Gamification applied to the treatment of pornography addiction: development of a psychological support app

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ABSTRACT : *Addictions, whether related to substance use, gaming, social networks, pornography, or other compulsive behaviors, represent one of the greatest contemporary challenges to mental health. Their causes involve a complex interaction between emotional, biological, and social factors, and treatment generally requires psychological support, personal motivation, and persistence. In this context, technology emerges as an important ally in building accessible and personalized therapeutic support solutions. This work aims to develop a mobile application that helps people with pornography addiction through gamification, promoting self-control and user engagement in their own journey of overcoming. The proposal consists of offering a plat form with interactive challenges, daily goals, symbolic rewards and monitoring of individual progress, using game elements to encourage the continuity of the process. By integrating user-centered design features and principles of psychology behavioral, the system aims to act as a complementary tool to traditional treatment methods, expanding the reach of motivational strategies in an intuitive and accessible way. It is expected that the application will contribute to the reduction of relapses, the strengthening of autonomy, and the improvement of users' quality of life*

KEYWORDS- *Pornography Addiction, Gamification,. Mobile Application, Psychology, Behavioral Support*

1. INTRODUCTION

In recent decades, digital technology has expanded significantly, influencing various aspects of daily life. According to the 2023 TIC Domiciles survey, 84% of Brazilian households had internet access, an increase of 13 percentage points from 2019 (CGI, 2023). This growing connectivity has opened new possibilities for developing technological solutions aimed at mental health. In Brazil, the Unified Health System (SUS) registered, in 2021, 400.3 thousand attendances attendances to people with mental and behavioral disorders due to drug and alcohol use (BRASIL, 2022). Globally, data from the United Nations Office on Drugs and Crime (UNODC) indicate that in 2021, about 39.5 million people worldwide suffered from disorders related to drug use, representing a 45% increase over a decade (UNODC, 2023). Although these data mainly refer to psychoactive substances, experts warn of the growth of behavioral addictions, especially those associated with compulsive use of online sexual content. The literature points to a significant correlation between compulsive porn use ography and mental health problems, such as depression, anxiety, loneliness, and decreased subjective well-being. According to Privara and Bob (2023), users who consume pornography compulsively show a higher propensity for stress, anxiety, and depression symptoms, even when usage frequency is not excessive. International studies estimate that 5% to 8% of internet users exhibit problematic-use patterns of pornography, impacting mood, intimate relationships, and work performance (KRAUS; SIKORA; POTENZA, 2020). In light of this scenario, the need for innovative strategies that assist in the prevention and treatment of addictions, including pornography addiction. Gamification has shown a positive impact in contexts such as education and mental health. A study by Cugelman (2020) showed that gamified applications contributed to greater engagement in treatments related to mental health. This work proposes the development of a mobile app that uses start gives gamified to assist people with psychological disorders related to pornography addiction. The application aims to offer personalized challenges, symbolic rewards, and progress monitoring, incentivizing self-control and overcoming harmful habit

1.1. OBJECTIVES OF THE WORK

1.1.1 General Objective

Develop a gamified mobile application to assist people with psychological disorders related to pornography addiction.

1.1.2 Specific Objectives

* Develop a self-control system for the user, helping them resist impulses and immediate gratifications.
* Encourage the replacement of compulsive behaviors with healthy and conscious routines, contributing to habit change.
* Maintain user engagement through progressive and personalized interactive challenges that reinforce overcoming triggers. and Positively reinforce the user's progress through symbolic rewards, such as badges, scores, or virtual milestones, encouraging the continuation of treatment.

1.2 JUSTIFICATION

The increasing incidence of compulsive behaviors related to the consumption of pornography represents an emerging challenge for public health in Brazil. The country currently holds the 7th position in the global ranking of online adult content consumption, with approximately 79% of accesses made via smart phones, especially among young people under 35 years old (UMMID, 2020). Globally, it is estimated that 84% of traffic to adult sites like Porn hub comes from mobile devices, which accounted for about 42 billion visits in 2019 alone (DRUG, 2020). These behaviors are often linked to symptoms of anxiety, depression, and dysfunctions in interpersonal relationships (KRAUS; SIKORA; POTENZA, 2020).

1.3 STRUCTURE OF THE MONOGRAPH

Besides this introduction, the present study is divided into five chapters. In Chapter 2, the theoretical foundation on gamification is presented, including the psychological principles that support this approach. Chapter 3 presents studies and works related to the use of gamification in mental health and addiction treatment. 4

2. STATE OF THE ART

2.1 reSET — Digital Therapy for Substance Use Disorders

The reSET app, approved by the FDA and developed by Pear Therapeutics, is a prescribed therapeutic software that uses techniques of Cognitive Behavioral Therapy (CBT) to assist in the treatment of substance use disorders, such as alcohol, cocaine and marijuana. Its focus is to broaden adherence to outpatient treatment through a gamified digital approach (STATES, 2017). The efficacy of reSET was evaluated in a randomized clinical trial with 399 participants. The experimental group used the application as a supplement to standard treatment. The intervention included 12 weeks of CBT sessions and positive reinforcement (digital rewards), aiming to increase retention and abstinence (STATES, 2017). The trial showed that 40.3% of participants in the reSET group maintained abstinence per 12

weeks, against only 17.6% in the control group, evidencing the positive impact of gamification on treatment adherence (STATES, 2017)

