4. **Gamification alone doesn't sustain consistency:**
   Digital characters and external rewards like badges trigger initial motivation, however, consistent behavior emerges only when users experience emotional resonance, perceive personal growth, social belonging and find value in their participation.

5. **Social motivation works only in the right context**:
   Users expressed that connecting with others who have similar skills and interests, and creating a safe space for interaction, would add value and trust. Engagement through shared goals and active profile interaction can enhance motivation

6. **Positive reinforcement encourages engagement:**
   Supportive feedback strengthens motivation. Participants appreciated that the digital pet only lost energy, not "died," showing how positive reinforcement sustains

engagement without guilt. Negative feedback, such as streak loss often backfire by increasing disengagement.

5.3 Reframing the problem space

At the outset of this project, the problem was framed as a lack of accessible tools to help individuals sustain consistent participation in recreational sports. It was also assumed that a singular gamification model for motivation would directly support users in maintaining regular engagement.

After critical reflections we redefine the problem space, not as a simple design challenge of "supporting consistency," but as an ongoing, adaptive process that requires a platform to flexibly accommodate personal and contextual fluctuations such as personal goal evolution, shifting social environments, seasonal and logistical barriers, and intrinsic motivation cycles. Sustainable engagement is about fulfilling SDT across changing circumstances.

Further, UI/UX design can play a critical role in supporting consistency in recreational sports participation by creating systems that prioritize above-mentioned flexibility. Incorporating features that encourage personal reflection and celebrate small milestones can help users maintain emotional connection to their progress, contributing a deeper sense of intrinsic motivation. Additionally, enabling low-friction community interactions such as easy event invitations, shared goal-setting, and informal social spaces can strengthen peer accountability without relying on competitive pressure. However, it is important to recognize the limits of digital interventions: while UX can scaffold motivation and reduce friction, it cannot fully overcome real-world barriers such as time constraints, facility access, or broader lifestyle changes. Therefore, successful platforms must complement, rather than attempt to replace, the complex realities of users' sporting lives.

6. CONCLUSION

This thesis examined the challenges of sustaining engagement in recreational sports and explored digital interventions that could address barriers to participation as a design prompt. Through an iterative design process, findings revealed that while logistical constraints such as access to courts and equipment play a role, the primary deterrents to consistent participation stem from motivation gaps, social inconsistencies, and lack of structured engagement. The initial prototype focused on community-building efforts, but inconsistent attendance highlighted that external facilitation alone was insufficient. Introducing gamified elements through digital pets increased engagement, but user interviews indicated that motivation is highly personal, requiring a system that adapts to individual goals rather than enforcing a singular model. The final iteration emphasized personalized goal setting, social accountability, and activity tracking, demonstrating that users seek more than one reason to participate; they want progress, recognition, and meaningful interactions that align with their personal motivations.

6.1 Directions for future work

Building on the insights from this research, several key directions emerge for future exploration. First, expanding the motivational framework by embedding gamified characters within the structure of Self-Determination Theory could deepen user engagement, ensuring that autonomy, competence, and relatedness are consistently supported through playful, personalized interactions. Second, introducing a narrative-driven layer, where users unlock evolving storylines or character development tied to their sports participation could strengthen emotional connections and sustain long-term motivation beyond goal achievement alone. Smarter social matchmaking mechanisms also present an important opportunity enabling users to find compatible play partners based on shared goals, skill levels, and motivational styles could enhance community engagement while respecting personal autonomy. Finally, longitudinal study is critical to validate the real-world impact of these interventions over time, moving beyond initial engagement to understand how digital tools can meaningfully sustain sports participation across weeks, months, and seasons. Together, these directions aim

not just to refine features, but to fundamentally enhance the capacity of digital platforms to support dynamic, evolving, and personal meaningful sports participation. However, feature stacking may also lead to cognitive overload or dilute the clarity of the user experience. Designers must carefully balance utility with simplicity to avoid unintended disengagement or confusion.

Figure 45 - Collection of memories showcasing people including us who engaged in sports over the course of this thesis

As digital systems increasingly shape how we connect, schedule, and move through daily life, the spontaneity and shared rhythms of recreational sports are becoming more difficult to sustain. However, these moments of unscripted, collaborative physical activity remain essential to social connection and personal well-being. This research explores when digital tools are designed to support motivation, autonomy, and social engagement, they may reduce friction and make it easier for people to play recreational sports. By enabling users to set personal goals, maintain accountability, and engage with others through shared progress, design can help transform participation into a sustainable practice. Rather than relying on obligation, this approach aligns with how people actually want to play, move, and stay connected.

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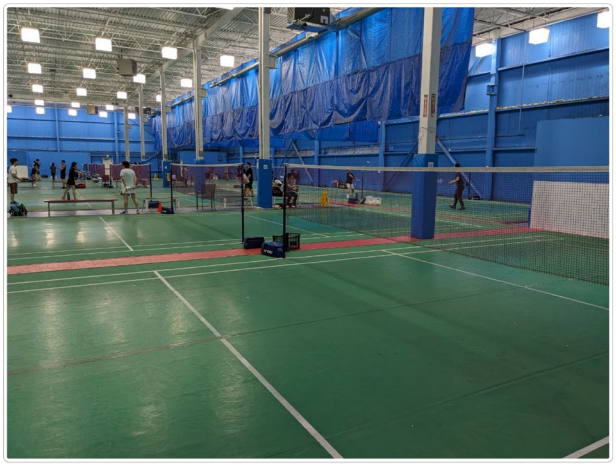
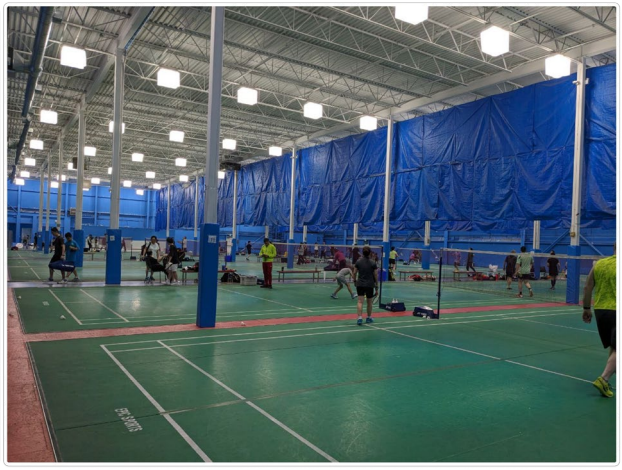
8. APPENDICES

