VILNIUS UNIVERSITY
BUSINESS SCHOOL

DEEPTECH ENTREPRENEURSHIP STUDY PROGRAMME

MARTYNAS PETKEVIČIUS

THE FINAL MASTER'S THESIS

Žaidybinių elementų įtaka ketinimui naudotis su sveikata susijusiomis aplikacijomis	***The Impact of Gamification Elements on the Intention to use Health-Related Applications***

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Name, surname, academic title, scientific degree of the supervisor

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SUMMARY

VILNIUS UNIVERSITY
BUSINESS SCHOOL
DEEPTECH ENTREPRENEURSHIP STUDY
MARTYNAS PETKEVIČIUS

The Impact of Gamification Elements on the Intention to use Health-related Applications

Supervisor : doc. Dr. Eglė Radvilė
Master's thesis was prepared in Vilnius, in 2023
Scope of Master's thesis - 62 pages.
Number of tables used in the FMT - 12 pcs.
Number of figures used in the FMT - 4 pcs.
Number of bibliography and references used in the FMT - 25 .
Conclusions of the FMT - 3 .

FMT described in brief:

In today's fast changing world, where digital technologies have become an integral part of our everyday lives and there is a greater emphasis on personal health and well-being, the intersection of these two disciplines has created a booming and disruptive field: health-related applications. Better known as health apps, these digital tools have become increasingly important in people's lives, giving them unprecedented control over the proactive management and constant monitoring of their health. The increasing popularity of health-related apps reflects a fundamental shift in how people access, engage with, and manage their health-related information and activities. These apps provide a wide range of features, ranging from tracking physical activity and diet to monitoring chronic diseases and conducting online consultations. However, despite the increasing proliferation of health applications, user engagement and desire to use continue to be important factors of their success.

Problem, objective and tasks of the FMT:

The primary goal of this thesis is to clarify how the introduction of gamification aspects in health-related apps affects user intention to use these apps. This master's thesis tries to comprehend the underlying features by analysing how gamification aspects can improve the health of users.

Research methods used in the FMT:

Content Analysis of two distinct health apps, one of which uses gamification components effectively to emphasise the significance of health and the other which employs less or no gamification aspects and has less of an impact on health to an end user.

Research and results obtained:

The research focuses on defining gamification within the realm of health-related applications and examining its impact on user engagement. Three conclusions have been reached during the FMT.

SANTRAUKA

VILNIAUS UNIVERSITETAS
VERSLO MOKYKLA
AUKŠTŲJŲ TECHNOLOGIJŲ VERSLAS
MARTYNAS PETKEVIČIUS

Žaidybinių elementų įtaka ketinimui naudotis su sveikata susijusiomis aplikacijomis

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Magistrinio darbo santrauka:

Šiuolaikiniame pasaulyje, kuriame skaitmeninės technologijos tapo neatsiejama mūsų kasdienio gyvenimo dalimi ir kuriame daugiau dėmesio skiriama asmens sveikatai ir gerovei, šių dviejų disciplinų sankirta sukūrė klestinčią ir trikdančią sritį: su sveikata susijusias programas. Šie skaitmeniniai įrankiai, geriau žinomi kaip sveikatos programėlės, tampa vis svarbesni žmonių gyvenime, todėl jiems suteikiama precedento neturinti galimybė aktyviai valdyti ir nuolat stebėti savo sveikatą. Didėjantis su sveikata susijusių programėlių populiarumas atspindi esminį pokytį, kaip žmonės pasiekia su sveikata susijusią informaciją ir veiklą, su ja užsiima ir tvarko. Šios programėlės suteikia daugybę funkcijų – nuo fizinio aktyvumo ir dietos stebėjimo iki lėtinių ligų stebėjimo ar konsultacijų internetu. Tačiau nepaisant didėjančio sveikatos programų skaičiaus, vartotojų įsitraukimas ir noras naudoti ir toliau yra svarbūs jų sėkmės veiksniai.

Magistrinio darbo problemos, tikslai ir uždaviniai:

Pagrindinis šio baigiamojo darbo tikslas – išsiaiškinti, kaip žaidimų aspektų įvedimas į su sveikata susijusias programėles paveikia vartotojų ketinimą naudoti šias programėles. Šiame magistro darbe bandoma suprasti esmines savybes, analizuojant, kaip žaidimų aspektai gali pagerinti vartotojų sveikatą.

Magistriniame darbe naudojami tyrimo metodai:

Dviejų skirtingų sveikatos programų turinio analizė. Viena iš jų efektyviai naudoja žaidimų komponentus, kad pabrėžtų sveikatos svarbą, o kitoje – mažiau arba visai nenaudojami žaidimo aspektai ir kurios turi mažesnį poveikį galutinio vartotojo sveikatai.

Tyrimai ir gauti rezultatai:

Atliekant tyrimą pagrindinis dėmesys skiriamas žaidybinių elementų apibrėžimui su sveikata susijusių programų srityje ir jo poveikio vartotojų įsitraukimui tyrimui. Visame magistriniame darbe buvo padarytos trys išvados.

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INTRODUCTION

In today's rapidly evolving world, where digital technologies have become an essential part of our daily lives, and an increased focus on personal health and well-being charges society, the convergence of these two domains has created a thriving and disruptive field: health-related applications. Better known as *health apps,* these digital tools have assumed an increasingly pivotal role in the lives of individuals, granting them unprecedented agency in the proactive management and continuous monitoring of their health.

The rapid rise of health apps in our lives is not merely a trend; it represents a fundamental shift in how we approach and engage with healthcare and wellness. These applications offer a various spectrum of functionalities, ranging from tracking physical activity and dietary habits to monitoring chronic health conditions and facilitating remote consultations with healthcare professionals. In this modern day landscape, health apps have emerged as dynamic companions, empowering users to take ownership of their health and well-being like never before.

As the adoption of health apps steadily inclines, the importance to delve deeper into the factors that underlie users' intentions (Kamel Mouloudj et al., 2023) to engage with and sustain their usage of these applications becomes unmistakably clear. The relevance of this investigation extends beyond mere curiosity; it underscores a critical need to grasp the intricacies of user behaviour within the context of health-related applications. To foster more effective and engaging health app ecosystems, it is essential to understand how users' intentions are shaped and influenced, particularly in the context of gamification—a strategy that introduces elements reminiscent of games into non-game settings.

Therefore, this master’s thesis takes a deeper look to navigate the complex environment of health apps (Quinn Grundy, 2022) penetrating the impact of gamification elements on users' intentions to interact with and continuously use these applications. In this work, it is aimed to understand the complex relationship between gamification, user engagement, and the sustainable adoption of health-related applications, as a result of contributing to a more profound understanding of the joining between technology and well-being.

Relevance of Work

The rising popularity of health-related applications represents a significant shift in how individuals access, interact with, and manage their health-related information and activities. These applications offer a diverse array of functionalities, from tracking physical activity and nutrition to monitoring chronic conditions and facilitating online consultations. However, among this rapid increase of health apps, user engagement and intention to use remain key determinants of their effectiveness.

Research Object

The primary object of this research is to define gamification as a modern day phenomenon and to investigate the impact of gamification elements within health-related applications on users' intentions to engage with and consistently use these applications. Gamification, the integration of game-like elements, such as points, badges, challenges, and rewards, into non-game contexts, has gained reputation as a strategy to enhance user engagement and motivation. However, its effectiveness in the field of health apps is to be determined as it is a fairly new technology and approach to modernising the attention to health.

Work Objective

The main objective of this thesis is to clear up on how the incorporation of gamification elements in health-related applications influences user intention to use these apps. This master’s thesis seeks to understand the underlying features through analysis which gamification elements can enhance health conditions of users.

Work Tasks

To achieve the stated objective, this research will consist of the following tasks:

1. **Literature Review**: Conduct an extensive review of existing literature to examine the theoretical foundations of gamification, user intention models, and the use of gamification in health-related contexts.
2. **Methods used to evaluate health applications**: Analyse the methods that are available and used to evaluate health applications and choose the appropriate method to evaluate the health applications.

3. **Content analysis**: Analyse and compare two specific health apps which one of them effectively uses gamification elements to highlight the impact of health and the other that uses less or no gamification elements and has less of an impact to health to an end user.

Theoretical and methodological approach

The research methodology will encompass a mixed-methods approach, incorporating both real life applications that are available to users, literature review and content analysis methods. This approach will provide a comprehensive understanding of the impact of gamification elements on user intention within the context of health-related applications. In the theoretical part of the master's thesis, it was reviewed what are gamification elements, applied content analysis was made comparing eight pre-determined gamification elements found in the health-related apps.

1. Defining Gamification in health-related applications: a Literature Review

This paragraph provides a comprehensive literature review on the topic of gamification in health-related applications, specifically focusing on how gaming elements have disruptively entered the field of health-related apps. It is a deep dive into research, literature and examples of how gamification changed the view and perception towards health and the issues it faces. The following section takes into consideration the scientific research, analysis and transformation of health applications and how it changed the way users interact with them and how it changed the perception towards individual health. Additionally, the section tries to find the answer to a pretty basic question: *Does gamification elements work towards better health?*

1.1. From Game Design Elements to Gamefulness: Defining Gamification

In the paper *From Game Design Elements to Gamefulness: Defining Gamification* (Sebastian Deterding, et al., 2011), the authors start on a pioneering exploration into the emerging field of gamification. The introduction serves as a captivating prelude to a thorough investigation into the concept's origins, applications, and implications. The central focus is on unravelling the transformative journey from discrete game design elements, such as points, badges, and leaderboards, to the broader and more encompassing notion of *gamefulness*.

The writers begin on a complete examination of the delicate aspects that make games intriguing and interesting in their scientific pursuit, with the overriding goal of determining how these principles might be astutely translated beyond the bounds of the gaming realm. The preface meticulously defines the authors' intention: to delve into the subtle domain of gamification and unravel the strategic use of gaming ideas in non-game circumstances. At the centre of this conceptual shift is the concept of "gamefulness," a departure from the traditional conception of games as separate entities and a disruptive leap into multiple areas such as education, business, and, most notably, health. The careful examination of the elements that make games engaging and entertaining reveals a rich mine of motivational and interactive dynamics that are inherent to the gaming experience. The writers negotiate the conceptual landscape of

gamification with precision, driven by a desire to harness and use these dynamics in unexpected circumstances. The goal is not simply to replicate games, but to extract the core of what makes them so fascinating and then deliberately incorporate these components into non-game contexts. The term "gamefulness" reflects this paradigm shift—a recognition that game principles, far from being constrained to their virtual or physical borders, may be easily integrated into a wide range of real-world circumstances. This movement signals a shift away from the old distinction of games vs non-games, recognizing the permeability of gaming dynamics across multiple areas. In their quest for comprehension and application, the authors highlight health as a particularly relevant topic for the incorporation of gamefulness. The potential influence of gamification on health is being investigated with vigour, recognizing the transformative ability of using game principles to drive individuals in their pursuit of wellbeing. The authors argue that by intentionally introducing game-like aspects into health-related contexts, individuals can be moved toward healthier behaviours using the same motivational processes that make games appealing. The authors' investigation goes beyond a simple assessment of gamification; it unfolds as a voyage into the conceptual frontier of gamefulness—a dynamic domain in which the engaging and participatory nature of games serves as a catalyst for positive change in a variety of industries. The authors hope to uncover the potential of gamefulness as a paradigm that transcends traditional limits, opening up new paths for motivation, engagement, and transformation in all dimensions of human experience through this scientific work.

By laying a solid foundation in the introduction, the authors open the door to a profound examination of gamification's theoretical underpinnings. The paper's significance lies in its attempt to codify a framework for understanding how game elements can be systematically employed to enhance user engagement, motivation, and behavioural outcomes in various settings. As the authors navigate the landscape from the microcosm of game design components to the macrocosm of gamefulness, they invite readers to contemplate the broader implications of this integration and to foresee the potential impact on human experiences and interactions.