2.2 Boendermaker, Prins & Wiers (2017) — Gamification of Cognitive Training for Alcohol

The Boendermaker, Prins & Wiers (2017) study investigated how gamification could be applied to the modification of Approach Bias Modification to improve the acceptance and effectiveness of cognitive training among users with problematic alcohol consumption. The authors developed a digital game that applied ABM in an online environment, with visual elements and playful rewards to make the task more engaging. The sample consisted of volunteers with a history of abusive alcohol use. Controlled experiments were conducted comparing gamified and non-gamified versions of the same training (BOENDERMAKER; PRINS; WIERS, 2017). The results showed that the gamified version was better received by the participants and achieved greater engagement, even without significant differences in immediate clinical outcomes. The study advocates using gamification to make cognitive therapies more appealing (BOENDERMAKER; PRINS; WIERS, 2017)

2.3 Cugelman (2013) - Gamification as a Mechanism for Behavioral Change

Cugelman (2013) presents one of the most comprehensive studies on the use of gamification as a tool to influence and modify human behaviors in digital environments. The author demonstrates that gamified elements, such as rewards, goals, immediate feedback, and progression, can significantly increase user engagement and motivation, making them especially useful in interventions aimed at harmful habits and risk behaviors. In the study, Cugelman analyzes various gamified applications in health contexts, education and self-control, identifying common psychological principles that explain its effectiveness. Among these principles are positive reinforcement, self-efficacy, and self-regulation, components that play a central role in addiction treatment. The analysis concludes that digital systems that incorporate these elements tend to promote greater adherence to the proposed activities and improve therapeutic outcomes, especially when combined with structured behavioral strategies (CUGELMAN, 2013). Thus, Cugelman's work provides a solid theoretical foundation for the use of gami fication in apps aimed at reducing compulsive behaviors, including behavioral addictions such as problematic pornography use. His findings reinforce the relevance of adopting gamified mechanics to support the process of behavioral change in a motivating and sustainable ways.

3. THEORETICAL FOUNDATION

This chapter aims to present the main theoretical concepts that underpin the development of this work. Topics such as gamification, behavioral addictions, reward systems, digital engagement mechanisms, and the use of gamification as a tool to assist in therapeutic processes will be discussed

3.1. Behavioral Addictions

Behavioral addictions (or behavioral dependencies) are defined as recurrent patterns of dysfunctional, repetitive, and impulsive behaviors, which do not involve chemicals, but cause significant harm in a person's life (GRANT et al., 2010). Among the most common addictions, the following stand out:

* Electronic gaming addiction;
* Compulsive use of social networks;
* Compulsive buying and Pornography or gambling addiction:

These behaviors are directly related to the reward system brain, comprising mainly limbic system structures such as the nucleus accumbens and the amygdala, structures illustrated in Figure 1. These areas participate in emotional regulation, memory formation, and dopamine release, fundamental to the sensation of reward and pleasure (VOLKOW; KOOB; MCLELLAN, 2016)

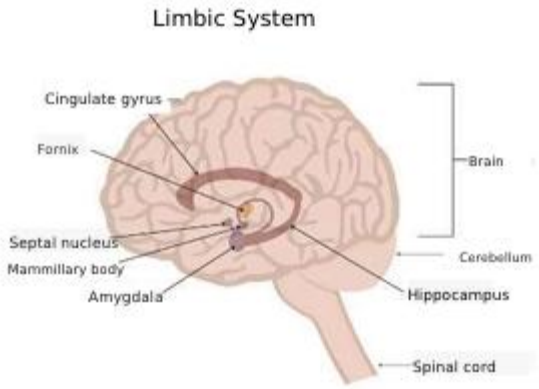


Figure 1 :- Representation of the limbic system. Source: (INFOESCOLA, 2025)

Games, social networks and gamified apps use mechanisms that activate this dopaminergic system, reinforcing behavior and increasing usage frequency, which can lead to behavioral addiction.

3.2 Pornography Addiction and Therapeutic Strategies

Porn addiction is a type of behavioral dependence characterized by by compulsive use of pornographic content, even in the face of negative consequences in areas such as relationships, academic or professional performance, and mental health (BRAND; LAIER; YOUNG, 2019). This behavior is often maintained by mechanisms similar to those involved in substance abuse, such as excessive activation of the MEYER system, 2020). brain reward and the weakening of inhibitory control (WEGNER; Cognitive-Behavioral Therapy (CBT) is one of the most effective approaches in treating pornography addiction. It works with identifying and restructuring distorted thoughts that sustain compulsive behavior, such as 'I can't resist' or 'watching once doesn't hurt' (ANDERSSON; CARLBRING; CUILJPERS, 2014). Common techniques include;

* Relapse episode recording and Exposure and response prevention techniques;
*Cognitive restructuring of emotional and contextual triggers

3.3 Gamification

The term gamification refers to the use of game elements and mechanics in contexts that are not originally playful (DETERDING et al., 2011). Gamification to has been widely used in various areas such as education, health, marketing and psychology, with the aim of promoting greater engagement, motivation and behavior change.