APPENDIX A: Diary study – journey mapping and observations

Entry 1 – Let's play: Badminton

Day: Saturday, 2024
Duration: 1 hour
Participants: 2
Equipment: pre-owned





	ACTIONS	TOUCHPOINTS	THOUGHTS
PRE-BOOKING	Deciding to spend the weekend differently. Asking friends about potential leads and/or	Word of mouth (people) Internet Badminton community Courts	"I should start with something that I am familiar with" "Oh, also, who do I play with?"

	collaborations Searching online to find courts to play Shortlisting and choosing a final one	Maps and navigation	"I will have to make a priority list of all the places and then choose one from it" "Do I have to call every place to enquire about how do I book and how much they charge?" "Can't I just go there directly whenever I want to?"
BOOKING	Went on the website to book the court Signed up to the website Filled in personal details Paid for the hourly rate Signed out Marked the calendar	Online website Credit card Personal calendar	"This seems pretty straightforward!" "I wonder if they will charge me if I cancel or change my booking"
POST-BOOKING	Asked younger brother if he was interested in playing together Packed necessary things - water, cap and shoes Took the badminton racket Looked at navigation to determine the mode of transport	Water bottle Cap Shoes Rackets Map navigation	"Finally, a weekend that would be spent doing something different" "I might try to book a different sport again the next time"
TRAVELLING	Chose subway as a suitable mode of transport	Public transport	"This journey is so long... Why can't the court come to me ha-ha?"
ARRIVAL	Went to the reception to ask for the court number to play Kept personal belongings in a	Reception Badminton court	"Wow! There are a lot of people who have already discovered a different way to spend their weekend" "This is definitely a right decision!"

	corner near the court Looked around to see the number of people playing and got pumped up		"I hope my bag is safe in this corner"
PLAYING	Played a few matches for an hour with short breaks in between Played for an extra 15 minutes as no one seemed to have a booking in the next slot Grabbed a few shuttle cocks lying on the floor and got ready to go home	Time	"Playing after such a long time is really exhausting" "Does my break time count towards the one hour I have booked the court for?" I don't think anyone is playing after me. I might as well play for a little more time!" "Oooo... There are some free shuttle cocks lying around. No one is using them so..."
POST-PLAYING	Went home through the same route and mode of transport Planned to come back again	Public transport	"I have to go home and sleep now!" "Such a good way to spend my weekend!" "I hope I come back again"

Table 8 - Diary Study: Badminton journey mapping

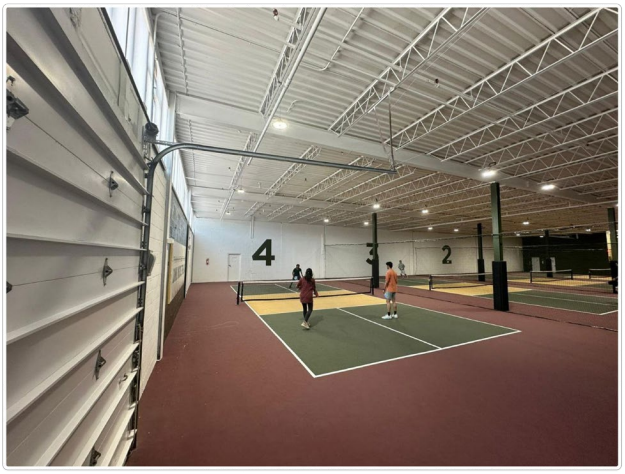
Observations:

- Most facilities required memberships to be purchased
- Most individuals playing were Asians
- There were ongoing coaching sessions
- The equipment rental was high quality
- No communication happened with other players
- Restrooms were available
- The facility was busy with almost all courts booked
- Lights were obstructing while playing at times
- They had 12 courts
- We were assigned a specific court that was meant for bookings

- Most players were young

Entry 2 – Let's play: Pickleball

Day: Friday, 2024
Duration: 2 hours
Participants: 4
Equipment: rented



	ACTIONS	TOUCHPOINTS	THOUGHTS
PRE-BOOKING	Wants new and entertaining experience, moving away from usual drinking nights Picked a trending sport Searched on google(phone)to find the nearest courts to play. Browsed through websites and made few calls to confirm what they offered	Smartphone Online browsing Phone calls	"I'm done with drinking, want some unique and entertaining." "Pickleball' has been trending these days maybe we could plan a day to play that game" "Wow, im glad i could find 3 people from my class to join me, glad they are interested." "I need to find a nearby courts, hope it's not expensive"

BOOKING	Discovered CatchCorner website Shortlisted a few based-on price and distance Logged in to make the booking Confirmed if renting equipment is available Confirmed the date with friends Secured a date for the next day	Booking website Browsing availability Confirmation calls Online booking - Online payment	"I better check their reviews and rating on google maps." "Do I need to call everyone and ask how much they charge and what are their timings?" "This CatchCorner website seems interesting, by why is it so confusing." "Glad I could book this online, not sure if they provide rackets though, they definitely should."
POST-BOOKING	Marked the calendar Planned with friends to meet the next day	Calendar Planning	"I hope no one gets back from the plan; else I must find someone else. Either way I'm excited "
TRAVELLING	Packed water bottle, a cap and shades Left early as it was a long journey Met my friends at a common subway station Spent an hour travelling by subway and bus with friends	Public Packing Being punctual - Time Navigation Public transport	"Need to find a common subway station to travel together." "Okay I'm bored, I should have got some book or something to read" "This is far, it better be worth it"
ARRIVAL	Arrived at the venue and chose a court to play Rented equipment and watched 'how to play' videos.	Navigation Indoor Courts Rackets and balls	"It wasn't that easy to find the location." "Wow they have 4 big courts, fun!" "Oh, the equipment and charged extra, that's slightly expensive."
PLAYING	Getting used to the rules as it was the first time playing the sport Changed sides and	Online tutorials Practice matches	"Glad they have a bench to keep our bags and rest when we want to"

	swapped teammates Took a break between the 2-hour slot, and went back at it again	Explaining rules	"Need to check how to play the game now" "Hope I don't waste a lot of time understanding the game" "This game is amazing, I think I'll shift the sides just for fun"
POST-PLAYING	Gave back and paid for the rented rackets and the ball Watched others play for a while Took a break before heading for the long journey back	Rest area	"Phew, that was a good game" "I better rest for a while before heading back" "I wonder how others are playing, wow they look professional" "Would be fun to play with them someday."