The introduction under examination is a milestone in the ongoing discussion of gamification, having a long-lasting impact that has resonated through following academic endeavours and practical applications. In essence, it has acted as a catalyst for a paradigm shift in how we think and approach motivation, engagement, and

design in domains well outside gaming. Its lasting effect stems from its capacity to foster a better understanding of the complex interplay between game features and human behaviour. This essential scholarly study has outlived its initial publication, leaving a lasting effect on the world of gamification studies. Its effect extends beyond academic circles, permeating actual applications and shaping tactics used in a variety of sectors. The introduction's fundamental findings have prompted a rethinking of how we structure interactions, assist learning, design work settings, and foster efforts for greater health and well-being. One of the most important contributions of this introduction is its role as a catalyst for shifting the conventional perspective of games as just entertainment to an appreciation of their potential as powerful motivators and drivers of engagement. The research has opened up new vistas in understanding how game characteristics might be deliberately leveraged to elicit desired actions and outcomes in non-game contexts by outlining the concept of gamefulness. The continuous evolution of gamification as a transformative force demonstrates the enduring impact of its introduction. It has not remained static, but has evolved and expanded, finding applicability in a wide range of human experiences. The notions offered have become part of the professional, academic, and practitioner lexicons, influencing how they approach the design of systems, experiences, and interventions. Furthermore, the significance of this introduction goes beyond the world of academia. It has spread throughout businesses and disciplines where motivation and participation are essential. The principles explained in this introduction have driven the development of tactics that utilise gamefulness to inspire positive behavioural change in a variety of settings, including education, workplace dynamics, and, most notably, health and well-being. This introduction will be remembered for its ability to bridge the gap between the world of games and the larger terrain of human behaviour. As a result, it has opened up new paths for investigation, innovation, and application, cementing its place as a cornerstone in the continuous transformation of how we envision and harness the motivational power of game aspects for the development of individuals and society as a whole.

1.2. Does Gamification Work?

Another approach on gamification is a study conducted by Juho Hamari et al. (2014), encapsulating a comprehensive review of gamification literature, underscores the transformative potential of badges and achievements in health applications. These

elements serve as external rewards that deftly tap into users' intrinsic motivations, creating a dynamic feedback loop that fuels consistent tracking of dietary choices, exercise regimens, and various other health metrics. The intrinsic motivation, amplified by the visual acknowledgment of achievements, propels users towards the cultivation of healthier lifestyles.

Gamification features, particularly badges and achievements, emerge as revolutionary agents in the area of health applications, orchestrating a tremendous impact on general well-being by masterfully intertwining complex psychological dynamics with enticing motivational rewards. The attainment of badges and achievements transcends the realm of mere digital embellishments as users navigate the landscapes of health and fitness apps; they metamorphose into potent symbols of individual triumphs, setting in motion a cascade of positive emotions that, in turn, fortify the commitment to the pursuit of healthier living. The subtle dance of behavioural psychology is at the heart of this transforming process. The acquisition of badges and achievements is a sort of positive reinforcement that is intentionally designed to recognize and celebrate the user's achievements in their health journey. Positive reinforcement, which is based on psychological principles, functions as a catalyst for substantial and long-term behaviour change. Each badge gained becomes a concrete symbol of progress, an acknowledgement of work, and a monument to the user's commitment to their own well-being. The symbolic significance of these digital praises extends far beyond the app User Interface (UI). They strike a personal chord with the user, instilling a sense of accomplishment and empowerment. As badges and achievements accumulate, users are no longer only passive beneficiaries of virtual incentives; rather, they become active participants in their own success story. This active participation generates a positive feedback loop in which the recognition of accomplishments motivates users to strive for more major milestones and larger health successes. The power of badges and achievements is derived not only from their visual representation, but also from the feelings they elicit. Accomplishing health objectives is a naturally emotional process, and gamification aspects serve to magnify these pleasant sensations. Whether it's the satisfaction of consistently documenting meals or the joy of reaching a weight loss milestone, each badge becomes a tangible marker of these emotional highs. These favourable feelings, in turn, promote pleasure and happiness, maintaining the link between healthy activities and positive well-being. The incorporation of badges and achievements in health applications goes beyond the

digital sphere and becomes a dynamic force in affecting real-world health outcomes. These gamification features become not only motivators but enduring catalysts for establishing health behaviours that stand the test of time by using the principles of behavioural psychology and positive reinforcement. Users who proudly display their virtual badges are not only celebrating individual accomplishments, but also actively participating in a transformative journey toward a better and more satisfying existence.

However, the impact of badges and achievements extends beyond the individual, weaving a social fabric within app communities. The act of sharing these accomplishments not only amplifies the sense of personal achievement but also fosters a communal spirit. Users, connected by common health aspirations, engage in a virtual camaraderie that promotes mutual support and accountability. This social dimension of gamification further solidifies the positive influence of badges and achievements on health behaviours, creating an ecosystem where the pursuit of well-being becomes a collective journey.

In essence, the integration of badges and achievements in health apps is a nuanced strategy that transcends conventional motivational techniques. By merging psychological principles, intrinsic motivation, and social dynamics, these gamification elements emerge as potent catalysts for instigating and sustaining positive health changes, steering users towards not just short-term goals but also the cultivation of enduring habits that fortify overall health and well-being.

1.3. Actionable Gamification: Beyond Points, Badges, and Leaderboards

Yu-Kai Chou's (2015) groundbreaking book, "*Actionable Gamification: Beyond Points, Badges, and Leaderboards*," not only expands but completely redefines the conventional idea of gamification. Chou delves under the surface of rewards, such as points and badges, and into the depths of human motivation. His point of view is transformative, emphasising that effective gamification is about making work intrinsically fun and interesting rather than just providing external rewards. This viewpoint is especially pertinent when it comes to health and wellness. Chou contends that practical gamification, as opposed to simpler equivalents, has the ability to transform how people approach their well-being. Rather than focusing on earning points and badges, practical gamification aims to make health tracking and

improvement inherently enjoyable. It seeks to create experiences that go beyond providing short-term motivation, in order to develop a long-term commitment to better habits. Actionable gamification targets users' overall well-being by including features such as challenges, progress tracking, and social connections within health apps. Chou's research demonstrates that a well-designed gamification strategy is more than just a cosmetic addition; it is a catalyst for long-term engagement and empowerment. His principles help to create an engaging, pleasurable, and socially connected journey toward health goals. Finally, actionable gamification has the potential to have a major impact on health outcomes by making the quest of well-being a pleasant and long-lasting experience.

Finally, Yu-Kai Chou's seminal book, "*Actionable Gamification: Beyond Points, Badges, and Leaderboards*," radically reshapes our understanding of gamification, especially in the context of health and wellness. Chou's thoughts go beyond the typical notion of employing superficial rewards to achieve beneficial behavioural changes, emphasising the need of making tasks naturally fun and engaging.

1.4. Examples of how gamification can be used to improve user engagement in health-related applications

A Major Research Project written by Aadil Khan (2020) takes an approach to fitness related apps and how it enables users to sustain engagement.: The paper presents an insightful analysis of how gamification can revolutionise user engagement in fitness apps. It begins by dissecting the core principles of gamification, exploring their applicability and effectiveness in fitness app design. Central to this analysis is the development of a prototype mobile fitness-game experience, meticulously designed to be both enjoyable and motivational. The paper describes this prototype in depth, focusing on its user-friendly interface, engaging mechanics, and a rewarding system that synergizes to create an immersive fitness journey.

The thorough examination goes beyond the surface-level features of fitness apps to investigate the fundamental psychological impact that gamification has on user behaviour. By introducing game-like features into these programs, users' workout routines are transformed, leading to increased regularity and enjoyment for fitness activities. This psychological viewpoint is not hypothetical; rather, it is supported by strong user testimonies and is firmly established in actual facts. The investigation of

how gamification affects the psyche and motivation of users extends beyond the apps' immediate capabilities. It reveals a more in-depth understanding of how features such as badges, achievements, points, and challenges may act as potent motivators, tapping into core aspects of human psychology to create good behavioural changes. Empirical proof is critical in proving the psychological impact of gamification. Individuals respond positively to the inclusion of game-like features in fitness apps, according to studies and research findings. These studies frequently entail rigorous experimentation, data collection, and analysis, yielding measurable results that demonstrate gamification's success in influencing user behaviour. Furthermore, user testimonials provide anecdotal but useful information, providing qualitative insights into the real-world experiences of people who have adopted fitness apps with gamified components. These personal experiences add a human touch to the investigation, demonstrating how gamification moves beyond theoretical principles to become a practical and influential force in altering users' exercise habits. Gamification has a wide-ranging psychological impact. It appeals to intrinsic motivators like accomplishment, mastery, and autonomy. Earning a badge or reaching a difficult milestone corresponds to core human aspirations for acknowledgment and self-improvement. Furthermore, the element of competition, whether against oneself or against others, creates a sense of challenge and excitement, encouraging individuals to push themselves beyond their own boundaries. The investigation delves into these subtle psychological dynamics, revealing how gamification produces a positive feedback loop, promoting beneficial fitness behaviours and habits. Finally, the investigation of the psychological influence of gamification on user behaviour in fitness apps extends beyond a cursory study of features. It explains in detail how these game-like components become potent drivers for beneficial behavioural change. The combination of factual evidence and user testimonies strengthens the case, establishing gamification as a revolutionary force that not only improves the functionality of fitness apps but fundamentally alters how people approach and engage with their health and wellness journeys.

The paper conducts a full and detailed examination of the delicate function that gamification plays inside fitness apps, unearthing both its considerable benefits and recognizing the inherent limitations it brings, all while giving light on prospective future research areas. This methodical and balanced approach leads to a more sophisticated understanding of gamification's complex influence in the ever-changing

field of health-related applications. In outlining the benefits of gamification, the research explains how game-inspired components function as powerful motivators, propelling users to long-term engagement with fitness apps. Gamification transforms the user experience into a dynamic and rewarding journey by including features such as badges, accomplishments, and challenges. The psychological roots of gamification are fully investigated, including intrinsic motivation and a sense of accomplishment. The study reveals how these factors not only promote fitness routine adherence but also inspire a sense of happiness and fulfilment in the pursuit of health goals.

Other authors (Cansu Toprak; Vaggelis Saprikis; Winayaka Ruhur Pamungkas) suggest their own research as possible engagement of doing game elements in apps. The paper provides a comprehensive overview of the role of gamification in mobile health applications, focusing on its potential to enhance user engagement in a mobile environment. While it does not delve into specific details about how gamification boosts engagement, the paper outlines the general concept that incorporating game designs and rewards in health-related apps can significantly motivate users. This motivation is key to ensuring consistent app usage (Cansu Toprak, Hicran Özgüner Kiliç, 2023).

Research highlights that gamification in health-related applications extends beyond mere design elements. It involves the strategic application of game mechanics to non-game contexts. This approach is not just about making the app more enjoyable; it is about leveraging these mechanics to generate a range of benefits for users. These benefits include motivational boosts, which encourage regular use of the app, and social benefits, which can arise from features that allow users to interact or compete with others. Gamification can provide emotional benefits (Vaggelis Saprikis, Maro Vlachopoulou, 2023), such as enjoyment or relief from stress, and cognitive benefits, such as improved problem-solving skills or enhanced learning about health-related topics.

An abstract of a paper written by Winayaka Ruhur Pamungkas et al. (2022), articulates that while gamification in health-related applications is primarily seen as a tool for enhancing user engagement through fun and rewards, its impact is multifaceted. It encompasses motivational, social, emotional, and cognitive aspects, making gamification a powerful tool in the realm of mobile health services.

2. Methods to evaluate health applications

In the field of health app evaluation, various strong methodologies can be used to comprehensively assess their efficacy and impact on user intent to use the application. Usability testing stands as a foundational approach, involving the examination of user interactions to identify the app's ease of use and overall user experience (Danielle E Jake-Schoffman et. al., 2017). Experimental designs, such as controlled experiments, offer a structured framework to measure the effectiveness and influence of health apps on predefined outcomes. Field testing extends the evaluation into real-world scenarios, providing insights into the app's performance across diverse user populations and natural environments. Observational studies, conducted through large databases or case series, delve into app use, user satisfaction, and the predictive value of app use on both behavioural and clinical outcomes. Researching the scientific support, literature review and scientific verification methods scrutinise apps based on the reliability of scientific sources and clinical validation obtained from literature databases. User-oriented assessments, considering consumer ratings, reviews, and feedback, offer a valuable perspective on the perceived quality of the app from the end-users. Peer-reviewed literature provides a scholarly lens to identify apps with a proven evidence base and demonstrated effectiveness. Additionally, the utilisation of specific quality assessment tools ensures a meticulous evaluation, surrounding factors like compliance with best practice standards and user experience. Integrating these diverse methodologies will not only offer a holistic understanding of health apps but also contribute to the advancement of knowledge in this ever growing field.