According to Werbach and Hunter (2012), the most common gamification elements are described in Table 1;

Element	Description
Score	Reward system that quantifies user actions
Levels	Progression stages that indicate evolution and experience
Badges	(badges) Symbols of achievements that reward behaviors desirable
Rankings	Competition among users based on performance
Challenges/Missions | Specific objectives with associated rewards	

Table 1 — Most common gamification elements in an app. Source: Prepared by the author.

3.3.1. Gamification as a Therapeutic Tool

Although gamification, when poorly applied, can reinforce compulsive behaviors, studies show that its structured use in therapeutic contexts can promote habit change and support the rehabilitation of behavioral addictions (LISTER et al., 2014).

According to King Delfabbro, and Griffiths (2017), gamified mechanisms can be inserted into therapeutic apps to help users;

- Recognize harmful behavior patterns;
- Monitor progress with healthy rewards;
- Create routines to replace bad habits;
- Improve adherence to psychological treatments;

Based on these premises, it is possible to distinguish between harmful and thera peutic gamification, as illustrated in Table 3.

Table 2 — Comparison between harmful and therapeutic gamification

Aspect	Harmful Gamification	Therapeutic Gamification
Objective	Compulsive engagement	Self-knowledge and self-control
Focus	Usage time, profits or sta- | being	Quality of life and well- | estar
Feedback	Instant and dopaminergic |	Progressive and reflective
Expected results | Addiction and isolation		| Rehabilitation and socialization

Table 3 - Comparison between harmful and therapeutic gamification. Source: Prepared by the author

3.3.2 Gamification in Addressing Addictions

Based on the approaches of Behavioral Psychology and Cognitive Behavioral (CBT), digital applications have been developed that adapt these methodologies to the virtual environment, demonstrating effectiveness in interventions related to addictions and mental health (ANDERSSON et al., 2014). One notable example is Rewire!, app that helps people overcome addictions such as pornography and procrastination through day counters, daily challenges and goal tracking. In addition, the use of pictograms, symbolic rewards, and adaptive challenges can help users with cognitive or psychological limitations to cope with triggers and reinforce healthy habits. In this context, assistive technology and the principles of Augmentative and Alternative Communication (AAC) can be combined with gamification to offer inclusive solutions.

4. MATERIALS AND METHODS

This chapter details the methodology that will be applied for the development of the application aimed at supporting people with addictions using gamification strategies. Tools, technologies and components used will be addressed, with explanations about each item

4.1 Classification of the Research

The research has an applied nature, since it seeks to generate knowledge with a focus on immediate practical application, especially in the development of technological solutions intended to support people with addictions. Regarding objectives, it is an exploratory study, as it aims to understand the context of addictions more deeply and identify effective ways to address them through technology. Regarding the technical procedures, it is characterized as action research, involving active participation in the process of developing a solution aimed at a socially relevant issue.

4.2 Tools and Technologies Used

4.2.1 Framework React Native

React Native is an open-source framework maintained by Face book that allows the development of native applications for Android and iOS from a single code in JavaScript or Typescripts (FACEBOOK, 2025). It was chosen for this project because it offers a very broad community, performance close to native and agility in cross-platform development, as summarized in Table 4.

Criterion	React Native | Flutter		iOS	Android
Multiplatform	Yes	Yes	No	No
Language	JavaScript	Dart	Swift	Kotlin
Performance	High	Very high | Maximum		Maximum
Community	Very wide	Moderate | Stable		Stable
Maintenance	Facebook	Google	Apple	Google
Access to native APIs | Good		Excellent | Complete | Complete		

Table 4 — Comparison between frameworks for mobile development. Source: Prepared by the author

4.2.2 Supabase

Supabase was adopted as the main database and backend platform of the application. It is an open-source Backend as a Service (BaaS) that provides a complete framework on top of PostgreSQL, including authentication, file storage, server less functions, and automatic API generation. The main advantage of Supabase is combining the robustness of a relational database with the practicality of a managed backend, allowing the developer to focus on the application logic without the need to configure servers or intermediate communication layers. In the context of this project, Supabase was responsible for storing the information of users, challenges, rewards and progress, as well as managing authentication and access policies.

Among the reasons that justified the choice of Supabase, the following stand out

* SQL standard compatibility, which simplifies database management;
* Native support for authentication and authorization;
* Scalability and cloud hosting, without the need for own servers; and open source, enabling transparency and customization and support for real-time notifications and updates (Real-time API).