Table 9 - Diary Study: Pickleball journey mapping

Observations:

- Most facilities required memberships to be purchased
- CatchCorner is a third-party application to book courts
- The upfront price on CatchCorner was higher than the original website
- They charged extra for renting equipment
- They had 4 courts
- They had a form for the first time visitors to fill in
- They had a resting area
- They had a café
- They had free balls
- Courts were separated by nets
- We were allowed to play on any court as it was empty at first
- They provided coaching sessions as well
- Mixed age groups

Entry 3 – Let's play: Squash

Day: Sunday, 2024

Duration: 2 hours

Participants: 2

Equipment: free rental

	ACTIONS	TOUCHPOINTS	THOUGHTS
PRE-BOOKING	Browsed through a catalog of multiple sports to choose one Searched online for nearby courts Called a public community park to book a court following the booking method as stated on their website	Smartphone Online list of sports Public community center	"How does someone choose a good sport that suits my needs from this enormous variety?" "Woah! I just have to make a call to book a court - that's easy. But I wonder if they'd pick up my call"
BOOKING	Called the community center for timing enquiry The community center mentioned the available dates and time slots One suitable slot was chosen (the community center made a mistake	Phone call Front desk, virtual Booking register Timetable	"Wow someone picked up my call instantly. That's positive" "Can I book a court for immediate today or do I have to make an advanced booking?" "Why do they need the

	by recording the wrong time slot and not clarifying)		name of the person whom I am playing with?"
POST-BOOKING	Decided to not call the community center again to clarify the confusion due to awkwardness	-	(After call) "I think they messed up my booking. I heard a Saturday, although I booked it for today. " "Should I call them again to clarify? ... No, I guess I will just show up today at the court and let's go on from there"
TRAVELLING	Decided to opt for public bikes as a mode of transport as the location was nearer Geared up to protect from the scorching sun	Bikes Weather	"Thank god its close by, I just need to take public bikes, no buses or street cars, phew." "Even if it's sunny, it's not raining at least, that would have cancelled the plan." "It is sometimes difficult to follow map directions while on a bike"
ARRIVAL	Went to the front desk and clarified the booking was for today and not for any other date The front desk had to cancel the mistakenly booked court in our name and transfer it to now Requested for equipment, court number and directions to reach to the court	Front desk, physical Rackets Balls Court Navigation map	"What if we don't get a chance to play, I seriously think they did book for another day." "The front desk has a staff to talk to." "Phew, no one else had booked for today, else we had to go back as it was booked for the next day." "The rackets and the ball are free! I'm excited now!"
PLAYING	Placed our bags in the back corner of our courts. Practiced a few shots Watched a few videos on how to play the game Familiarized with the	Online tutorials	"There are doors on my left and right, which one is it?" "Wow this court is big, but wait there's no ventilation, we are definitely going to sweat real good."

	rules, the court and the game Moved our bags to the front of the court as it was obstructing our game play		"Where do i put my bag, I can't keep it outside the court, I suppose i have no choice." "How do I even serve? What are the rules?"
POST-PLAYING	Sat near a fan outside to cool down as the court was stuffy Searched for a charger as one of our phones were dying and needed it to reach back home Found one at a nearby restaurant Enjoyed drinks and snacks to replenish our energy after an intense game.	Low battery Charging port Energy drain Snacks and drinks Rest area	"Damn! How do I get home now? I need my phone to unlock a public bike" PANIC PANIC PANIC "I feel slightly dizzy after the game, more panic? I need some energy"

Table 10 - Diary Study: Squash journey mapping

Observations:

- They provided free equipment rental
- They had other sports at the same facility
- The squash court had poor ventilation which led to excessive sweating
- The booking process was seamless, yet with a small bump
- Cheaper price as it was a public court
- No charging point
- There was hazardous substance storage right next to the squash court
- There wasn't proper storage for personal belongings
- No interaction with other quash players, as it was blocked on all sides
- We didn't meet any other squash players, we might have been the only ones

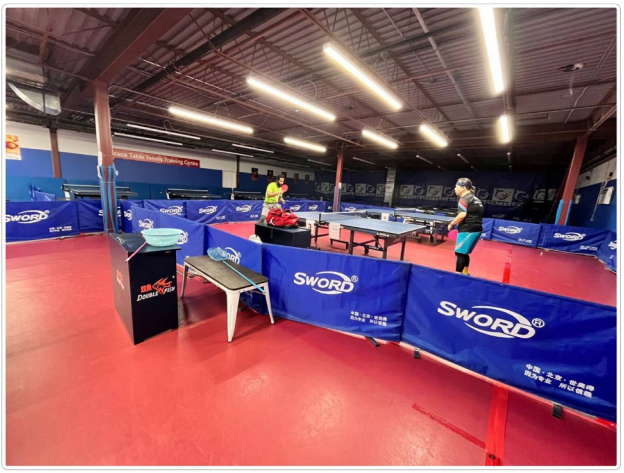
Entry 4 – I wanna play: Table tennis

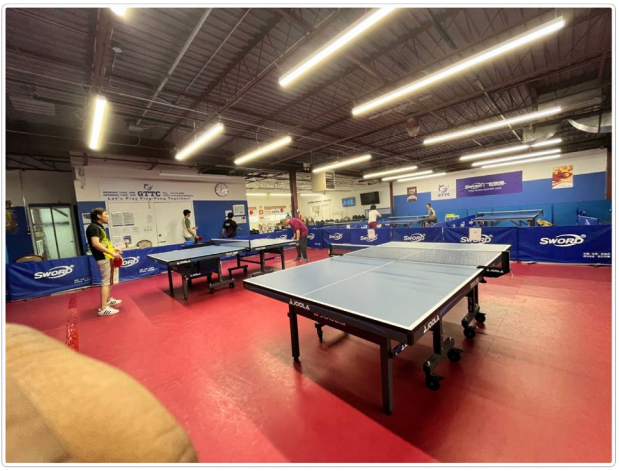
Day: Wednesday, 2024

Duration: 2 hours

Participants: 2

Equipment: owned + rented





	ACTIONS	TOUCHPOINTS	THOUGHTS
PRE-BOOKING	Did not give up in searching for a table for almost 6 months Called a suitable lead to confirm about pricing and equipment rental Checked their reviews and rating online before committing Checked the distance, but didn't care. Convinced my roommate to join.	University settlement Online search Table tennis communities	"I am going to find a court and book one for sure" "They are slightly far but I want to play!" "Thankfully they are affordable, reviews are not bad either, that's a win-win" 'I hope my roommate says yes"
BOOKING	Reserved a timeslot online and chose to pay	Online booking system	"Good they have an option to pay in person"

	on arrival.		
POST-BOOKING	-	-	"Finally booked! This feels so satisfying. I can't wait to play now"
TRAVELLING	Opted for public transport as it was too far.	Public transport	"I am really excited now. I think I might need to practice a bit before I play since I haven't played for a long time"
ARRIVAL	Searched for the entrance as it was confusing Almost gave up on entering the facility as we thought it was shut. Confirmed with the person coincidently entering the facility at the same time as he showed us the way. Confirmed with the manager and paid for the booking Had to borrow equipment from other players	Entrance gate	"Please be open, please!" "Thank god we saw someone going in, we would have gone back otherwise" "I'm having a hard time communicating with the manager as he is not comfortable conversing in English" "They said they provide equipment on call, now I have to ask others"
PLAYING	Started playing on a table of our choice Asked other players if we could join them	Fellow players Equipment	"It is really awkward to ask other players here to play together. Most of them seem shy." "I would like to learn few techniques from that guy. Should I ask or would I disturb him during his practice?"
POST-PLAYING	Watched others play Returned the borrowed equipment Remained confused	-	"This was extremely satisfying! It is too far from my place though. Let's see if I can come here again." "Everyone here is really dedicated in the sport. I

	about whether to visit again		would love to be a part of this community!"