2.1. Evaluating health application: a Usability Testing method

The journal article by Danielle E Jake-Schoffman et. al., (2017) covers the methods for evaluating the content, efficacy, and usability of commercially available health apps. The publication defines four methods that can be used on health apps to determine content, usability, and efficacy. The first method is *Content Analysis,* a research methodology that involves coding and interpreting qualitative, usually text-based material. Health applications that are commercially available include various features, medical information and guidance which all can be subject for content analysis. While content analysis can require a straightforward description of the included content, an alternative approach involves choosing a comparator for

assessing the app content. In scientific literature, three frequently utilised comparators are clinical guidelines, evidence-based protocols, and behaviour change techniques. Certain studies employing content analysis have compared the app content with clinical guidelines established by professional organisations. This method facilitates the identification of apps that extensively integrate clinical guidelines, revealing potential content gaps in other apps. Furthermore, it bestows credibility upon commercial apps that receive high scores from researchers, clinicians, and patients. However, analysing content in commercial apps presents four primary challenges. The first hurdle stems from the variability in how apps incorporate clinical guidelines, evidence-based strategies, and behaviour change techniques. For instance, while one app may allow users to set behavioural goals, a more comprehensive approach during behavioural counselling involves aiding users in selecting realistic and measurable goals, coupled with guidance on adjusting these goals based on performance over time. In this scenario, app developers must exercise judgement to determine if the implemented goal-setting aligns with the intended fidelity threshold. To enhance the evaluation of app content, researchers are advised to explicitly define the threshold for each behavioural strategy. Utilising continuous rating scales, instead of binary indicators, can provide a more nuanced assessment of the extent to which a particular strategy has been implemented.

The second method to evaluate and assess the health application features is *Usability Testing*, a method that refers to how well an app functions and whether or not it serves its intended purpose. Usability is commonly assessed through various dimensions, including user evaluations of app flexibility, operability, understandability, learnability, efficiency, satisfaction, attractiveness, consistency, and error rates. Conducting usability testing tailored to a specific target population can prove especially beneficial for researchers or clinicians whose work centres around that particular demographic. Usability testing can be conducted in a laboratory where users are asked to carry out specific tasks with an app in a controlled setting with extensive observation. Conducting testing in a laboratory setting can be advantageous, particularly when evaluating usability within a specific population that may possess distinct characteristics compared to the company's targeted users. An inherent limitation of usability testing is its potential inability to accurately replicate user interactions with the app in real-world scenarios. Consequently, more extensive field testing may become imperative. Conducting field testing or mobile in-the-wild testing

enables the observation of how individuals utilise the app in their everyday lives, providing a deeper understanding of its real-world usage. This approach allows for assessing the app's usability within a specific target population or determining the most suitable app for a given demographic. While field tests offer valuable data, the dynamic nature of app usage in real-life settings makes direct observation challenging. Additionally, the findings may only be applicable to the selected user sample, which is often limited in size. Therefore, obtaining additional evidence on app usability across diverse populations becomes crucial to gain comprehensive insights into which apps are most fitting for specific demographics.

The third approach for evaluating and assessing the features of health applications is through *Observational Studies*, a method employed to measure app usage, user satisfaction, and the predictive impact of app use on both behavioural and clinical outcomes. These studies can be carried out using extensive user databases or by conducting case series involving a smaller user sample to assess outcomes tracked by the app. While observational studies do not establish causality, such as the app's efficacy on a particular outcome, they are valuable for exploring associations between app use and various outcomes. For instance, a study on users of popular weight loss apps could investigate whether the duration of app use is linked to greater weight loss. Observational studies also furnish insights into the duration of real-world use for specific user types. For example, employing ecological momentary assessment allows the collection of data multiple times throughout the day, offering information about usage patterns across different individuals or intra-individual usage patterns, Danielle E Jake-Schoffman et. al., (2017).

The final approach when evaluating the features of health applications is *Efficacy Testing*, a method considered to be crucial in establishing whether use of a commercial app results in meaningful change in behaviour and clinical outcomes. The perfect approach to efficacy testing is the Randomised Controlled Trials (RCT). A crucial decision point in Randomised Controlled Trials (RCTs) involves selecting an appropriate control or comparison group, with each option tailored to address a specific research question. Usual care control groups, for instance, aim to determine if a commercial app enhances conventional care. On a contrary, there might be an interest in assessing whether a behavioural strategy delivered through an app surpasses the same strategy when delivered through a traditional method. In such cases, a noninferiority trial utilising the traditional condition as a comparator becomes suitable.

If the research question revolves around whether an app improves upon standard practice, a comparison can be drawn between standard practice with and without the app. Comparative effectiveness studies, encompassing both equivalence and noninferiority designs, may involve comparing two apps or an app with an alternative treatment approach. For instance, in one RCT, researchers investigated whether a newly developed investigator-generated smoking cessation app, employing a novel behaviour change model, exhibited greater effectiveness than a commercially available app (Jonathan B. Bricker et. al., 2014).

Investigations into commercial health apps can assume various forms, contingent upon the specific research question and the time and resources available for completion. No singular methodology reigns supreme, as each offers distinct types of evidence along with a unique set of advantages and limitations. Research on these apps in the commercial realm serves as a valuable counterpart to studies that delve into the creation and testing of innovative apps within academic laboratories. Both approaches contribute significantly to the literature, working in tandem to advance the health-related applications space and fortify its foundation with empirical evidence.

2.2. Evaluating health application: Identification, Characterization, and Assessment method

Another great way to evaluate the health applications is through identification, characterization, and assessment as covered by Alessia Paglialonga et. al., (2018). The purpose of this evaluation is to give users relevant and meaningful knowledge about the application before starting to use it. Starting with *Identification,* the key is to fulfil the specific needs and diverse source of information in order for users to better understand about the health application itself. The authors of the journal paper investigate the studies conducted on different target groups (medical doctors, medical students, as well as citizens) and the conclusion was that "...users tend to be concerned about app overload and may have difficulty in keeping an overview of all the health apps that are available".Furthermore, the abundance of information within app markets is often disjointed, posing a challenge for the public to discern sound guidance from suboptimal advice. This difficulty is exacerbated by the frequent absence of proper references and supporting scientific information. In an effort to address these limitations, various online resources have been introduced to catalogue, provide commentary on, and review health-related apps. These resources encompass

web portals, communities of both experts and users, app repositories, as well as news sites. An additional valuable information source, particularly for researchers and healthcare professionals, is peer-reviewed literature. Journal articles frequently serve as a reliable starting point for identifying apps with a proven evidence base and demonstrated effectiveness. However, the time lag between app release and article publication can be considerable, influenced by study duration as well as the additional time required for peer-review and editing processes. Consequently, the most recent health apps, even if scientifically sound and reliable, might face challenges due to the lack of immediate evidence.

Moving on to the *Characterization* of a health application features, is another method to evaluate. Various solutions have been proposed for characterising, classifying, and comparing apps to meet diverse user needs in different contexts. Some methods have a broad scope, while others concentrate on specific target user groups, diseases, or medical domains. The more general approaches utilise overarching features, allowing them to characterise a wide array of apps across multiple specialties. In contrast, the more specific methods address features relevant to particular application areas or considered conditions. Based on the authors the "Examples of general features include, for example, the target user (e.g., healthcare professionals, medical or nursing students, or patients), the intervention strategy (e.g., tracking health, involving the healthcare team, providing health information), or the app's function." In general, the diverse methods of characterization prove valuable for assessing individual health apps or for comparing and categorising apps within a specific domain by assessing their features. However, merely ranking descriptive features is not inherently adequate for obtaining reliable estimates of app quality. Recognizing the need for methods that can comprehensively assess app quality, various approaches have been introduced, each capable of highlighting one or more components of app quality, as outlined in the following sections.

Lastly, the *Assessment* of an app predetermines the quality in a variety of ways, both qualitatively and quantitatively. One of the key elements of quality in health apps is evidence-base. This method can help in identifying apps that effectively integrate guidelines and also pinpoint potential shortcomings in the content of apps. Another crucial aspect associated with the evidence base involves scientific verification and clinical validation. In this regard, certain studies have devised techniques to evaluate apps by gauging the reliability of scientific sources accessible through literature

databases. Finally, a fundamental aspect of app quality pertains to the users' viewpoint. Evaluating the user-oriented aspects of quality is a pressing matter because information presented on app stores, such as consumer ratings and reviews, can be deceptive and often proves an unreliable measure of quality. Consequently, attempts have been undertaken to establish methods for assessing app quality based on the perceptions of end users.

To sum up, it is becoming increasingly evident that crafting high-quality health apps is intertwined with the formulation of guidelines for app identification, characterization, and evaluation. The development of recommendations and constraints for health app development is imperative, and this goal can only be accomplished through a collaborative, multidisciplinary, and multi-stakeholder effort.

2.3. Evaluating health application: Usability and Quality ratings method

Authors Peyman Azad-Khaneghah et. al., (2020) in their own research backs up the previously covered paragraph on health apps usability and quality ratings. This methodological approach, combining systematic literature review and an exploration of the grey literature, demonstrated a thorough and exhaustive effort to identify and evaluate existing usability and quality rating scales. The comprehensive analysis of 87 peer-reviewed articles yielded a significant discovery of 24 usability scales and 25 quality rating scales and the conclusion was "...existing usability and quality rating scales are targeted at professionals, not end users who are patients or caregivers. Rating scales that are usable by all end-users would make mobile health apps accessible and meaningful to consumers." The identified gap in the usability and quality assessment tools became the main point of their conclusion. The authors emphasised that these scales, primarily designed for professionals, might not be suitable for the broader category of end-users. Such end-users, encompassing patients and caregivers, represent a diverse group with varying levels of technological literacy and healthcare knowledge. The main conclusion arising from their study underscored the urgent need for the development of rating scales that are not only applicable but also user-friendly for all end-users. The ultimate goal is to make mobile health apps more accessible and meaningful to a wider consumer base, aligning with the inclusive principles of patient-centred care. This research, thus, not only contributes valuable

insights to the academic community but also advocates for practical changes in the healthcare technology landscape, emphasising user inclusivity and empowerment.

2.4. Evaluating health application: Objective Assessment method

Another methodology of assessing the health apps is *Objectively Assessing and Comparing the User Experience* as covered in an article by Maciej-Hyzy et.al., (2023). In short the authors have conducted a review on two thousand apps available on the marketplaces and have identified the appetite of users to use the available applications. For this method to be feasible, digital health apps must demonstrate effectiveness and safety in usage. The quality, characterised by "compliance with best practice standards," must reach the utmost standard for healthcare professionals to endorse these apps. An integral facet of app quality is the user experience (UX). Ensuring a positive UX for digital health apps is essential to guarantee safe and intended usage of the technology. The aim of this study was to outline prevalent practices associated with UX in the design of digital health apps. The research concluded that users are more keen on using the health applications that are effective, safe to use and endorsed by healthcare professionals which leads to a positive user experience.

2.5. Evaluating health application: Scoping Review method

Another approach to evaluating the health applications is *Scoping Review,* a comprehensive search of scientific literature, databases and reference lists that helps to understand the usability methods and attributes of health applications, a research paper published by Susanne Grødem Johnson et. al, (2022). The review combined eighty eight articles involving ninety eighth studies, mainly related to medical and nursing students and conducted within twenty two countries. The study consisted of five stages that include: identifying the research question, identifying relevant studies, selecting studies, charting the data, and summarising and reporting the results. Firstly there were two questions formulated: “Which usability methods are used to evaluate the usability of mobile apps for health care education? Which usability attributes are reported in the usability studies of mobile apps for health care education”. Secondly, ten electronic databases were chosen to be used in the research which mainly consisted of scientific literature, journal articles and medical information. Thirdly, the selection of two studies of independent authors which covered health care, usability

testing methods and typical education setting. Fourthly, extraction of data about the study and descriptions of usability attributes have not been standardised, therefore, a review author used deductive analysis to interpret the usability attributes reported in the included studies. Lastly, summarising and reporting the results in a feasible matter such as tables and graphical illustration. The conclusion of this research is that the predominant methods employed in assessing usability were experimental designs, with a significant portion of studies utilising field testing. The results can support the planning and conduct of future usability studies for the advancement of mobile learning apps in health care education.

2.6. Evaluating health application: Practical Use method

Final research methodology, an article published by Jean-Marie Bonnin et al., (2018) covers the practical use of medical equipment that is linked with the health application. As per authors view, the technologies essential for developing pervasive health apps with extensive and seamless interactions in their surroundings are now readily accessible. Numerous research studies and experiments have showcased the genuine capability of health apps to engage with their environment. Nevertheless, the design, testing, and ensuring the continuous maintenance and evolution of pervasive health apps pose significant challenges. Specifically, there is a deficiency of tools to empower developers to create apps capable of adapting to increasingly intricate and dynamic environments (such as the addition or removal of sensors, dealing with failures, and accommodating mobility). The paper articulates a vision to mitigate this complexity, drawing on our ongoing research in smart environments and personalised health monitoring apps. Using SAM, a smart asthma monitoring app, as an illustration, it emphasises the necessity for a comprehensive set of new interactions to assist health app developers in interacting with users' environments, particularly for obtaining more intelligent access to data. The discussed requirements include the minimum quality level of the data, methods to adapt to diverse sources (data fusion/aggregation), network mechanisms for data collection (network/link level), and the collection of raw data from sensors. The paper delves into potential solutions to address these requirements.