Thus, the (SUPABASE, 2025) Supabase proved to be a modern, efficient solution and suitable for the development of a functional prototype of a cross-platform application focused on gamification and psychological monitoring.

4.2.3 PostgreSQL Database

The database used in this project was PostgreSQL, chosen for its robustness, robustness, adherence to the Structured Query Language (SQL) standard, and broad use in systems that that require security and stability. As described in its official documentation, PostgreSQL is a “advanced object-relational database system, highly stable, reliable, and capable of handling large volumes of data and complex queries” (POSTGRES, 2025). In the context of this work, PostgreSQL was made available via the Plata form Supabase, which provides a scalable and secure infrastructure for storing sensitive data, such as user profiles, progress records, social interactions, and statistics

4.2.4 Visual Studio Code (VS Code)

The Visual Studio Code editor was used during development. It supports extensions for React Native, NestJS, Prisma, as well as version control tools Git (MICROSOFT, 2025).

4.2.5 Modular Architecture

Modular architecture promotes separation of responsibilities between functionalities design of the application, facilitating maintenance, testability and reuse of code. Each module contains its own routes, services and controllers (FOWLER, 2002).

4.2.6 JWT Authentication

User authentication was implemented using JSON Web Tokens (JWT), a open standard based on JSON for securely exchanging information between parties. The token is generated after login and passed as a header in authenticated requests (BRADLEY; JONES; SAKIMURA, 2015). The authentication flow is illustrated in Figure 2;

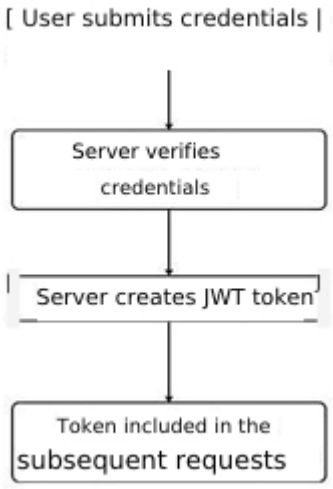


Figure 2 JWT authentication flow. Source: Prepared by the author

5. DEVELOPMENT

This chapter aims to detail the process of development of the proposed system, describing the technical steps and how the functionalities were implemented. The application was conceived to offer a digital environment to support the treatment of behavioral addictions, focusing on pornography addiction, using gamification as a motivational tool for personal progress. In this section, the technical aspects of the project are addressed, from the architecture general to the development of the interface and the integration with the database.

5.1. mobile System Overview

The development of the system was based on the need to create an application that would function as psychological support, encouraging the user to maintain healthy habits and overcome compulsive

behaviors. The system was planned in a modular way, so that each part fulfills a specific function within a scalable and easy-to-maintain structure. The system architecture was divided into three main layers: the presentation layer, presentation layer, business layer and data layer. The presentation layer, developed in React Native, is responsible for interacting with the user, displaying information and collecting data in an accessible and responsive way. The business layer implements the gamification rules, processes user behavior, and defines the scoring, rewards and challenges logic. Finally, the data layer, based on Supabase, handles the storage of system information, managing the database and security policies.

5.2 Planning and Development Steps

The development process was guided by an iterative methodology, which enabled constant adjustments during the implementation phases. The choice of this approach is due to the experimental nature of the project, which required continuous usability validation and the adherence of gamified resources to the therapeutic objective of the application. Initially, requirements gathering was carried out, identifying the main functionalities needed to meet the users' demands and the purposes of the system. Next, the conceptual modeling stage was conducted, with the objective to structuring the database and defining the flow of the application's operation. After validating these definitions, work began on building the interface prototype and conducting tests of element arrangement and navigation experience prepared in Figma, the main collaborative design platform for creating relevant products (FIGMA, 2025). The implementation was carried out using the React Native framework, which allows multiplatform development, ensuring compatibility with Android and iOS devices. The integration between the application and the database was done through Supabase, whose API provides authentication, storage, and real-time communication features. The choice of these technologies provided agile and modern development, enabling the creation of a functional and extensible solution.

5.3 Database Modeling and Integration with Supabase

The database modeling was developed with the aim of representing faithfully the entities and relationships that make up the system's operation. Supabase, the platform chosen for this step, is an open-source solution * that provides PostgreSQL-based backend infrastructure, enabling secure and scalable data management. Its adoption is justified by practicality, automatic API generation, and native support for authentication and storage. The system database was designed to encompass related entities to users, social interactions, and the achievements mechanism. The profiles table stores the essential information of each user, including identification, name, profile photo, and description, functioning as the core of relations among the other entities. The posts table records publications made by users, containing the textual content text, like and comment counters, and metadata such as creation and update dates. Interactions on these publications are modeled by the likes and comments tables: the former records the likes associated with a user and a post, while the latter stores comments, including nested replies via the parent_id field that references previous comments. The achievements system is structured from the rewards and user rewards tables. The first defines the available achievements, including name and description; the second records which rewards have been reached by users over time, relating each achievement to a specific profile and the date it was obtained. The

relational diagram of the database, shown in Figure 3, illustrates these connections and highlights the integration between the social modules and the rewards system allowing the application to monitor activities, log interactions and award achievements in a consistent and structured way.