Table 11 - Diary Study: Table tennis journey mapping

Observations:

- Difficult to communicate with manager and the players as they were not comfortable in English
- Approximately 15 courts. Only 4 of them were being used
- Most people playing were above 40 years old
- All of them were Asians
- Common balls to play facilitate interaction between players

APPENDIX B: Recruitment Poster

APPENDIX C: Recruitment questionnaire form

Phase 1: Welcome to the Screening party!

*Cue the beats (*Hit the  button up top to vibe while filling this out!)

Hey there, sport! These questions are designed to match you with our study and keep things diverse and inclusive. Don't sweat it, no judging here, and absolutely no body shaming. Just be real with yourself and have fun while answering.

About Study: We're cooking up some cool ways to use design and tech to make playing sports fun and consistent for Gen Z and millennials in Canada (aged 19-43). Whether you're a sports pro or just someone who loves binge-watching Netflix, we want your voice in the mix!

What is involved:
Phase 1: Fill out this quick form to help us know if you're eligible.
Phase 2: Hang with us for a fun 30-minute chat. (online or in person)
Phase 3: You get to try our brand-new unreleased version of a mobile app! Fiddle with it for some time, maybe a full hour if you enjoy it.

Oh, and did we mention *free gift cards*? You'll get one each for Phase 2 and Phase 3!

Your data: a) Participants can no longer withdraw their data after the completion of Phase 2 (data collection) and after the end of Phase 3 (user testing). Participants can request the removal of their data by contacting the research team via email, phone, or in person before these deadlines. There are no consequences for withdrawing data; participants will retain all incentives (for the participated phase). If participants request to withdraw, all their data will be permanently deleted. Data, if not withdrawn, will be anonymized and be used to inform the app design process conducted in this research.

Got questions? Slide into our DMs (aka email):

Kunal: kunaldevi@ocadu.ca | Nikhil: thomasnikhil@ocadu.ca

Recruitment questions:

1. Which age group do you belong to? *
2. Where do you reside? *
3. Do you play any sports? If yes how often? *
4. Why tho? What's stopping you? Do you wish to play more? *
5. What should we call you? *
6. What pronouns do you roll with? *
7. Where can we text you or drop an email? If we vibe, we'll be getting back to you! *
8. What's your motivation to take part in this study? *

APPENDIX D: Semi-structured interview questionnaire

A. Introduction

Hi, Thank you for your time. Let's start to get to know you better. Tell us about yourself, what you do, where you are from and what you are up to these days

- Rationale: Setting a friendly tone, making the participant feel comfortable.

B. Participant schedule & behavior

- Walk through your daily routine, how does your day look like on weekdays and weekends?
- Do you have any regular activity that you perform, apart from school, work or household chores, what do you like about that? What motivates you to engage in that?
- Do you engage in any recreational activity? What do you enjoy about that?
- Do you like socializing and meeting people or do you enjoy spending time with yourself? Why / Why not?

- Rationale: Understanding personal motivational traits, personality, behaviors and lifestyle

C. Participant's sports involvement & psychology

-When was the last time you played any sport? What was the highlight of that session?
- What do you like about sports? What emotions do you experience while playing?
- How often do you play sports? What makes you go back and play more?
-Do you enjoy playing multiple sports or do you like sticking to one? Why?
- Do you like to reflect on your performance after a session? What do you usually think about?

- Rationale: Understand users' participation and outlook on sports

D. **Participant's current sports participatio**n

- Do you plan a session beforehand or is it an impromptu plan with new people? Take us through the process
- (depending on the answer) do you have your own equipment/borrow? Do you play with the same people / different, how? Do you book courts, or do you play at drop in and start to play?
- Are you part of any team/ community of the sports you play? How do you connect?

- Rationale: Understand the current scenario of the logistics of participation

APPENDIX E: Thematic motivation-based questions

AUTONOMY RELATED

- What are some of the personal goals you set for each sports session?
- What are some non-physical benefits you gain or value from playing your sport
- What are some of the best moments that you remember made you happy?
- What kind of feedback or reflections help you feel like you're getting better?

COMPETENCE RELATED

- What kind of milestones or achievements would you like to celebrate in your sport?
- What are some of the best skills you are proud of in this sport?
- What are some of the skills that you would like to develop in this sport?
- What's a recent win or achievement you've had in your sport, no matter how small?

RELATEDNESS RELATED

- What are some factors that you use to compare yourself with other players of your sport?
- What are the different ways you use to celebrate others' wins/achievements?
- What are some things that you do with your sports friends after you complete a sports session?

What are some factors that you look for in a person to be your play partner/buddy?

APPENDIX F: Thematic Analysis

Procedure

Familiarization

Recordings of the semi-structured interviews were transcribed into text. A second review of the interview transcripts highlighted recurring emotional, behavioral, and motivational patterns related to sports participation.

Barriers to consistent participation surfaced prominently. One participant reflected, *"I was a lot more involved in sports as a kid, but, as an adult now, the gym is really all I have time to do. It's not as fun, but it's still a good way to get active,"* illustrating how time constraints and lifestyle changes hinder sustained engagement.