In summary, the field offers numerous excellent methods in order to evaluate the health-related applications’ for the intention to use them by the end-users. One

particular method that stood out during the overview is Usability Testing and Content Analysis within the method of evaluation. It involves interpreting qualitative and usually text-based material that allows better understanding of the intentions of users to use the health application and for research methodology usually there are three predetermined factors that allows to analyse the application: clinical guidelines, evidence-based protocols, and behaviour change techniques. While other methods are also great in their way, some of them lack depth, continuity and concrete results such as Scoping Review. Since the Usability Testing method provides a more vast approach to analyse the health-related application the method will be used further in the thesis to compare two applications and provide insights, results and conclusion.

3. Content Analysis of MyFitnessPal and Lose It! applications

For the methodological part of this thesis a Content Analysis was chosen as the best way to compare two health-related applications: MyFitnessPal and Lose It!. This method was chosen as the perfect way to compare, analyse and give insights as there were several problems identified with the complexity and data restriction on both applications. The problems with data were identified as: (i) sensitive data collection; (ii) sensitive data anonymization; (iii) sensitive data protection and safekeeping; as per General Data Protection Regulation (GDPR) of Regulation (EU) 2016/679 (2023). GDPR categorises sensitive user data, inclusive of but not limited to racial, political, religious, trade union membership, genetic, biometric, sexual orientation, and **health details** of individuals within the European Union (EU) (European Commission, 2023). To adhere to these regulations and mitigate the risk of mishandling sensitive data or potential data breaches, the Content Analysis methodology became the most fitting choice. This method deviates from conventional data manipulation techniques like descriptive, diagnostic, predictive, prescriptive, and discovery analytics, as covered by Mohamed Khalifa in 2018. Content Analysis, distinguished by its emphasis on coding and interpreting qualitative, often text-based material, proves to be an apt form of evaluation for both applications. MyFitnessPal and Lose It! being commercially available platforms with various features, medical information, and guidance, align seamlessly with the approach of Content Analysis. By delving into the qualitative aspects of the content within these applications, this methodology allows for a fine distinctive search of the user experience, feature efficacy, and the handling of sensitive health-related information, ensuring a comprehensive and privacy-conscious comparative analysis.

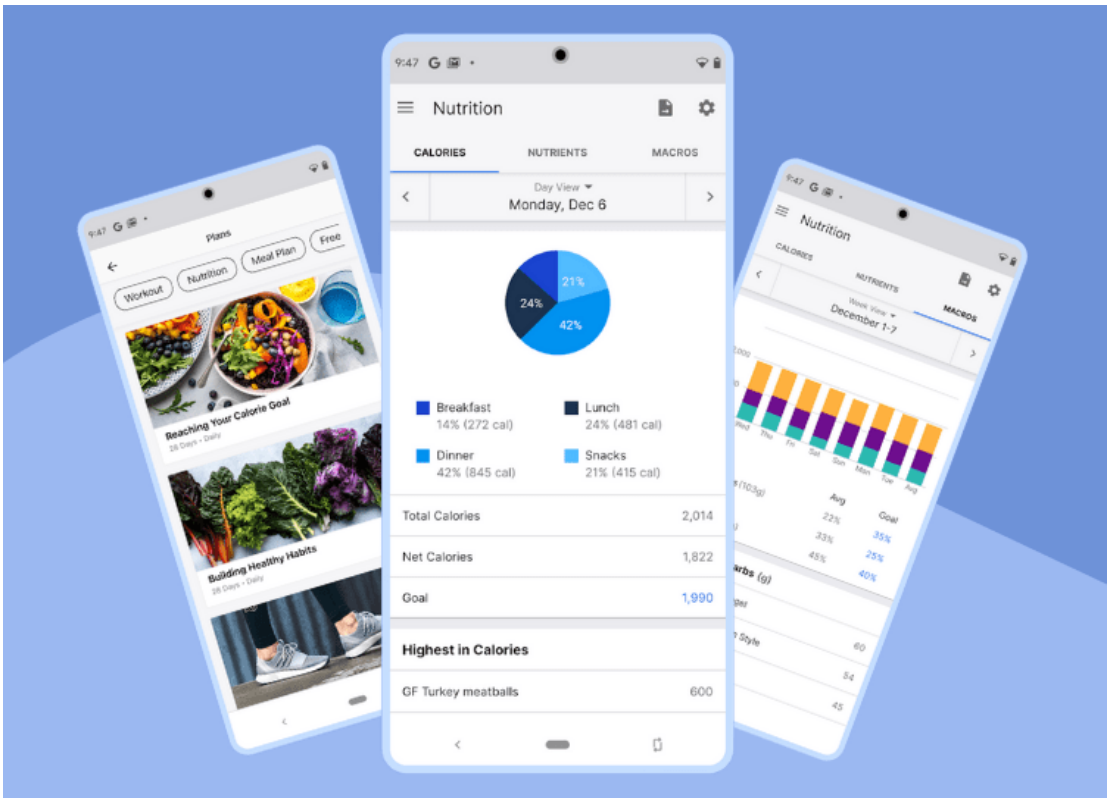
3.1. Overview of MyFitnessPal application

Leading the way in the ever-evolving world of fitness and health applications, MyFitnessPal offers a range of features that are painstakingly crafted to guide users on their path to improved health. The application's core is a large nutritional database that functions as a kind of digital compass, giving users a sophisticated tool to map out their exercise and food habits in great detail. Those who use this all-inclusive resource get a significant understanding of their general health and are better equipped to make decisions that fit their particular lifestyles.

The application's nutritional database is a strong base that includes a wide range of food items and nutritional data. By easily logging their meals, users can obtain a thorough picture of their daily dietary intake and nutritional balance as seen from Figure 1.

Figure 1

UI/UX of application MyFitnessPal



Source: FitnessDrum (2023)

In addition to capabilities that go beyond food tracking, the detailed mapping of dietary decisions is enhanced by the addition of exercise activities, giving users' health attempts a comprehensive picture. This versatile gadget serves as a personal health companion, helping users make lifestyle decisions that support their fitness and health objectives and help them better comprehend the subtleties of their behaviours. MyFitnessPal is dedicated to empowering its users in ways that go beyond simple tracking features. By converting data into useful insights, the program helps users feel in charge of their own health journeys. MyFitnessPal transforms from a monitoring tool into a personalised advisor by giving users access to a multitude of information, which helps them make educated decisions and raises their awareness of their general

well-being. MyFitnessPal functions as an invaluable ally by combining elements that enable users to lead better, more educated lifestyles in addition to providing guidance throughout their wellness journeys.

The unique selling point of MyFitnessPal is how well it incorporates gamification features, which is a calculated move that significantly increases user incentive and engagement, see Figure 2.

Figure 2

Gamification elements within MyFitnessPal application

Source: TheSweetSetup (2023)

The program is more than just useful; it makes the quest for health a fulfilling, engaging, and dynamic experience. A pivotal aspect of this gamified approach is the incentive scheme, whereby individuals obtain badges as symbols of acknowledgment

for accomplishing noteworthy objectives and consistently recording their meals. These badges, which function as physical representations of achievement and are similar to virtual prizes, make tracking health outcomes visually rewarding. MyFitnessPal's gamification strategy goes far beyond just providing incentives. With the app's large user base, it creates a sense of accomplishment and community that serves as the basis for developing positive behaviours. The community feels a tangible sense of accomplishment as members unlock badges for maintaining healthy behaviours or reaching fitness objectives, which promotes a spirit of support and triumph among all. This group's celebration of accomplishments goes beyond the digital sphere, fostering a community of support where users are inspired, encouraged, and linked by one another's wellness journeys. Essentially, MyFitnessPal's deft application of gamification is more than just a tool; it's a game-changing tactic that makes the quest of health an engaging and socially enriching activity. With this creative methodology, the application fosters a lively and connected community centred around the shared objective of attaining and commemorating a healthier lifestyle, while also enabling individuals to take control of their well-being.

MyFitnessPal has a global reach, fostering a large and diverse community that uses the platform as a guide for their health and fitness goals, see Table 1. This enormous user base illustrates the app's worldwide appeal and ability to connect with people from all around the world. MyFitnessPal operates as an integral part of the Under Armour brand, within a visionary ecosystem dedicated to improving the convergence of technology and well-being. The collaboration between MyFitnessPal and Under Armour demonstrates a dedication to a common goal that goes beyond the normal limitations of functionality. Far more than a simple software, MyFitnessPal symbolises a genuine commitment to democratising health, seeking to make wellness accessible to people of all backgrounds and lifestyles. This aim is consistent with a broader vision of transforming the landscape in which technology plays a critical role in improving the general well-being of humans worldwide.In essence, as a member of the Under Armour family, MyFitnessPal serves as a beacon of equality and accessibility in the area of health and fitness technology. MyFitnessPal not only guides users on their personal wellness journeys but also actively contributes to the transformation of a world where everyone, regardless of background, has the tools and resources to prioritise and achieve optimal health by fostering a global community and championing a mission that goes beyond conventional expectations.

Table 1

Key figures related to MyFitnessPal application

Key figures	**MyFitnessPal**
Parent entity	Under Armour, Inc.
Registered users	200+ million
Monthly users	*Information unavailable*
Marketplace rating	4.6 on average
Annual revenue	$247 million (2022)
Weight loss	180+ million pounds (2014)

Source: compiled by author based on MyFitnessPal (2023)

MyFitnessPal envisions a world in which technology easily integrates into the fabric of daily activities, igniting a holistic and complete approach to health. The application's unwavering commitment to user-friendly features, as well as its strategic implementation of gamification, are at the forefront of this vision, both of which not only align with its mission and vision, but also position MyFitnessPal as a dynamic and supportive ally in the personalised journey toward health and well-being. MyFitnessPal's focus on user-friendly features demonstrates its passion to make health and wellbeing accessible to all. The application's straightforward design and simple layout contribute to a smooth user experience, allowing people of all technology backgrounds to easily integrate health tracking into their daily life. By lowering entry hurdles, MyFitnessPal transforms into a versatile tool that enables people to take charge of their health without adding unneeded complexity. Gamification strategically integrated within MyFitnessPal raises the user experience even further, making the pursuit of health into an interesting and rewarding journey. This gamified method not only increases motivation but also infuses a sense of accomplishment and community, transforming health tracking into a pleasurable and socially connected activity. In this way, MyFitnessPal serves as a beacon, directing people toward a more empowered and balanced living. MyFitnessPal's futuristic ambition, in essence, goes beyond the usual notion of a health app. It imagines a world in which technology is seamlessly woven into the fabric of daily life, making health and well-being a vital and joyful part

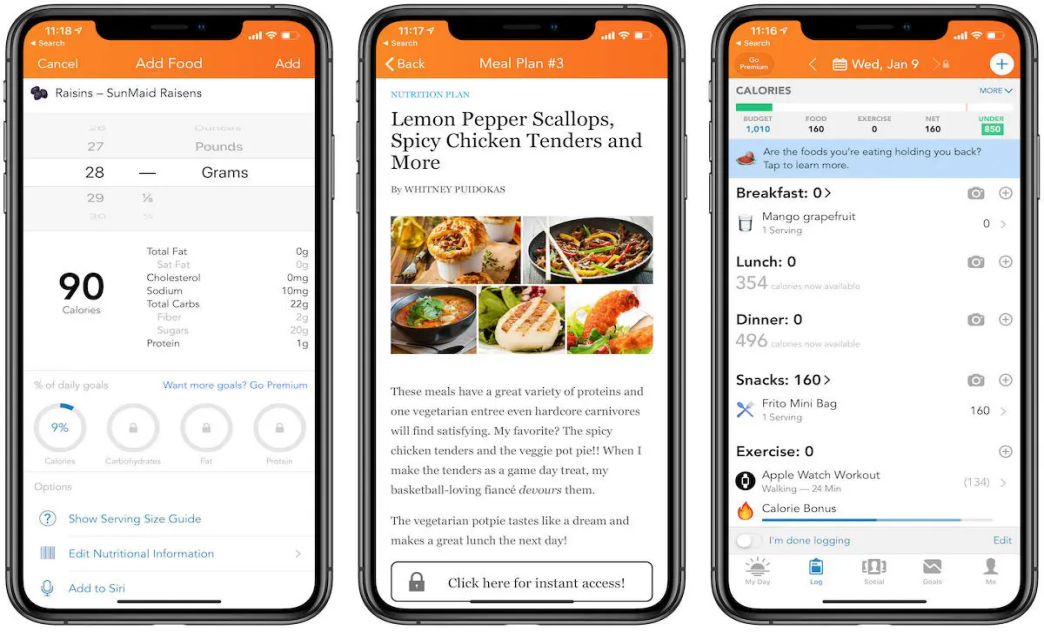
of each individual's journey. MyFitnessPal is at the forefront of this transformative vision, serving not just as an application but also as a dynamic companion, encouraging and supporting users on their journey to a healthier and more satisfying life.