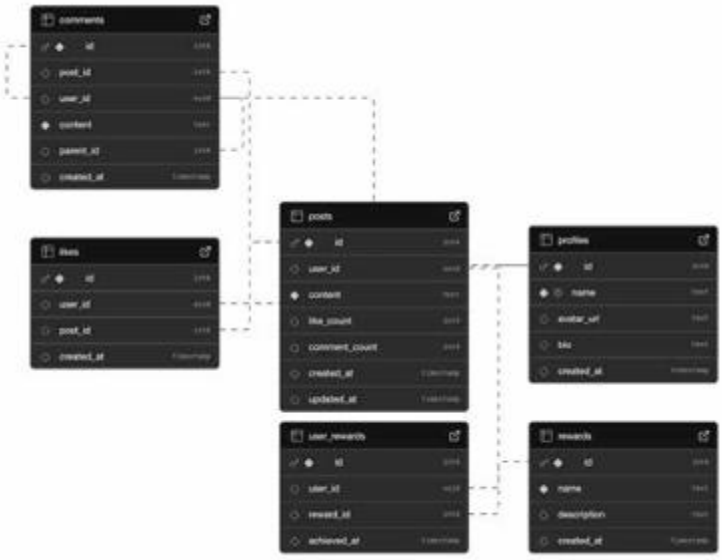


Figure 3 — Relational database diagram. Source: Created by the author

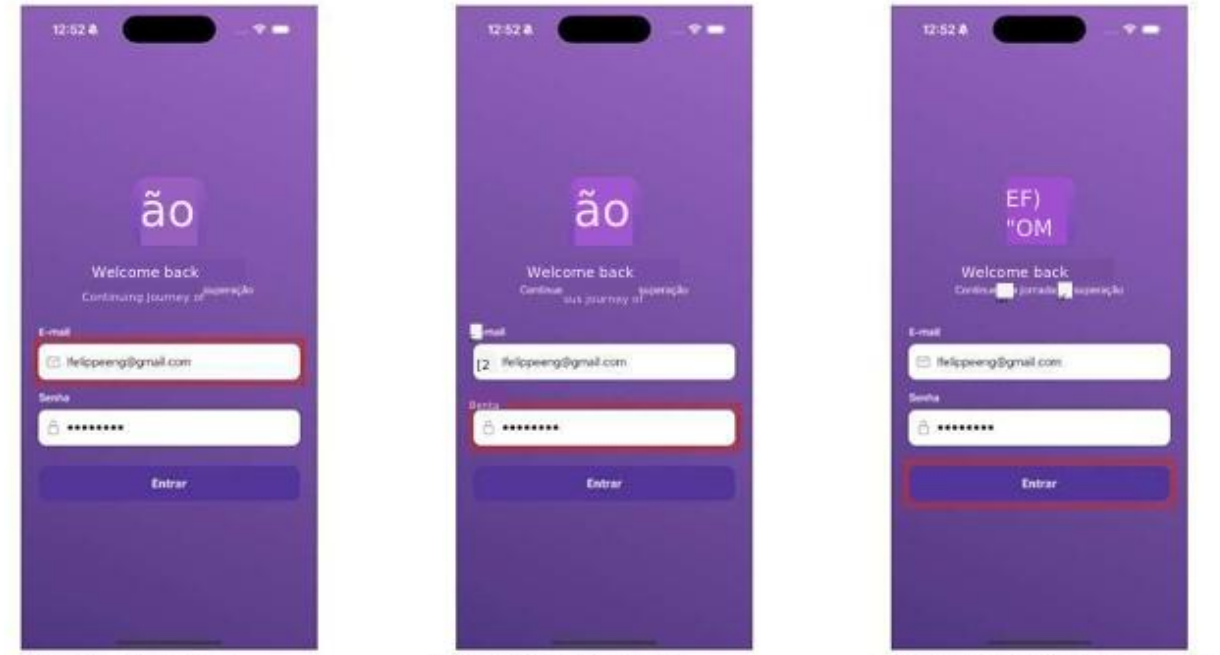
The integration of the database with the application was carried out through the library of the Supabase which provides support for React Native, it allows sending and receiving data through secure requests. The application authenticates the user, retrieves their challenges and updates progress in real time. In addition, the Supabase provides events that notify the application of every change, ensuring instant interface updates. To ensure offline functionality, a local storage mechanism using AsyncStorage was implemented, allowing later synchronization of data with the remote database.

5.4 Interface and Functionality Development

Here is the detailed description of the main interfaces that make up the application, with the aim of showing how it works, its functionalities, and the design decisions that guided its construction. Each screen was developed based on principles of visual clarity, accessibility, and functional coherence, ensuring smooth navigation aligned with the application's psychological support purpose.