Flexibility and enjoyment emerged as important factors shaping participation. Several participants expressed a preference for maintaining a primary sport while exploring others for variety and fun: *"I think I would be a 2-sport athlete. I would focus on one but also have a second one that I just enjoy,"* and *"I enjoy badminton and table tennis but if I was trained in neither, I would pick badminton because it's more movement and it's also more fun."* Adaptability to environmental factors was noted in statements like, *"Adding more indoor sports to my list rather than outdoor sports."*

Social structures played a significant role, as illustrated by one participant who said, *"I frequently use WhatsApp groups because that's where most of the people are."* Others highlighted a preference for less crowded environments, such as, *"I like to go skating either in the middle of the day or late at night because no one's there."*

Finally, participants' reflections aligned with Self-Determination Theory's core needs. In terms of autonomy, one noted, *"Improve my skill to a level where I have more chances of winning in lower-level tournaments and make sure you don't get into any injuries."* Competence was emphasized through, *"Able to experiment few services which I was trying since many years,"* while relatedness was reflected in, *"Verbally encourage people when I notice improvements; I prefer a person who has a competitive spirit but understands it's all for fun."*

These early patterns around barriers, individualized motivation, and the role of social connection formed the basis for the final thematic analysis

Initial Coding

The excerpts from both activity 1 and 2 were converted into initial codes. The codes are a general summary of the meaning of the excerpt. All codes were generated manually to keep them relevant to the research question. The following is the list of all initial codes generated:

- Weather mediates engaging in sports
- Lack of knowledge of space and sports players restricts participation
- Age is a barrier to play professionally
- Lack of stretching routine before play sessions causes injury
- Dependence on friends for performing outdoor activities
- Wishes play buddies to be more consistent
- Selective socializing
- Prefers less crowd for participating in sports
- Learning curve is a barrier
- Focuses on a sport trained in
- Reflects upon competence-related goals
- Retrospect on personal set performance-based goals
- Achieving set goals impacts motivation
- Identifies with levels of achievements
- Has different goals based on session type
- Reflects on performance and skills
- Reflects on strategizing and individual contributions
- Reflects on personal contribution in games
- Reflects for self-improvement
- Passive reflection is preferred
- Negative progress causes demotivation
- Switches between sports based on seasons

- Season dictates sport choice
- Involves in both competitive and friendly sessions
- Multiple sports + fun sports are preferred
- Multiple sports for staying physically fit
- Focuses on one sport, having fun in few others
- Has a primary sport (focused), and secondary one for variety
- Values teamwork and coordination
- Looks for people with similar goals
- Appreciates players who play for fun
- Values friendships that extend beyond playing sports
- Some sessions are focused on socializing
- Digital community formed a club
- Digital communication facilitates play
- Uses digital social platforms like WhatsApp to maintain large sports communities
- Communicates using digital social groups which are not very active
- Seeks information regarding different session types from community players
- Different communities have separate digital social groups
- Values punctuality
- Arriving on time = more play
- Post-game rituals and closure
- Non-sports conversations and relaxation
- Food and drinks as social bonding
- Casual socializing and catching up
- Verbal encouragement and recognition
- Physical gestures of support
- Online and public recognition
- Playful and competitive fun
- Appreciates social activities revolving around sports
- Likes socializing
- Cares about social energy

- Appreciates social aspects of sports

The following are examples of converting excerpts into codes:

Excerpt	Code
"My friends are usually available on the weekends, so I'm usually more outside on the weekend and on weekdays. I'm usually more indoors."	Dependance on friends for performing outdoor activities
"For badminton, I have to learn everything from scratch. It'll take me ages to get to a very good level"	Learning curve is a barrier
"I find that I need to work on my stance, or I need to work on my stamina."	Reflects on performance and skills

Table 12 - Initial code examples for activity 1 (semi-structured user interviews)

The excerpts from activity 2 were coded based on the psychological needs framework outlined by Self-Determination Theory (SDT), focusing specifically on autonomy, competence, and social relatedness. Coding aimed to capture how participants articulated experiences of self-direction, skill development, and social connection in their sports participation, providing insight into the motivational factors that could inform the design of digital interventions. The following are examples of converting activity 2 excerpts into codes:

	Excerpt	Code
Autonomy based	*"Do new things that you don't usually do; mental exercise"*	Mental well-being and stress relief
Competence based	*"Improved my forehand topspin compared to a month ago"*	Technical skill improvement
Social relatedness based	*"High five and going out for dinner afterwards"*	Food and drinks as social bonding

Table 13 - Initial code examples for activity 2 (thematic exploration)

Reviewing and refining themes

After generating initial codes, we systematically refined and categorized them into overarching themes aligned with our research objectives: identifying key motivational drivers and barriers to consistent sports participation and informing the design of a digital tool grounded in Self-Determination Theory. Codes that captured similar aspects of sports participation such as environmental factors, skill development, and social influences were grouped together, creating a structured thematic framework for further analysis. The first step in refining the themes was to group related initial codes that shared similar meanings or addressed common aspects of sports participation. The following initial thematic categories were formed:

- **Environmental factors** - Codes related to external conditions affecting participation, such as weather constraints and availability of play spaces.
- **Physical limitations** - Factors like fitness levels, injury risks, and age-related barriers affecting participation.
- **Reliance on others** - Codes indicating social dependency on friends or groups to engage in sports.

- **Social preferences** - Participants' preferences for socializing, playing with familiar people, or engaging in smaller/larger groups.
- **Skill development challenges** - Issues related to learning curves, technical improvement difficulties, and self-doubt.
- **Goal-oriented behaviour** - Codes reflecting personal goal setting, performance tracking, and motivation strategies.
- **Self-assessment and improvement** - Factors related to personal reflection, evaluating progress, and identifying areas for growth.
- **Variety and adaptability** - How participants switch between multiple sports, prefer flexible schedules, or adjust based on seasons.
- **Teamwork and collaboration** - Importance of coordination, non-verbal communication, and cooperation in gameplay.
- **Digital and social connectivity** - The role of digital platforms, WhatsApp groups, and online networking in sustaining engagement.
- **Punctuality and commitment** - The impact of time management, play session planning, and reliability in participation.
- **Post-activity socializing** - Social aspects outside of the game itself, such as celebrating wins, bonding over meals, and casual conversations.
- **Encouragement and recognition** - The impact of positive reinforcement, peer validation, and competitive motivation.
- **Playful and fun interactions** - The importance of humour, spontaneous moments, and enjoying the game itself rather than pure competition.

At this stage, the thematic categories still contained some overlap, but they provided a structured framework for further refinement into distinct sub-themes and overarching themes.

APPENDIX G: SMS 2 items

Why do you practice your sport?