3.2. Overview of Lose It! application

Lose It! distinguishes out in the health and fitness app landscape by providing a complete set of tools that have been thoughtfully created to guide users on their weight reduction journeys. A user-friendly platform intended for smooth calorie tracking is fundamental to its functionality. This critical feature enables users to diligently document their daily food consumption and stick to individually adjusted calorie targets, resulting in a real and practical tool for efficient weight management. Lose It! distinguishes itself by emphasising simplicity and user-centric design, resulting in an environment in which users can easily record and track their dietary decisions.

Figure 3

UI/UX of application Lose It!



Source: MacWorld (2023)

The application lays a heavy emphasis on facilitating efficient and effective weight control. Users can not only create individualised weight loss targets, but also

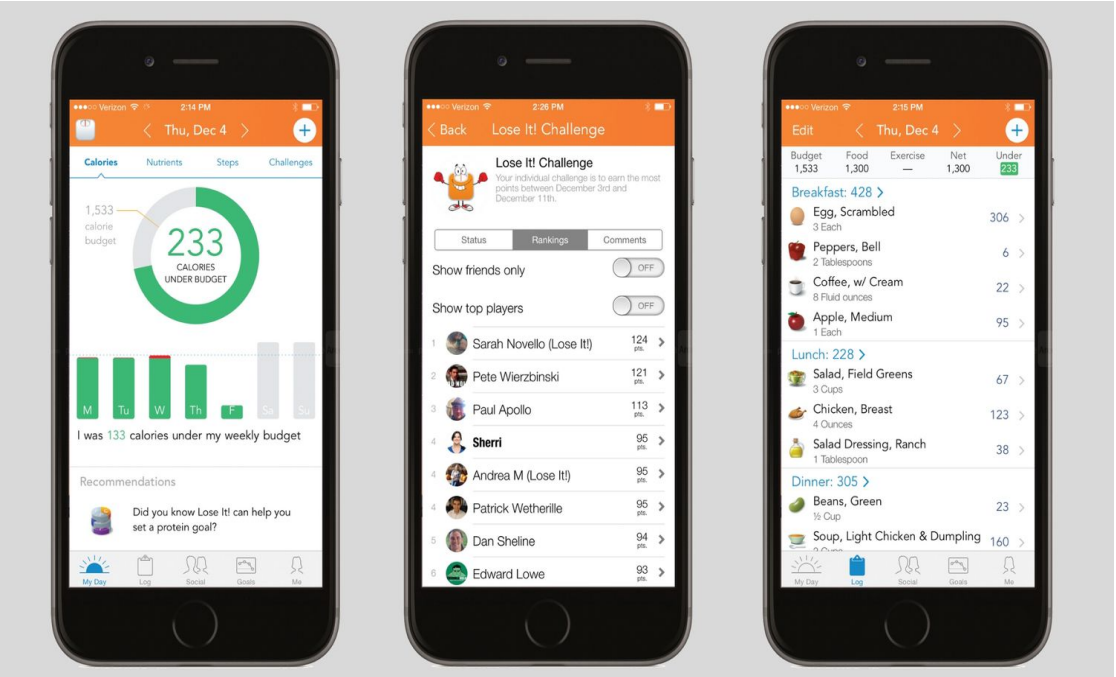
track their progress using simple visual tracking tools. These tools, distinguished by their clarity and ease of use, enable individuals to visualise their journey, delivering insights that aid informed decision-making in pursuit of their health goals.

In summary, Lose It! has positioned itself as more than simply a calorie-tracking app; it is a comprehensive ally in the weight loss path. Lose It! strives to enable individuals to take charge of their health in a practical and accessible manner by incorporating user-friendly features with an emphasis on healthy weight management.

While Lose It! does not have as many obvious gamification components as some of its competitors, it carefully incorporates community challenges and social features to increase user engagement. These features combine to create a one-of-a-kind platform where users may focus on personal health goals while also connecting with a larger community.

Figure 4

Gamification elements within Lose It! application



Source: Lifewire (2023)

The introduction of community challenges adds a competitive yet supportive dimension, encouraging people to join and share their success. This community-driven

approach goes beyond the conventional solitary nature of health tracking apps, cultivating a sense of camaraderie in which users may celebrate accomplishments, provide encouragement, and share vital insights. Lose It! converts the weight loss journey into a communal experience by establishing a supportive atmosphere in which users motivate and uplift one another in their pursuit of improved health and wellness.

Lose It!, a FitNow, Inc. product, is driven by a mission that is strongly founded in empowering individuals to take control of their well-being through tailored weight management, see Table 2.

Table 2

Key figures related to Lose It! application

Key figures	**Lose It!**
Parent entity	FitNow, Inc
Registered users	40+ million
Monthly users	1.4+ million
Marketplace rating	4.7 on average
Annual revenue	$23 million (2022)
Weight loss	100+ million pounds (2023)

Source: compiled by author based on Lose It! (2023)

The company's ultimate mission is to contribute to a healthier society by harnessing technology to give individualised solutions for weight management. FitNow envisions a future in which technology effortlessly integrates into people's daily lives, removing obstacles to access and making weight control an integral part of a variety of lifestyles.

The company's dedication extends beyond standard health app goals. FitNow aspires to build an environment in which people of all backgrounds may easily access products that not only aid in weight loss but also fit effortlessly into their everyday routines. FitNow aspires to reinvent the relationship between individuals and their health by envisioning a future in which technology functions as a catalyst for increased well-being, fostering a holistic approach that is both individualised and accessible to all. Lose It!, in essence, symbolises FitNow's vision of a world in which

technology is a seamless and integral partner in the journey toward better, more satisfying lives.

Lose It! goes above and beyond what one may anticipate from a health app, representing a perfect combination of simplicity and efficacy in its features while also cultivating a sense of community and support. Lose It! promotes itself as a loyal ally, tuned in to the individual needs and objectives of its customers on their quest to better health and fitness.

The app's simplicity is obvious in its user-friendly design and easy capabilities, which make it accessible to users of all technological levels. Behind this simplicity, however, is a powerful tool that empowers people to take control of their weight reduction and overall well-being. Lose It! evolves from a digital assistant to a dependable partner who understands, encourages, and accompanies users through the struggles and successes of their health goals..

Furthermore, the app's emphasis on community and support fosters a holistic environment in which users do not feel alone on their wellness journey. Lose It! becomes a place for collective motivation and inspiration by enabling individuals to interact and share their experiences, challenges, and achievements. In essence, Lose It! is more than just an app; it is a companion dedicated to aiding and appreciating the transforming and personal nature of each user's health and wellness journey.

3.3. Content Analysis Comparing Gamification Elements in MyFitnessPal and Lose It!

To conduct a conceptual content analysis of the eight predetermined gamification elements of MyFitnessPal and Lose It! applications, the following steps were conducted and analysed:

1. **Data Preparation.** Table that compares MyFitnessPal and Lose It! across eight gamification elements, see Table 3.

Table 3

Eight predetermined gamification elements of MyFitnessPal and Lose It!

Gamification Element	MyFitnessPal	Lose It!
Badges and Achievements	Yes, awards badges for milestones	Limited badge system for tracking goals
Points and Streaks	Yes, users earn points and track streaks	Limited point system
Challenges	Offers challenges for users to join	Occasional community challenges
Social Integration	Users can connect with friends	Users can connect with friends
Notifications and Reminders	Sends reminders and notifications	Sends reminders for tracking
Goal Setting	Encourages users to set goals	Encourages users to set weight goals
Tracking and Visualization	Provides visual tracking and graphs	Offers progress tracking and visual tools
Rewards for Consistency	Rewards consistent tracking	Rewards consistency with progress

Source: compiled by the author

2. **Coding for Existence and Frequency of Gamification Elements.** Coding for the existence of each element in both apps. The presence of an element is coded as *Yes*, and the absence as *No*. If only some features are present but not in full it is coded as *Limited,* See Table 4.

Table 4

Eight coded gamification elements of MyFitnessPal and Lose It!

Gamification Element (coded)	MyFitnessPal	Lose It!
Badges and Achievements	YES	LIMITED
Points and Streaks	YES	LIMITED
Challenges	YES	LIMITED
Social Integration	YES	YES
Notifications and Reminders	YES	YES
Goal Setting	YES	YES
Tracking and Visualization	YES	YES
Rewards for Consistency	YES	YES

Source: compiled by the author

3. **Analysis.** In depth Content Analysis of MyFitnessPal and Lose It!

3.3.1. Content Analysis: Comparing of Badges and Achievements

This paragraph is an overview of gamification elements Badges and Achievements of both MyFitnessPal and Lose It! applications in Content Analysis retrospective. The paragraph covers coding, analysis and comparison of both applications and provides conclusions.

Table 5

Content Analysis of Badges and Achievements of MyFitnessPal and Lose It! applications

Gamification element	MyFitnessPal	Lose It!
Badges	Existence: A notable element of MyFitnessPal is its dynamic badge system, which is deliberately meant to recognize and reward users for various achievements and milestones. The badges cover a wide range of accomplishments, encouraging variation and personalization. Frequency: The persistent emphasis on badges throughout the offered information demonstrates that MyFitnessPal acknowledges the importance of visually reflecting users' successes. The wide variety of badges guarantees that users have numerous options for acknowledgment, which boosts their drive.	Existence: Lose It! also has a badge system, albeit with a more limited description than MyFitnessPal. While the material recognizes its presence, the amount of detail demands a more straightforward approach. Frequency: The information hints that, while badges are part of the gamification plan, they may not be as closely woven into the user experience as they are in MyFitnessPal. The description's simplicity suggests a more basic application.
Achievements	Existence: Achievements are effortlessly interwoven into MyFitnessPal's gamification philosophy, serving as tangible indicators of users' progress. These accomplishments go beyond app interactions and reflect real-world health and fitness breakthroughs. Frequency: achievements are mentioned implies that they are not merely an additional feature, but a critical component of user incentive. MyFitnessPal uses accomplishments to recognize and support members on their health journeys.	Existence: Achievements in Lose It! are mentioned in the context of users attaining specific weight loss or health milestones. The emphasis appears to be on recognizing achievements that coincide with the app's primary goal of weight management. Frequency: While accomplishments are recognized, the content suggests a more easy integration, perhaps providing users with a clear and uncomplicated approach for measuring progress.
Findings	MyFitnessPal stands out for its intricate integration of Badges and Achievements. The sophisticated badge system, together with milestones related to real-world goals, contributes greatly to a holistic and motivating user experience. The frequency of mentions emphasises the strategic importance of certain gamification aspects in the app's design.	Lose It! takes a simpler approach to Badges and Achievements. The app's emphasis on simplicity is consistent with its underlying theme of effective weight management without needless complexity. While badges and achievements are available, they may play a more simplified function in user motivation.

Source: compiled by the author based on MyFitnessPal and Lose It! features (2023)

MyFitnessPal is a robust and dynamic badge system that helps to motivate and engage users in their health and fitness journey. This method is intended to celebrate various accomplishments, instilling a sense of accomplishment and encouraging constant app use. MyFitnessPal offers a large variety of badges, each of which is linked to certain achievements or milestones. These accomplishments can include consistently documenting meals for a set number of days, meeting specific calorie or nutritional targets, or attaining weight loss milestones. Many of MyFitnessPal's badges are goal-oriented, coinciding with users' health and fitness goals. Users might, for example, receive badges for meeting weight loss objectives, completing fitness challenges, or sticking to a steady exercise schedule. The badges are visual incentives that individuals can display proudly on their profiles. This visual representation of accomplishments not only delivers a sense of accomplishment, but it also serves as a source of encouragement, urging users to maintain their healthy behaviours. The badge mechanism of MyFitnessPal substantially encourages ongoing app engagement. Users are encouraged to report their meals and activities on a regular basis in order to preserve their streaks and win badges. Consistent tracking is a critical component of accomplishing health and fitness objectives. Users can browse their friends' accounts and compare their badges. This competitive element gives the badge system a social dimension, driving users to outperform their colleagues and accomplish new goals.

Lose It! also has a badge system, however it is more limited than MyFitnessPal. The Lose It! badge system recognizes users for key milestones and successes in their weight management journey. Lose It! rewards users with medals for attaining specific weight loss or health objectives. These milestones could include decreasing a certain amount of weight, consistently reporting meals, or monitoring for a given amount of time. The badge system in Lose It! is simple and basic. Users may quickly identify the badges they have achieved and the achievements they are working towards. Lose It! badges, like MyFitnessPal, serve as a form of acknowledgment and incentive. Users receive positive reinforcement for their accomplishments, which might help them stick to their weight loss goals. Lose It!'s badge system complements the app's goal-setting features. Users establish their own weight loss or health objectives, and the badges provide concrete recognition when those objectives are attained.