5.4.1. Authentication Screen

The user experience begins on the authentication screen, responsible for validating the provided credentials and enabling access to internal functionalities. This screen appetites very clearly defined fields for entering email (Figure 4a) and password (Figure 4b), highlighting them with sufficient visual contrast to guide the user during filling. Next, a centered action button (Figure 4c) enables completion of the login process into the system.

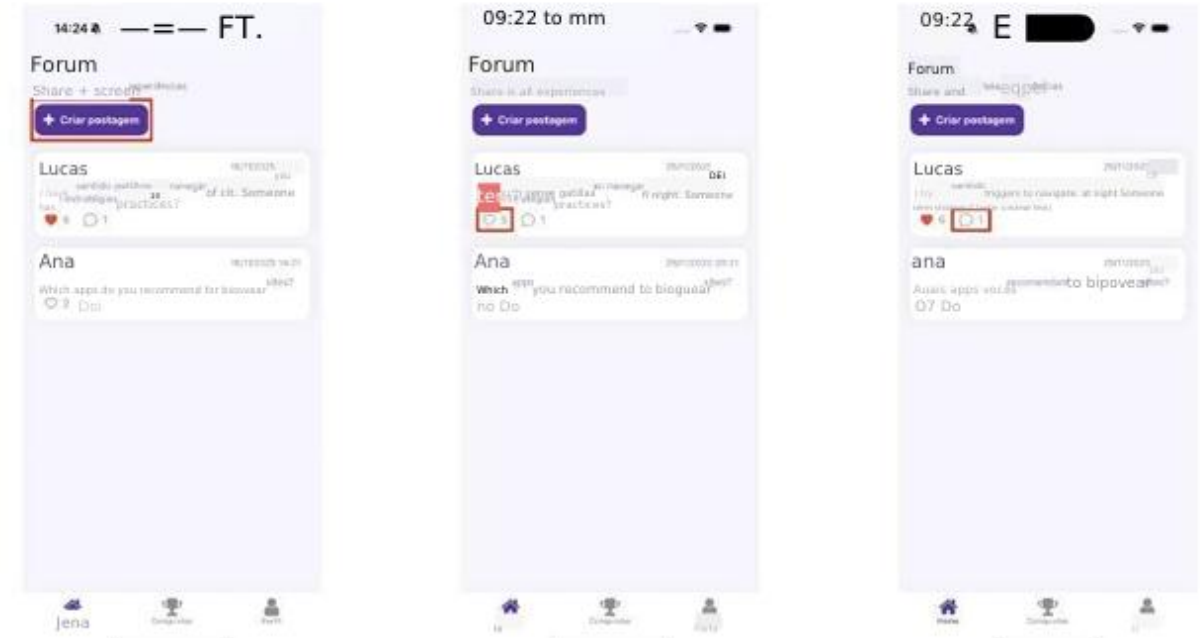


(a) Text field of e-mail. (b) Text field of senha. (c) Submit button of the form.

Figure 4 login form demonstration. Source: Prepared by the author

5.4.2 Home Screen and Main Features

After successful authentication, the user is directed to the home page, which functions as the central hub of community interactions of the app. On this screen, there is the forum, a space for sharing personal experiences and messages of support among members. The interface displays posts in chronologically organized cards, containing information such as the author's name, publication time, and message text. A highlighted button (Figure 5a), located at the top of the screen, allows creating new posts and encourages continuous sharing. Also on the home page, the user can interact directly with the posts the middle of the button of “like” (Figure 5b), represented by a heart icon. At the number of likes is incremented. When clicking the comments button (Figure 5c) on a specific post, the user is redirected to that section's comments area, are the comments already published are displayed, each identified by the author's name and the corresponding text. The inbox (Figure 6a) located at the bottom allows that the user writes their own contribution, simply press the side button (Figure 6b) to send it. Submitting a comment results in immediate update of the list (Figure 6c).