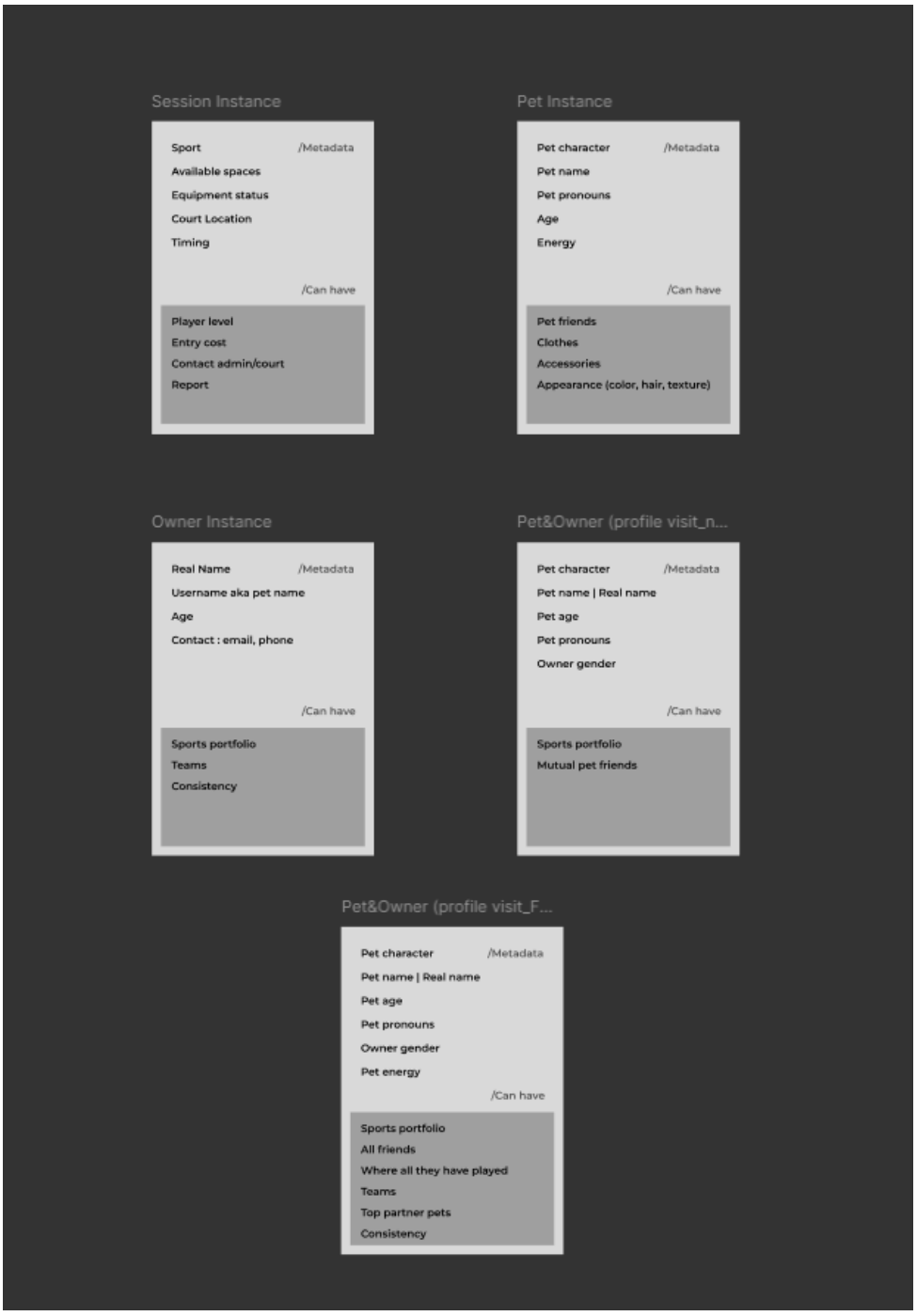
Does not correspond at all 1	Corresponds very little 2	Corresponds a little 3	Corresponds moderately 4	Corresponds quite a bit 5	Corresponds quite a lot 6	Corresponds completely 7

1.	Because I would feel bad about myself if I did not take the time to do it.	1	2	3	4	5	6	7
2.	I used to have good reasons for doing sports, but now I am asking myself if I should continue.	1	2	3	4	5	6	7
3.	Because it is very interesting to learn how I can improve.	1	2	3	4	5	6	7
4.	Because practicing sports reflects the essence of whom I am.	1	2	3	4	5	6	7
5.	Because people I care about would be upset with me if I didn't.	1	2	3	4	5	6	7
6.	Because I found it is a good way to develop aspects of myself that I value.	1	2	3	4	5	6	7
7.	Because I would not feel worthwhile if I did not.	1	2	3	4	5	6	7
8.	Because I think others would disapprove of me if I did not.	1	2	3	4	5	6	7
9.	Because I find it enjoyable to discover new performance strategies.	1	2	3	4	5	6	7
10.	I don't know anymore; I have the impression that I am incapable of succeeding in this sport.	1	2	3	4	5	6	7
11.	Because participating in sport is an integral part of my life.	1	2	3	4	5	6	7
12.	Because I have chosen this sport as a way to develop myself.	1	2	3	4	5	6	7
13.	It is not clear to me anymore; I don't really think my place is in sport.	1	2	3	4	5	6	7
14.	Because through sport, I am living in line with my deepest principles.	1	2	3	4	5	6	7
15.	Because people around me reward me when I do.	1	2	3	4	5	6	7
16.	Because I feel better about myself when I do.	1	2	3	4	5	6	7
17.	Because it gives me pleasure to learn more about my sport.	1	2	3	4	5	6	7
18.	Because it is one of the best ways I have chosen to develop other aspects of myself.	1	2	3	4	5	6	7

APPENDIX H: Code for Prototype 2

https://github.com/Ocadusports/letsgrabamatch

APPENDIX J: Prototype 3 instances



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APPENDIX K: Invitation Email

Hi xxx,

Thank you for participating in Phase 1 of this research. **You've been selected for Phase 2 of the Research study *"Let's Grab a Match"*.**

We know life's busy with memes, TikTok scrolls, and Netflix binges, but hear us out! This is all about finding your motivation to get moving, and we're making it fun, chill, and super flexible. Whether you're a gym buddy, a pickleball newbie, or someone who hasn't kicked a ball since PE class, you're perfect for this!

Please find the link to the online meeting scheduled for (Date, Day, Time):

MEETING LINK

What's next?

You are required to read and sign a consent form which we will be sharing soon.

Let us know if the date and time mentioned above for Phase 2 **do not** work for you.

Phase 2:

- A 1-on-1 online chat with us about 45 minutes
- You'll give us feedback on your sports journey and challenges
- You will help us brainstorm specific app features.
- Discuss gift card preferences

Phase 3 (conducted on a different day - To be decided)

Why Should You Care?

- Earn $25 CAD gift cards for Phase 2 and Phase 3 (that's $50 CAD for both!)
- Even if you withdraw, you still get to keep your rewards

Any Risks?

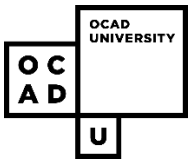
- Phase 2: Nope, it's all chill here. All your data (mentioned in the consent form) is safe and secure with us.
- Phase 3: No risk at all!

Hit us up if you have any questions:

Let's make sports happen! Thanks for being part of something cool.

Catch you soon!

Kunal & Nikhil



This study has been reviewed and received ethics clearance through the Research Ethics Board at OCAD University #102645. If you have any comments or concerns, please contact the Research Ethics Office through research@ocadu.ca.