Finally, the analysis demonstrates that MyFitnessPal and Lose It! take different ways to incorporate Badges and Achievements into their gamification techniques. The

emphasis on diversity, detail, and the seamless integration of accomplishments into real-world goals in MyFitnessPal contributes to a comprehensive and engaging user experience. Lose It!, on the other hand, emphasises simplicity, matching badges and achievements more closely with weight management goals. These various tactics demonstrate how each application tailors gamification to its specific user group and overall program objectives.

3.3.2. Content Analysis: Comparing of Points and Streaks

This paragraph is an overview of gamification elements Points and Streaks of both MyFitnessPal and Lose It! applications in Content Analysis retrospective. The paragraph covers coding, analysis and comparison of both applications and provides conclusions.

Table 6

Content Analysis of Points and Streaks of MyFitnessPal and Lose It! applications

Gamification element	MyFitnessPal	Lose It!
Points	Existence: MyFitnessPal uses a comprehensive point system tied to a variety of activities such as food tracking, exercise tracking, and health-related information. Points are a measurable indicator of a user's engagement and development. Frequency: The point system is continuously emphasised in the presentation, emphasising its importance in motivating users to interact with the app on a regular basis. The assignment of points to specific goals increases their motivational value.	Existence: Lose It! has a simpler point system that rewards users for tracking their meals, exercise, and other health-related activities. While it is not as thorough as MyFitnessPal's points, it does provide a meaningful indication of user participation. Frequency: The point system is mentioned in the presentation, showing its importance in driving users to interact with the app on a frequent basis. The system's simplicity is consistent with Lose It!'s general strategy.
Streaks	Existence: MyFitnessPal's gamification method includes streak tracking, which rewards users for consecutive days of app activity. Streaks for various activities can be developed, developing a sense of discipline and devotion. Frequency: The advertising emphasises the importance of streaks on a constant basis, portraying them as a powerful motivator for users to maintain everyday interactions. The app's visual display of streaks contributes to their importance in user engagement.	Existence: Lose It! allows for streak tracking, albeit with less focus than MyFitnessPal. Users are urged to register meals on successive days, which contributes to a sense of consistency. Frequency: While streaks are acknowledged, the material suggests that Lose It! may not place as strong an emphasis on streak tracking as MyFitnessPal. The feature exists, however it may not be as prominently shown.
Findings	MyFitnessPal is notable for its strong integration of Points and Streaks. The point system is a dynamic measure of users' activity, and streaks provide a degree of dedication and discipline to the gamified experience. The frequency of mentions emphasises their critical function in encouraging regular app usage.	Lose It! takes a more straightforward approach to Points and Streaks. While not as thorough as MyFitnessPal, the point system serves its function in motivating users, and streak tracking, while included, may not be as important to the user experience.

Source: compiled by the author based on MyFitnessPal and Lose It! features (2023)

MyFitnessPal uses a thorough point system and streak monitoring to encourage users to use the app on a regular basis and stick to their health and fitness habits. These gamification features are essential to the user experience and can help develop motivation and adherence to healthy habits. MyFitnessPal awards points for various actions such as food planning, exercise tracking, and measuring health-related indicators. Each activity that a user completes earns them points. These points are frequently linked to specific goals or successes, generating a sense of accomplishment and development. The point system incentivizes users to use the app on a daily basis. Users earn points for reporting their meals, exercise, and other health-related activities, which motivates them to stay consistent in their tracking efforts. MyFitnessPal places a high value on streak monitoring. Users are paid for using the app on consecutive days. Streaks can be developed for a variety of activities, such as documenting meals, meeting daily nutrient targets, or exercising consistently. As users attempt to maintain their streaks, this feature instils a sense of discipline and devotion. Within the app, users can visibly track their point totals and streaks. This visual representation allows them to track their development and see the results of their hard work. Increasing your point totals and streak lengths becomes a source of personal pride and inspiration. The point system and streak tracking in MyFitnessPal can add a competitive element, especially when users connect with friends within the program. Users can compare their point totals, streak durations, and achievements to those of their friends, encouraging friendly competition and inspiration.

Lose It! features a point system as well, but it takes a more straightforward approach than MyFitnessPal. While it encourages users to report meals and activities on a regular basis, it does not place as much focus on streak monitoring. Lose It! is a simple point system that rewards users for tracking their meals, exercise, and other health-related activities. Users gain points as they interact with the app, giving them a sense of progress and accomplishment. Lose It!, like MyFitnessPal, encourages users to register their meals and activity on a regular basis in order to earn points. This constancy is critical to accomplishing weight control and health goals. While Lose It! allows you to monitor consecutive days of logging, it does not prioritise streak tracking as much as MyFitnessPal. Streaks may exist, but they may not be as apparent. Lose It!'s point system serves as a form of motivation, as users strive to earn points by remaining engaged with the program. Points are a physical indication of their continued dedication to their health quest.

Finally, the analysis shows that Points and Streaks are important components of the gamification techniques in MyFitnessPal and Lose It!, albeit to varied degrees of complexity. MyFitnessPal takes a comprehensive and precise approach, employing powerful motivators such as Points and Streaks to encourage ongoing app usage. Lose It!, on the other hand, prefers simplicity, offering users a plain gamified experience. These various approaches illustrate the programs' efforts to personalise gamification aspects to their respective user bases' preferences and engagement styles.

3.3.3. Content Analysis: Comparing of Challenges

This paragraph is an overview of gamification element Challenges of both MyFitnessPal and Lose It! applications in Content Analysis retrospective. The paragraph covers coding, analysis and comparison of both applications and provides conclusions.

Table 7

Content Analysis of Challenges of MyFitnessPal and Lose It! applications

Gamification element	MyFitnessPal	Lose It!
Challenges	Existence: MyFitnessPal has a variety of challenge categories, such as step challenges, calorie-burning tournaments, and dietary challenges. This variety ensures that users with a variety of health and fitness goals can find challenges that meet their needs. Frequency: The advertisement stresses the presence of many challenge kinds, emphasising the app's commitment to catering to a wide user base with varying interests.	Existence: Lose It! offers users communal challenges and events on a regular basis. These challenges are usually based on specific health or fitness topics and may last for a set amount of time. Frequency: Lose It! challenges are described as "occasional," implying that they are not as frequently included as in MyFitnessPal.
Findings	The data shows that Challenges are essential to both MyFitnessPal and Lose It!, each with its own strategy. MyFitnessPal distinguishes itself with a wide range of challenge kinds, frequent competitions, and a strong emphasis on community building and recognition. Lose It!, on the other hand, provides challenges on a more irregular basis, frequently focusing on milestones and social support. These distinctions reflect the programs' tactics for using challenges to encourage user involvement, competition, and goal-oriented collaboration.	The data shows that Challenges are essential to both MyFitnessPal and Lose It!, each with its own strategy. MyFitnessPal distinguishes itself with a wide range of challenge kinds, frequent competitions, and a strong emphasis on community building and recognition. Lose It!, on the other hand, provides challenges on a more irregular basis, frequently focusing on milestones and social support. These distinctions reflect the programs' tactics for using challenges to encourage user involvement, competition, and goal-oriented collaboration.

Source: compiled by the author based on MyFitnessPal and Lose It! features (2023)

MyFitnessPal provides a wide range of challenges meant to stimulate competition, goal-oriented participation, and a sense of community among users. These challenges can be very motivating and can help to encourage frequent app usage. MyFitnessPal offers users a variety of challenge kinds to pick from. Step challenges, calorie-burning competitions, food challenges, and other activities are examples of these challenges. This variety ensures that users with a variety of health and fitness goals can find challenges that meet their needs. MyFitnessPal challenges frequently feature friendly rivalries with friends or the broader MyFitnessPal

community. Users can ask their friends to join challenges or join challenges organised by others. This element of competition adds an interesting layer to users' health and fitness journeys. Many challenges on MyFitnessPal are goal-oriented, motivating members to strive toward specific health and fitness goals. These goals can range from completing a set number of daily steps to meeting calorie or exercise goals. Users can track their progress and see how they compare to others. MyFitnessPal challenges build a sense of community and togetherness. Users can communicate with other users, provide progress reports, and provide encouragement and motivation. This social feature of the program improves user interactions, encouraging accountability and encouragement. MyFitnessPal frequently recognizes and awards virtual accolades or prizes to challenge champions. These incentives provide users a concrete sense of accomplishment and encourage them to compete for the top positions in challenges.

Lose It! also has community challenges, albeit they are not as broad or diversified as MyFitnessPal. These challenges are intended to motivate people to strive toward specific health and fitness goals in collaboration with others. Lose It! hosts community challenges and events on occasion. These challenges are usually based on specific health or fitness topics and may last for a set amount of time. In Lose It!, community challenges frequently concentrate around reaching certain milestones connected to users' weight loss or health goals. Participants collaborate to achieve these group milestones. While the challenges are fun, Lose It!'s offerings aren't as varied or as numerous as those in MyFitnessPal. Users may come across fewer difficulty possibilities. Lose It! community challenges foster group support and involvement. Users can participate in challenges with friends or with other users, discussing progress and motivating one another. The challenges in Lose It! correspond to the goals that users establish within the program. Users can strive toward specific milestones that correspond to their weight management goals.

Finally, the analysis shows that Challenges are essential to both MyFitnessPal and Lose It!, each with its own strategy. MyFitnessPal distinguishes itself with a wide range of challenge kinds, frequent competitions, and a strong emphasis on community building and recognition. Lose It!, on the other hand, provides challenges on a more irregular basis, frequently focusing on milestones and social support. These distinctions reflect the programs' tactics for using challenges to encourage user involvement, competition, and goal-oriented collaboration.

3.3.4. Content Analysis: Comparing of Social Integration

This paragraph is an overview of gamification element Social Integration of both MyFitnessPal and Lose It! applications in Content Analysis retrospective. The paragraph covers coding, analysis and comparison of both applications and provides conclusions.

Table 8

Content Analysis of Social Integration of MyFitnessPal and Lose It! applications

Gamification element	MyFitnessPal	Lose It!
Social Integration	Existence: Within the program, MyFitnessPal allows users to connect with others, forming a social network based on shared health and exercise goals. Frequency: The evidence emphasises the existence of friend connections on a regular basis, emphasising their significance in forming a supportive community.	Existence: Lose It! helps users to connect with friends within the app, providing a social network focused on health and weight loss. Frequency: The content emphasises the existence of friend connections on a regular basis, emphasising their function in the formation of a social network.
Findings	MyFitnessPal is notable for its meticulous integration of Social Integration. The rich badge system, together with milestones related to real-world goals, greatly contributes to a comprehensive and stimulating user experience. The frequency with which these gamification aspects are mentioned emphasises the strategic importance of their inclusion in the app's design.	Lose It! takes a simpler approach to Social Integration. The app's emphasis on simplicity is consistent with its underlying theme of effective weight management without needless complexity. While badges and achievements are available, they may play a more simplified function in user motivation.

Source: compiled by the author based on MyFitnessPal and Lose It! features (2023)

MyFitnessPal prioritises social integration, allowing users to connect with friends and use social features to improve their health and fitness journeys. This rich social component encourages users to feel a sense of community, support, and friendly competition. Within the app, MyFitnessPal users can connect with friends. Users can make and accept friend requests, building a network of others who have similar health

and fitness objectives. Users can communicate with their friends about their accomplishments, progress, and milestones. This sharing of accomplishments serves as a source of motivation and allows users to celebrate their victories together. The social integration of MyFitnessPal encourages pleasant rivalry among friends. Users can compare their accomplishments with those of their friends, such as steps done, calories burned, or weight loss progress. This competitive aspect can encourage users to strive for betterment. MyFitnessPal's social component fosters a supportive community in which members may exchange tips, share experiences, and offer encouragement. This sense of belonging might help individuals stay motivated and devoted to their health and fitness goals. Users bring an accountability aspect into their health journey by interacting with friends. Knowing that their peers may see their progress and activities can motivate individuals to stick to their schedule and avoid lapses. Users can see real-time updates from their pals, such as completed exercises, meals logged, and unlocked achievements. This dynamic stream keeps users engaged and up to date on the activities and progress of their friends.

Lose It! utilises social connections as well, albeit in a somewhat different way than MyFitnessPal. While it encourages social engagement, it may not provide the same depth and integration. Users of Lose It! can connect with friends within the app, building a social network of people who have similar health and weight control goals. Users in Lose It! can share their achievements and progress updates with their friends. This feature allows users to celebrate achievements and milestones together. Lose It! encourages group support and participation. Users can join and create groups focused on specific themes or aims, allowing like-minded people to connect and discuss. Lose It! enables challenges and competitions among friends and groups, though not as extensively as MyFitnessPal. Users can compete in friendly competitions to attain specified goals. Users can see their friends' progress and activities, such as weight loss goals and meals logged. This shared progress sheds light on each other's health journeys and provides opportunity for encouragement.