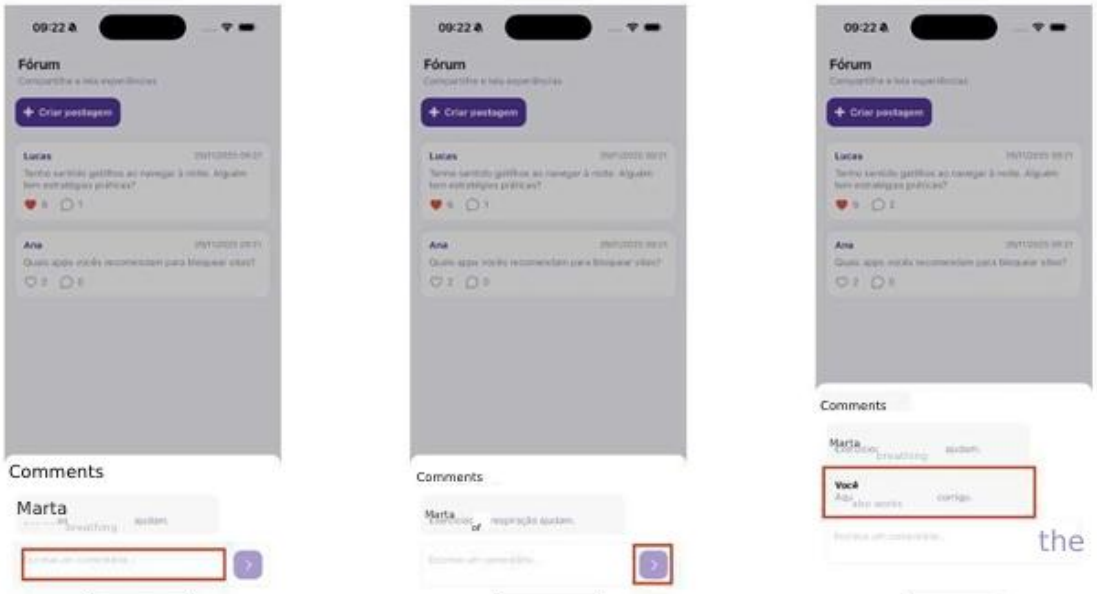


(a) Botão de creation of posts.

(b) Botão para adicionar cur- tidas.

(c) Botão para adicionar co- mentários.

Figure 5 — Demonstration of the buttons on the home page. Source: Prepared by the author



(a) Text field to add a comment.

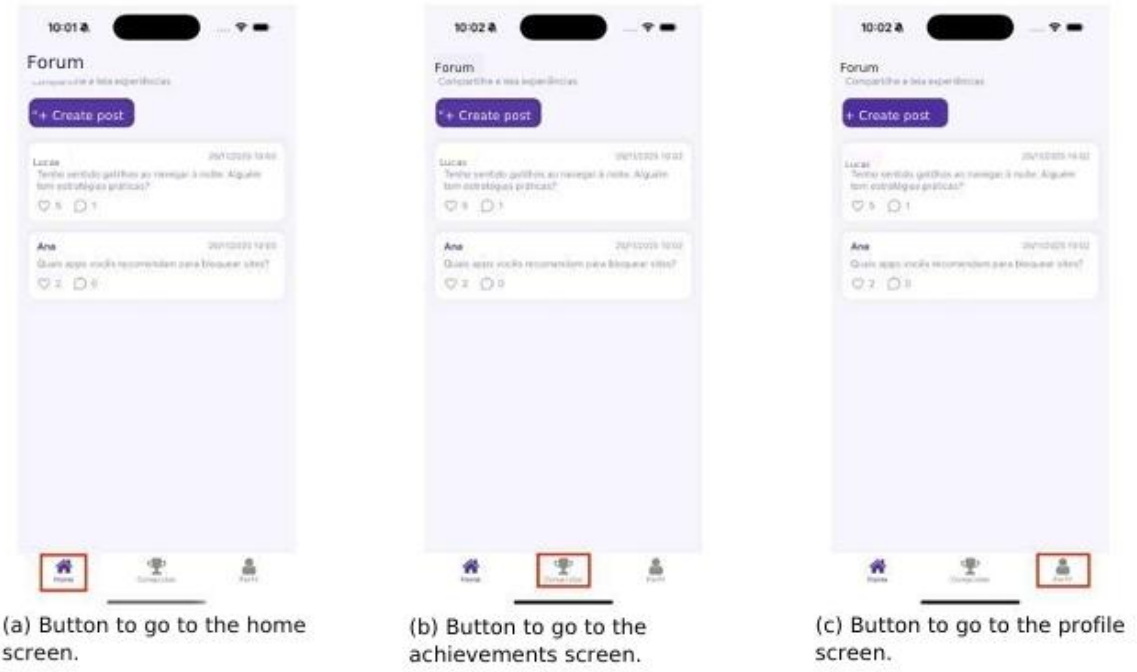
(b) Button to send a comment.

(c) Demonstration of a sent comment.

Figure 6 - Demonstration of the comment sending flow. Source: Prepared by the author

5.4.3 Navigation between Screens

Navigation between the main areas of the application is done through the bottom bar which presents three options: “Home” (Figure 7a), “Achievements” (Figure 7b), and “Profile” (Figure 7c)



(a) Button to go to the home screen. (b) Button to go to the achievements screen. (c) Button to go to the profile screen.

Figure 7 — Demonstration of the buttons to navigate between screens. Source: Prepared by the author.

5.4.4 Unlocked Achievements and Profile Screens

Selecting the “Achievements” tab takes the user to a panel (Figure 8a) that gathers all the rewards unlocked during their journey. Each achievement is presented on a card containing the name of the recognition, its description, and the date it was obtained. This screen plays an important role in the system's gamification, allowing the user to view their progress in a tangible and motivating way. The “Profile” tab (Figure 8b) displays the user's personal information. On this screen, the registered name and a brief description entered by the user are shown, which can express their motivation or personal goal within the platform. The interface maintains the minimalist visual standard of the other screens, prioritizing clarity and emotional neutrality. The complete flow of the system's operation can be seen in Figure 9, which shows the steps from user authentication to progress recording and the unlocking of achievements.