APPENDIX L: Consent Form

Date:

Project Title: Let's Grab a Match: Enhancing motivation and engagement in sports for Gen-Z and millennials.

PURPOSE

Congratulations! You have been selected because you have completed the screening questionnaire and meet the eligibility criteria for our research study.

This study is designed to explore how digital tools, and design can increase sports participation and consistency, specifically targeting youngsters and adults in Canada aged 19-43. By gathering input from various individuals, including those who play sports and those who do not, we aim to develop solutions that increase and enhance sports participation.

This research is funded by OCAD University Graduate Project Fund and is completed as part of our master's thesis at OCAD University which will contribute to our degree completion.

WHAT'S INVOLVED

You will now participate in a one-on-one interview and a card-sorting exercise during phase 2, which will last approximately 45 minutes.

After this, you will be invited to participate in Phase 3 which will involve user testing of a digital tool (mobile app) designed to encourage sports participation. This will help us improve our app design and user experience.

POTENTIAL BENEFITS

Possible benefits of participation include increased personal awareness of sports motivation and participation habits, as well as access to tools that may help improve consistency in playing sports.

Although we cannot guarantee benefits from participating in this study, participants may gain insights into how digital tools can support their fitness and recreational activities.

POTENTIAL RISKS

No potential risks have been identified for this study.

CONFIDENTIALITY

All information you provide will be kept confidential. Your responses will be anonymized, and pseudonyms will be assigned in any published reports or presentations. Audio recordings will be stored securely on password-protected devices, and only the research team (Kunal Devi, Nikhil Thomas, Adam Tindale and Kate Hartman) will have access to this data. All identifiable data will be securely deleted after May 2025.

AUDIO RECORDING

You may review or edit any audio recording transcripts before they are finalized. These recordings and transcripts will be made available to the participants through an online drive storage (shared via your email) which will be accessible to only the concerned participant and the research team. Recordings will be securely stored and will be destroyed at the end of the project.

INCENTIVES FOR PARTICIPATION

Participants will receive a $25 CAD gift card for each - phase 2 and phase 3 of participation (total of $50 CAD if both phases are completed). Even if you choose to withdraw from the study, you will still receive the incentive for the participated phase.

VOLUNTARY PARTICIPATION

Participation in this study is voluntary. If you wish, you may decline to participate the study.

You may withdraw participation until the end of each Phases separately - Phase 2 (data collection, incentivization) and Phase 3 (user testing, incentivization). You can no longer withdraw data of Phase 2 after the end of Phase 2, and you can no longer withdraw the data of Phase 3 after the end of Phase 3. Withdrawal will not affect any incentives, and all identifiable data will be permanently deleted. Your choice of whether to participate will not influence your future relations with OCAD University or the investigators (Kunal Devi, Nikhil Thomas, Adam Tindale and Kate Hartman) involved in the research.

To withdraw from this study, you may contact Kunal Devi by email - kunaldevi@ocadu.ca before the completion of phase 2 or phase 3 for the respective data collected. Any data collected until the point of withdrawal will be securely deleted.

PUBLICATION OF RESULTS

The results of this study will be published in a master's thesis, presented at academic conferences, and may also be shared in journal articles. Data will be presented in aggregate form, and individual quotes will not be attributed without permission. Feedback about this study will be available upon request. For more information, you may contact by email

Kunal Devi - kunaldevi@ocadu.ca Nikhil Thomas – thomasnikhil@ocadu.ca

CONTACT INFORMATION AND ETHICS CLEARANCE

If you have any questions about this study or require further information, please ask. If you have questions later about the research, you may contact

1. Kunal Devi - kunaldevi@ocadu.ca

2. Nikhil Thomas – thomasnikhil@ocadu.ca

or the Faculty Supervisor, Adam Tindale, (where applicable) using the contact information provided above. This study has been reviewed and received ethics clearance through the Research Ethics Board at OCAD University [#102645]

If you have questions regarding your rights as a participant in this study, please contact: Research Ethics Board c/o Office of the Vice President, Research and Innovation OCAD University

100 McCaul Street

Toronto, M5T1W1
416 977 6000 x4368
research@ocdu.ca

AGREEMENT

I agree to participate in this study described above. I have made this decision based on the information I have read in the Information-Consent Letter. I have had the opportunity to receive any additional details I wanted about the study and understand that I may ask questions in the future. I understand that I may withdraw this consent at any time.

Name: _____

Signature:
_____ Date: _____

Thank you for your assistance in this project. Please keep a copy of this form for your record

Attributing quotes

Yes, I wish to be attributed for my contribution to this research study. You may use my pseudo name alongside statements and/or quotations that you have collected from me.

No, I do not wish to be attributed for my contribution to this research study. You may not use my name/pseudo name alongside statements and/or quotations that you have collected from me.