Finally, the analysis demonstrates that MyFitnessPal and Lose It! both appreciate the value of social integration in improving consumers' health and fitness experiences. While they both have similar capabilities, each app takes a different approach, with MyFitnessPal stressing real-time updates and Lose It! emphasising group support and challenges. Incorporating these social components helps to create engaging and supportive communities within both applications.

3.3.5. Content Analysis: Comparing of Notifications and Reminders

This paragraph is an overview of gamification elements Notifications and Reminders of both MyFitnessPal and Lose It! applications in Content Analysis retrospective. The paragraph covers coding, analysis and comparison of both applications and provides conclusions.

Table 9

Content Analysis of Notifications and Reminders of MyFitnessPal and Lose It! applications

Gamification element	MyFitnessPal	Lose It!
Notifications and Reminders	Existence: Active reminders for meal logging are available, emphasising the importance of calorie management. Frequency: Mentioned repeatedly, demonstrating the commitment to repeating this key health practice.	Existence: Meal logging reminders do exist, which aligns with the goal of effective weight management. Frequency: emphasises their importance for users in continuously recording their food intake.
Findings	MyFitnessPal is notable for its meticulous integration of Notifications and Reminders. The rich badge system, together with milestones related to real-world goals, greatly contributes to a comprehensive and stimulating user experience. The frequency with which these gamification aspects are mentioned emphasises the strategic importance of their inclusion in the app's design.	Lose It! takes a simpler approach to Notifications and Reminders. The app's emphasis on simplicity is consistent with its underlying theme of effective management without needless complexity. While notifications and reminders are available, they may play a more simplified function in user motivation.

Source: compiled by the author based on MyFitnessPal and Lose It! features (2023)

MyFitnessPal includes a robust reminder and notification system to actively engage users and inspire them to stay on track with their health and exercise objectives. These reminders are effective tools for reinforcing continuous app usage and good habits. MyFitnessPal provides meal logging reminders to users to remind them to keep track of their food intake throughout the day. These reminders are especially useful for people who want to keep track of their calorie consumption and nutritional choices. Users are encouraged to log their workout activity through alerts. This tool allows users to keep track of their workouts, track their fitness improvement, and stay committed to their workout regimens. MyFitnessPal customises reminders to users' specific goals. For example, if a user's goal is to lose weight, the app may deliver reminders about calorie tracking and staying below their daily calorie allowance. Consistent reminder delivery develops discipline and encourages users to stick to their daily tracking practices. It serves as a mild nudge, reminding users to

keep track of their health and fitness routines. The regular distribution of reminders develops a sense of discipline and motivates users to stick to their daily tracking practices. It serves as a mild nudge, encouraging users to keep accountable for their health and fitness routines. Some MyFitnessPal notifications may contain motivational content, such as inspirational quotations, success stories, or health suggestions. These aspects provide consumers with additional encouragement and support while they travel. Users can customise their notification options, including the types of reminders they receive and when they receive them. This personalization guarantees that reminders are suited to each person's tastes and routines.

Lose It! also includes reminders, which are largely focused on recording users' daily activities in order to assist them in maintaining consistency in their weight management efforts. While it may not have as many reminder types as MyFitnessPal, it does provide useful tools to keep consumers engaged and accountable. Lose It! delivers reminders to users to urge them to log their daily meals, physical activity, and other health-related activities. These reminders encourage users to report their data on a regular basis, which is critical for optimal weight management. Lose It!, like MyFitnessPal, tailors reminders to users' weight loss and health goals. Users receive suggestions relating to their personal goals, assisting them in staying on track. Lose It!'s reminders emphasise the significance of consistency in tracking. This consistency is essential for users to keep a clear picture of their development and make smart dietary and activity decisions. While the reminders in Lose It! are largely focused on tracking, they may also include motivating messages to urge users to stay dedicated to their goals. These messages are intended to motivate and inspire. Users can customise the scheduling of their reminders, ensuring that they receive notifications at a time that is convenient for their daily routines and preferences.

Finally, the analysis shows a convergence in the gamification features connected to notifications and reminders, with MyFitnessPal and Lose It! using comparable tactics to motivate, encourage consistency, and provide individualised advice to users on their health and fitness journeys.

3.3.6. Content Analysis: Comparing of Goal Setting

This paragraph is an overview of gamification elements Notifications and Reminders of both MyFitnessPal and Lose It! applications in Content Analysis

retrospective. The paragraph covers coding, analysis and comparison of both applications and provides conclusions.

Table 10

Content Analysis of Goal Setting of MyFitnessPal and Lose It! applications

Gamification element	MyFitnessPal	Lose It!
Goal Setting	Existence: Provides a wide range of goal kinds, including fitness improvement, dietary changes, and particular nutrient targets in addition to weight loss. Frequency: Consistently highlighted, demonstrating the app's commitment to meeting a wide range of health and fitness goals.	Existence: Although it is not expressly stated, Lose It! encourages users to set weight reduction or health goals, showing an emphasis on specific aims. Frequency: The implied concentration on weight-centric goals suggests a slightly limited range than MyFitnessPal.
Findings	MyFitnessPal distinguishes out for its numerous goal kinds, which cater to a wide range of ambitions other than weight reduction.	Lose It! emphasises weight-related goals more explicitly.

Source: compiled by the author based on MyFitnessPal and Lose It! features (2023)

MyFitnessPal is a comprehensive and diverse goal-setting system that allows users to set a variety of health and fitness goals. The app's goal-setting approach is intended to provide users with feedback, incentive, and a clear path to follow as they work toward their desired objectives. MyFitnessPal supports a wide range of goals, not just weight loss. Users can establish objectives for weight loss, fitness development, dietary changes, or even particular nutrient targets such as protein intake. This adaptability guarantees that users' goals are aligned with their individual aspirations. MyFitnessPal recommends personalised goals based on user data such as age, gender, exercise level, and desired rate of development. These recommendations give customers a starting point for their goals, making the process more accessible and personalised to their specific requirements. The software monitors users' progress toward their objectives over time. Users can see their accomplishments and track their progress using charts, graphs, and summaries. This graphic representation keeps users motivated by highlighting their accomplishments and opportunities for growth.

MyFitnessPal gives users regular feedback and inspiration as they work toward their objectives. This feedback can include messages of congratulations for reaching milestones, reminders to continue on target, and data-driven insights into progress. Users have the ability to change their goals at any moment to reflect changing circumstances or preferences. The adaptability of MyFitnessPal allows users to modify their goals as needed, ensuring that they remain relevant and achievable. The app's social component also aids in goal achievement. Users can share their goals with their friends, which adds another element of accountability, encouragement, and support.

Lose It! focuses on weight management and encourages users to create weight loss or health goals. While its approach is more focused on weight-related goals, it gives users a clear and easy way to work toward healthier living. Goals: Lose It! encourages users to create weight loss or health goals, with an emphasis on body weight management and reduction. Users enter their desired weight and the rate at which they wish to reach it. This weight-centric approach is appropriate for people who are primarily concerned with weight management. Based on the users' goals and profiles, the app sets a daily calorie budget. This calorie budget acts as a guiding principle for consumers, assisting them in making informed dietary decisions in order to meet their weight goals. Lose It! monitors the weight loss progress of users over time. Users can visualise their journey using charts and graphs that show changes in body weight, giving them a clear image of their progress toward their weight-related goals. Lose It! offers a supportive environment in which users can obtain weight control advice, recommendations, and encouragement. The app's emphasis on weight loss goals is consistent with the app's fundamental mission of assisting users in leading healthier lives. While not directly related to goal setting, Lose It! hosts community challenges and events on occasion that match with users' weight control goals. These challenges allow users to collaborate with others to reach milestones.

Finally, the analysis shows that MyFitnessPal and Lose It! share a dedication to promoting goal-oriented engagement, individualised coaching, and a supportive atmosphere to help users reach their health and fitness goals. The nuanced distinctions are in Lose It!'s goal categories and specific focus on weight-centric goals, whereas MyFitnessPal extends its goal-setting capabilities to other areas.

3.3.7. Content Analysis: Comparing of Tracking and Visualization

This paragraph is an overview of gamification elements Tracking and Visualization of both MyFitnessPal and Lose It! applications in Content Analysis retrospective. The paragraph covers coding, analysis and comparison of both applications and provides conclusions.

Table 11

Content Analysis of Tracking and Visualization of MyFitnessPal and Lose It! applications

Gamification element	MyFitnessPal	Lose It!
Tracking and Visualization	Existence: Allows you to track a variety of parameters such as weight, body measurements, nutritional intake, exercise, and nutrient consumption. Frequency: Consistently highlighted, demonstrating the app's comprehensive commitment to tracking various aspects of health and fitness.	Existence: Emphasises weight tracking as a primary metric. Frequency: This is frequently emphasised, indicating a concentrated approach to weight-related measurements.
Findings	MyFitnessPal distinguishes itself by emphasising customisable charts and graphs, allowing users to adapt their monitoring experience to their tastes.	Lose It! Users will be able to compare different data points throughout time, assisting in the identification of relationships and making educated decisions.

Source: compiled by the author based on MyFitnessPal and Lose It! features (2023)

MyFitnessPal provides customers with sophisticated and comprehensive visual monitoring features that enable them to effectively monitor their health and fitness progress. Charts and graphs, for example, are designed to provide clear and precise insights on users' travels. Weight, body measurements (such as waist and hips), nutritional intake, activity, and nutrient consumption are all supported by MyFitnessPal. Users can track their progress across these indicators in a single location. MyFitnessPal offers customisable charts and graphs, allowing users to choose the stats they want to see. Users can customise their monitoring experience to focus on the parts that are most important to their goals. Users can access historical data and trends, allowing them to track their development over time. Users can find patterns, successes, and places for growth by using this historical viewpoint. The

visual monitoring features on MyFitnessPal frequently incorporate marks or milestones connected to the users' individual goals. This tool shows users how near they are to accomplishing their goals. Users can compare various data points across time, assisting them in identifying correlations and making data-informed decisions. They can, for example, examine how their dietary choices affect their weight or exercise habits. MyFitnessPal's visual tracking features give real-time updates, ensuring that users have access to the most up-to-date information on their progress. This instantaneity enables users to make timely changes to their routines. The visual display of progress can be used to motivate and hold people accountable. Users can see their accomplishments and be motivated to keep working.

Lose It! also provides progress monitoring features with visual representations, albeit its tracking experience is less detailed than MyFitnessPal. Lose It! is largely concerned with weight tracking as a primary metric. Users can track their body weight fluctuations over time using visual representations such as charts and graphs. The app's primary visual tool is often the calorie budget, displaying users' daily calorie intake and expenditure. These tools allow users to visualise their adherence to their calorie objectives. The visual progress monitoring tools from Lose It! are well-known for their ease of use. They give users a clear picture of their essential KPIs without being overly complicated. Lose It! provides handy visual depictions of weight fluctuations and calorie tracking, although it may have fewer advanced tools for in-depth trend analysis than MyFitnessPal. The visual tracking options in Lose It! are in line with the app's core purpose of assisting users in efficiently managing their weight. Users can track their progress toward weight-loss goals. Lose It!'s visual progress tracking can encourage consumers to keep up their weight-loss efforts. Seeing favourable weight reduction patterns might give you a sense of success and encouragement.

Finally, the analysis shows that MyFitnessPal and Lose It! share a dedication to providing consumers with powerful tracking and visualisation capabilities. While MyFitnessPal provides a wider range of tracking stats and customisable tools, Lose It! prioritises simplicity and user friendliness.

3.3.8. Content Analysis: Comparing of Rewards for Consistency

This paragraph is an overview of gamification elements Rewards for Consistency of both MyFitnessPal and Lose It! applications in Content Analysis

retrospective. The paragraph covers coding, analysis and comparison of both applications and provides conclusions.

Table 12

Content Analysis of Rewards for Consistency of MyFitnessPal and Lose It! applications

Gamification element	MyFitnessPal	Lose It!
Rewards for Consistency	Existence: Recognizes and compensates users for constant tracking, promoting daily meal and activity logging. Frequency: The importance of streaks and consistency in reaching health and fitness goals is consistently emphasised.	Existence: Emphasises constant tracking, awarding streak awards to those who register their meals and regularly remain below their calorie objectives. Frequency: emphasis on building consistent and durable tracking behaviours is frequently emphasised.
Findings	Both applications frequently promote streaks and consistency as crucial components of accomplishing health and fitness objectives, with prizes provided to motivate users to maintain these behaviours.	Both applications frequently promote streaks and consistency as crucial components of accomplishing health and fitness objectives, with prizes provided to motivate users to maintain these behaviours.