(a) Achievements Screen. (b) Profile Screen.

Figure 8- Demonstration of unlocked achievements and profile screens. Source: Prepared by the author.

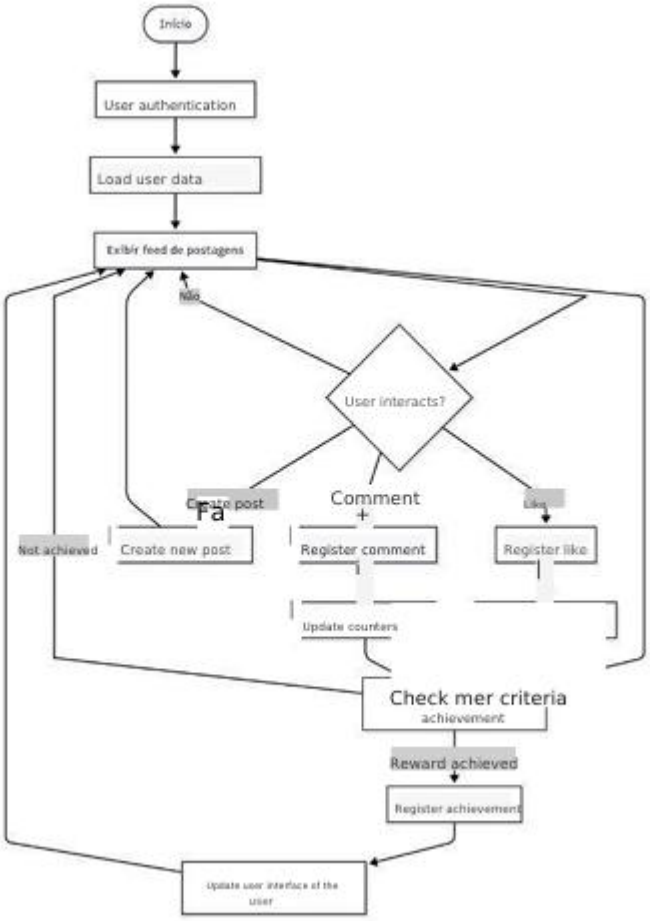


Figure 9 System operation flowchart. Source: Prepared by the author.

6. CONCLUSIONS

The development of the system, covering from the database design up to the implementation of the mobile application, demonstrated the technical and functional viability of a gamified solution aimed at psychological support for individuals facing porn addiction. The integration between React Native, Supabase and authentication proved adequate, offering security, scalability and operational simplicity to the prototype. The implemented functionalities: challenges, achievements, progress tracking and social interaction, evidence that gamification elements can act as complementary strategies in strengthening self-control and promoting healthy habits. The system was designed with a focus on usability and accessibility, essential aspects for its therapeutic potential. Thus, it is concluded that the developed application represents a promising resource in aiding the treatment of behavioral addictions, potentially expandable in the future and integrated into professional practices of psychological support. If evolved and implemented in a real context, the system has the capacity to contribute to more accessible, effective, user-centered digital interventions.

6.1 Future Work

Upon completing the development of the functional prototype of the application and conducting tests exploratory tests with the authentication flow, posts, interactions, and reward system, new ideas and opportunities for improvement emerged with the aim of making the solution more complete, accessible and effective in supporting people with porn addiction. In this section, possible future developments that can expand the system's impact and applicability are presented.

6.1.1 Expansion of User Functionalities

One possibility of evolution is the creation of a more complete space for acompa nishment individual, allowing the user to register personal information relevant to their journey, such as emotional history, reflective notes and personalized goals. In addition, a module for communication between the user and professionals could be included, of partner psychologists, creating a channel of supervised guidance, always respecting ethical standards and privacy. This functionality would broaden the therapeutic nature of the system by offering more individualized support during the recovery process.

6.1.2 Expansion of Gamification Mechanics

Despite the achievements and rewards implemented, it is possible to significantly expand gamification mechanics.

• New types of challenges based on weekly and monthly cycles;
* Adaptive goals that automatically adjust to user behavior;

- ✓ Systems of 'duels with oneself,' where the user tries to surpass their previous performance;
- ✓ Richer visual feedback, such as charts, animated medals, and progress tracks;
- ✓ Possibility of themed missions related to self-control, mindfulness, or healthy sexual education;

It is also possible to incorporate multimedia elements, such as explanatory videos or guided exercises, assisting the user during relapse episodes or moments of vulnerability.

6.1.3 Advanced Monitoring and Artificial Intelligence

To reinforce the therapeutic aspect, future iterations may include machine learning models capable of:

- Detect relapse patterns;
- Predict moments of higher risk;
- Recommend personalized challenges;
- Generate progress summaries using natural language processing

This additional layer would make the system smarter and able to offer individualized recommendations, supporting the user in a continuous and contextualized manner.

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