Audio/video- recording

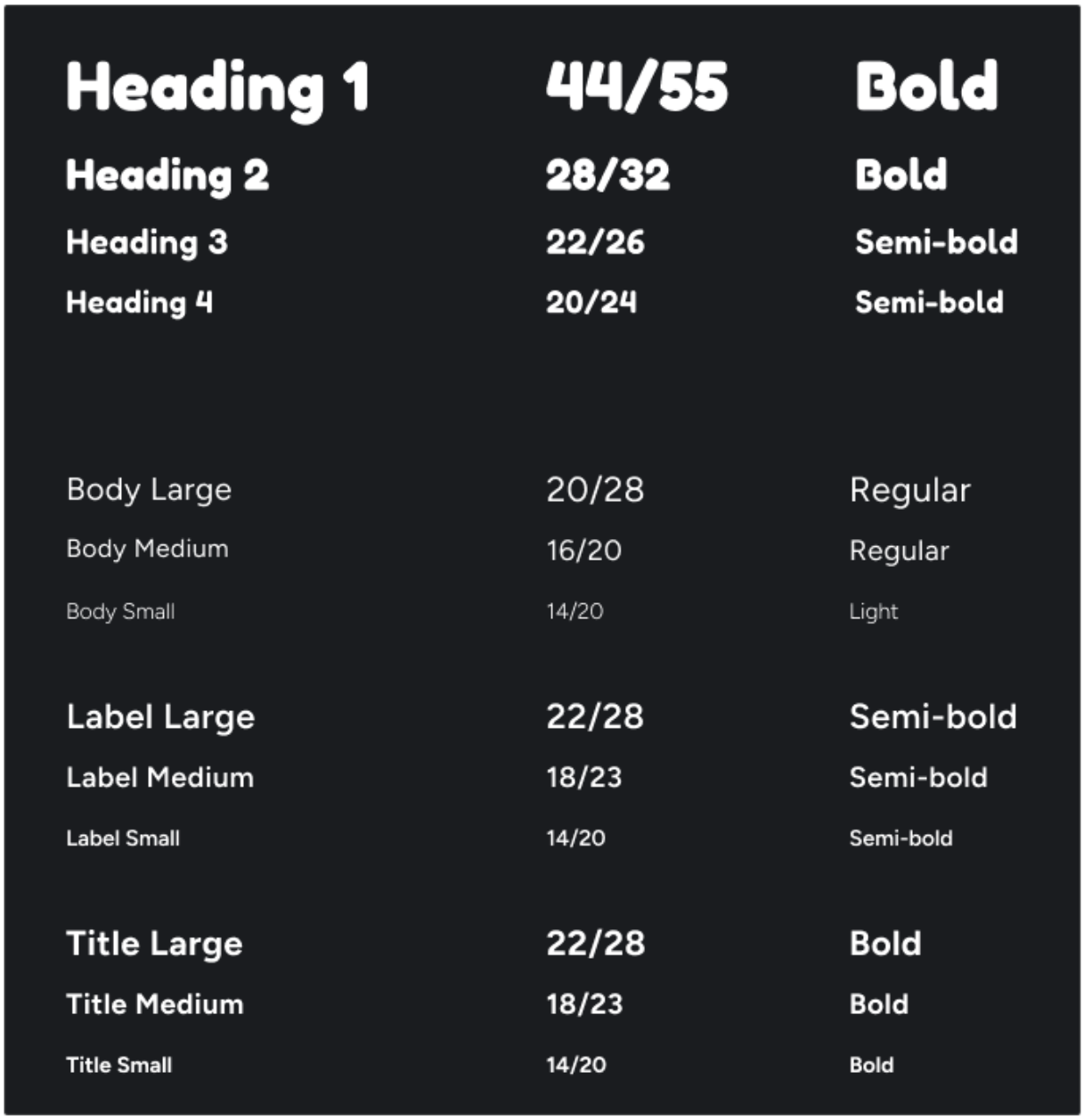
I agree to be audio recorded for the purposes of this study. I understand how these recordings will be stored and destroyed.

I do not agree to be recorded for the purposes of this study.

__ _____

Signature of Participant Date

APPENDIX M: Prototype 4 UI Design and Branding



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Label Small	14/20	Semi-bold
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Title Medium	18/23	Bold
Title Small	14/20	Bold


Purple Honey 100
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Purple Honey 300
Purple Honey 400
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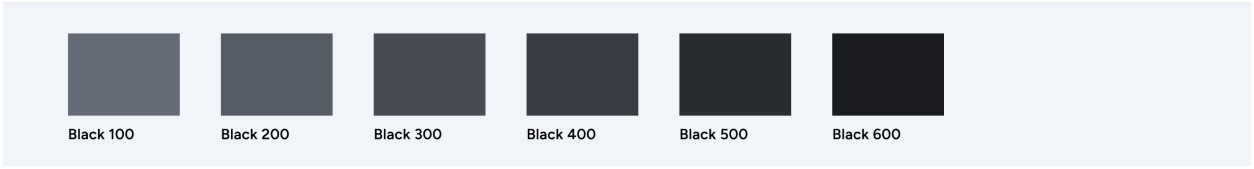
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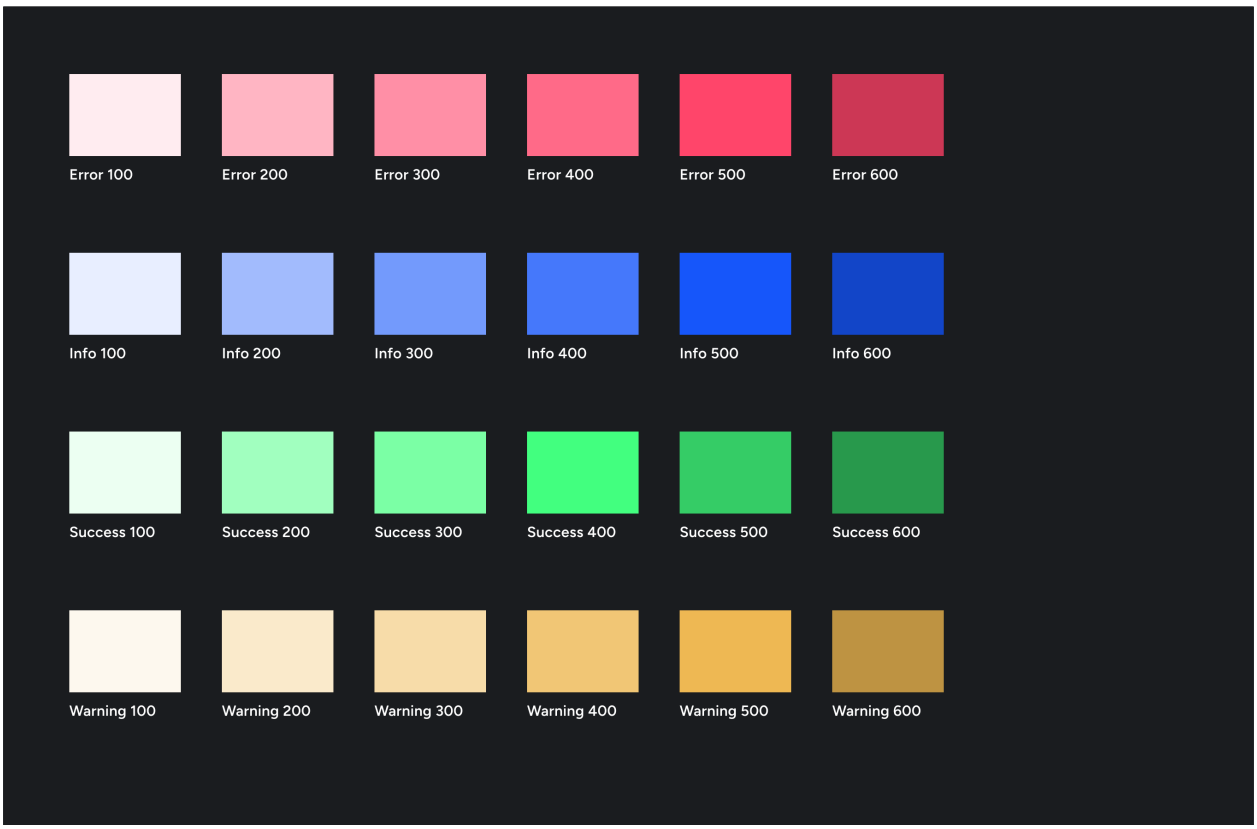
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