Source: compiled by the author based on MyFitnessPal and Lose It! features (2023)

MyFitnessPal prioritises rewarding users for their persistent efforts in documenting meals, exercise, and other health-related activities. This gamification element is intended to encourage users to utilise the app on a daily basis. When customers consistently report their meals, exercise, and health data, MyFitnessPal provides them with positive feedback and reinforcement. Consistency is recognized and appreciated as a big accomplishment. Streak monitoring is one of the primary ways MyFitnessPal rewards consistency. Users are encouraged to engage in the app on a daily basis. Users' streaks grow as they register their meals and exercise on a daily basis, and this progress is visibly shown within the app. The badge system in MyFitnessPal includes prizes for consistency. Users can receive badges for logging meals for multiple days in a row or reaching certain streak milestones. These badges serve as visual acknowledgement of their dedication. Users' success toward their

health and fitness goals, such as weight loss or improved nutritional habits, is strongly influenced by their tracking consistency. Users may see how their constant efforts are yielding positive results. Users who consistently report their meals and exercise may receive encouraging reminders from the app. These reminders urge them to keep up their good tracking routines. When users connect with friends within the app, the streak tracking and badge system might provide a competitive element. Users can compare their streaks and accomplishments, which encourages friendly rivalry. Consistency with MyFitnessPal leads to a sense of accomplishment. Users who log their data on a regular basis are more likely to meet their health and fitness goals, which is a major reward in and of itself.

Lose It! likewise rewards users for consistency in documenting meals and activity, albeit with a more minimalist approach than MyFitnessPal. Lose It! emphasises constancy in weight tracking. Users who consistently register their body weight can observe their progress over time, which might be motivational for people who are trying to lose weight. Users can measure their progress toward their weight loss objectives by tracking their meals and exercising on a consistent basis. Seeing positive weight trends can be a satisfying experience. Lose It! encourages users to log their data on a regular basis by highlighting the benefits of tracking. Users are advised that persistent tracking is required to meet their health and weight management goals. Visual depictions of users' weight fluctuations over time are available. This visual progress tracking can give consumers a sense of success and motivate them to keep tracking consistently. The achievement of weight-related goals is the major incentive for consistency in Lose It!. Users who continuously log their data are more likely to observe improvements in their weight and overall health.

Overall, the analysis demonstrates that MyFitnessPal and Lose It! are both committed to using gamification features to drive consistency in users' tracking and goal accomplishment. In both apps, the use of streaks, daily goals, badge systems, and social recognition leads to a stimulating and engaging user experience. The subtle distinctions are in how these features are implemented, which reflects each app's unique approach to gamifying the health and fitness journey

4. Conclusion and recommendations

The study's relevance is anchored in the growing prominence of health applications in contemporary society. These applications, ranging from tracking physical activity and dietary habits to managing chronic health conditions, have the way individuals interact with healthcare. The thesis addresses a critical gap in understanding how gamification elements can influence user behaviour and sustain engagement with these applications.

The research focuses on defining gamification within the realm of health-related applications and examining its impact on user engagement. Given the novelty and rapidly evolving nature of gamification in health apps, the study provides valuable insights into how these elements can be leveraged to enhance user experience and intention to use.

The primary objective of this thesis is to elucidate the influence of gamification elements on users' intentions to engage with health apps. Through a mix of theoretical exploration and practical analysis, the thesis aims to identify key gamification strategies that can improve user engagement and promote sustained use of health apps.

The methodology employed in the thesis is comprehensive, involving a literature review, usability testing, content analysis, and comparison of two specific health apps – MyFitnessPal and Lose It!. This multi-faceted approach allows for an in-depth understanding of the role and effectiveness of various gamification elements in health apps.

Conclusion Number. 1: Impact of Gamification on User Engagement

The research presented in the thesis conclusively demonstrates that gamification elements significantly impact user engagement in health-related applications. By incorporating game-like features such as points, badges, challenges, and social integration, these applications can substantially increase user motivation and participation. The comparative analysis of MyFitnessPal and Lose It! applications provided concrete examples of how different gamification strategies can cater to diverse user preferences and needs. This finding underscores the potential of

gamification to transform the user experience in health apps, making them more interactive, enjoyable, and effective in promoting healthier lifestyle choices.

Conclusion Number. 2. Importance of Personalized Gamification Strategies

The thesis highlights the importance of personalised gamification strategies tailored to the specific goals and preferences of the app's target audience. The study reveals that both MyFitnessPal and Lose It! use similar gamification elements, their implementation and focus differ, reflecting their unique user bases and core objectives. This insight is crucial for app developers and health practitioners, as it suggests that the one-size-fits-all approach in gamification may not be effective. Instead, a more nuanced understanding and implementation of gamification, considering the specific health goals and engagement patterns of the user base, can lead to more sustained and meaningful user interaction with health apps.

Conclusion Number. 3: Future Research Directions and Ethical Considerations

The thesis opens avenues for future research, especially in the areas of long-term behavioural impact, cultural specificity in gamification, and ethical considerations. It calls for more in-depth studies to examine the long-term effects of gamification on health behaviours and outcomes. Furthermore, it suggests exploring the effectiveness of gamification across different cultural and demographic groups to ensure inclusivity and accessibility in health app design. Finally, the thesis underscores the importance of addressing ethical considerations, such as data privacy and the psychological impact of gamification, to ensure the development of safe and beneficial health applications. These areas of future research are critical for advancing our understanding of gamification in health apps and ensuring their responsible and effective use.

Recommendations

1. Future studies should explore the diversity of gamification strategies across different health-related applications, focusing on how various elements cater to distinct user needs and preferences.
2. Conduct user experience studies to understand the practical impact of gamification elements on user behaviour and long-term app engagement.
3. Investigate the integration of emerging technologies like AI and machine learning in gamification strategies to personalise user experience and enhance engagement.
4. Examine the long-term behavioural and health impacts of using gamified health apps, determining their effectiveness in promoting healthier lifestyles.
5. Research the effectiveness of gamification elements across different cultural and demographic groups to ensure inclusivity and accessibility in health app design.
6. Address ethical considerations, such as data privacy and the psychological impact of gamification, ensuring that health apps are both safe and beneficial for users.

Overall Significance

In conclusion, the thesis significantly contributes to the field of digital health by providing a detailed analysis of gamification in health-related applications. It highlights the potential of gamification to transform user engagement, presenting a nuanced perspective that can inform future app development and research in this domain. The findings and methodologies employed offer a valuable reference for developers, researchers, and practitioners aiming to leverage gamification strategies to enhance the efficacy and appeal of health applications.

LIST OF REFERENCES

1. Chou, Y.-K. (2023). *Actionable gamification - Beyond points, badges, and leaderboards*. Repro Books Limited.
2. Mouloudj, K., Bouarar, A. C., Asanza, D. M., Saadaoui, L., Mouloudj, S., Njoku, A. U., Evans, M. A., & Bouarar, A. (2023). Factors Influencing the Adoption of Digital Health Apps. In *Advances in Healthcare Information Systems and Administration* (pp. 116–132). IGI Global. http://dx.doi.org/10.4018/978-1-6684-8337-4.ch007
3. Toprak, C., & Kiliç, H. Ö. (2023). Gamification and gamification mobile application examples in the health industry. In *Considerations on Education for Economic, Social, and Environmental Sustainability* (pp. 334–369). IGI Global. http://dx.doi.org/10.4018/978-1-6684-8356-5.ch016
4. Saprikis, V., & Vlachopoulou, M. (2023). A literature review and an investigation on gamified mobile apps in health and fitness. In *Operational Research in the Era of Digital Transformation and Business Analytics* (pp. 227–234). Springer International Publishing. http://dx.doi.org/10.1007/978-3-031-24294-6_24
5. Paglialonga, A., Lugo, A., & Santoro, E. (2018). An overview on the emerging area of identification, characterization, and assessment of health apps. *Journal of Biomedical Informatics*, *83*, 97–102. https://doi.org/10.1016/j.jbi.2018.05.017
6. Azad-Khaneghah, P., Neubauer, N., Miguel Cruz, A., & Liu, L. (2020). Mobile health app usability and quality rating scales: A systematic review. *Disability and Rehabilitation: Assistive Technology*, *16*(7), 712–721. https://doi.org/10.1080/17483107.2019.1701103
7. Hyzy, M., Bond, R., Mulvenna, M. D., Bai, L., Daly, R., & Leigh, S. (2023). Objectively assessing and comparing the user experience of two thousand digital health apps. In *Design, User Experience, and Usability* (pp. 335–343). Springer Nature Switzerland. http://dx.doi.org/10.1007/978-3-031-35705-3_25
8. Khalifa M. (2018). Health Analytics Types, Functions and Levels: A Review of Literature. *Studies in health technology and informatics*, 251, 137–140.
9. Grundy, Q. (2022). A review of the quality and impact of mobile health apps. *Annual Review of Public Health*, *43*(1), 117–134. https://doi.org/10.1146/annurev-publhealth-052020-103738
10. Jake-Schoffman, D. E., Silfee, V. J., Waring, M. E., Boudreaux, E. D., Sadasivam, R. S., Mullen, S. P., Carey, J. L., Hayes, R. B., Ding, E. Y., Bennett, G. G., & Pagoto, S. L. (2017). Methods for

evaluating the content, usability, and efficacy of commercial mobile health apps. *JMIR mHealth and uHealth*, *5*(12), e190. https://doi.org/10.2196/mhealth.8758

11. Bricker, J. B., Mull, K. E., Kientz, J. A., Vilardaga, R., Mercer, L. D., Akioka, K. J., & Heffner, J. L. (2014). Randomized, controlled pilot trial of a smartphone app for smoking cessation using acceptance and commitment therapy. *Drug and Alcohol Dependence*, *143*, 87–94. https://doi.org/10.1016/j.drugalcdep.2014.07.006
12. Johnson, S. G., Potrebny, T., Larun, L., Ciliska, D., & Olsen, N. R. (2022). Usability methods and attributes reported in usability studies of mobile apps for health care education: Scoping review. *JMIR Medical Education*, *8*(2), e38259. https://doi.org/10.2196/38259
13. Hamari, J., Koivisto, J., & Sarsa, H. (2014, January). Does gamification work? -- A literature review of empirical studies on gamification. *2014 47th Hawaii International Conference on System Sciences*. http://dx.doi.org/10.1109/hicss.2014.377
14. Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011, September 28). From game design elements to gamefulness. *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments*. http://dx.doi.org/10.1145/2181037.2181040
15. Pamungkas, W. R., Handayani, P. W., & Pinem, A. A. (2022, August 2). The implementation and impact of gamification on user engagement and acceptance of mobile personal health record application. *2022 10th International Conference on Information and Communication Technology (ICoICT)*. http://dx.doi.org/10.1109/icoict55009.2022.9914893
16. Bonnin, J.-M., Gay, V., & Weis, F. (2018). Creating smarter spaces to unleash the potential of health apps. In *Lecture Notes in Computer Science* (pp. 134–145). Springer International Publishing. http://dx.doi.org/10.1007/978-3-319-94523-1_12
17. *Lose It! - Calorie counting made easy*. (n.d.). Lose It! Retrieved December 9, 2023, from https://www.loseit.com/about/
18. *MyFitnessPal revenue and usage statistics in 2023*. (n.d.). Dev Technosys. Retrieved December 9, 2023, from https://devtechnosys.com/data/myfitnesspal-statistics.php
19. *General Data Protection Regulation (GDPR) – official legal text*. (2016, July 13). General Data Protection Regulation (GDPR). https://gdpr-info.eu/
20. *What personal data is considered sensitive?* (n.d.). European Commission. Retrieved December 16, 2023, from

https://commission.europa.eu/law/law-topic/data-protection/reform/rules-business-and-organisations/legal-grounds-processing-data/sensitive-data/what-personal-data-considered-sensitive_en

21. Khan, A. (2020). *Let's get physical: Exploring gamification in fitness apps to sustain user engagement* [Major Research Project, Ryerson University]. https://rshare.library.torontomu.ca/articles/thesis/Let_s_Get_Physical_Exploring_Gamification_in_Fitness_Apps_to_Sustain_User_Engagement/23159873
22. Johnson, L. (2019, January 9). The 6 best iPhone apps for weight loss. *Macworld*. https://www.macworld.com/article/232315/best-ios-and-iphone-apps-for-weight-loss.html
23. drum, fitness. (2023, June 20). *MyFitnessPal review 2023 - Everything you need to know*. Fitness Drum. https://fitnessdrum.com/myfitnesspal-review/
24. Gonzales, C. (2019, April 23). *A roundup of apps for a fitter you – the sweet setup*. The Sweet Setup. https://thesweetsetup.com/a-roundup-of-apps-for-a-fitter-you/
25. Moreau, E. (2019, March 13). The 12 best weight loss apps of 2023. *Lifewire*. https://www.lifewire.com/best-weight-loss-apps-4588825