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Mind Yourself: Prototype of a Mobile Application to Aid in Cognitive-Behavioral Therapy for Children and Adolescents Who Are Victims of Violence

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Abstract

The World Health Organization (WHO) characterizes child violence as maltreatment of children under 18 years of age, among which, the most impactful and traumatic is sexual abuse, responsible for triggering cognitive and psychological consequences for children or adolescents raped. In this sense, cognitive-behavioral therapy is effective in managing post-traumatic stress disorder and anxiety disorders, as well as depression resulting from child violence. A question can be raised: could a mobile solution, so popular among young people and children, contribute with ostensible methodologies to collect evidence of such abuses on a public that lacks the help of adults? This approach uses, among other tools, the therapy notebook: a form of daily recording of emotions made by the patient, which the prototype of the proposed application seeks to substitute for the digital version and also to interconnect the patient, psychologist and psychiatrist. This is an initial proposal based on mobile applications, with cloud computing connection perspectives.

Keywords: Child violence; Sexual abuse; PTSD; Anxiety; Cognitive behavioral therapy.

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1. Introduction

Violence against children and adolescents is defined by the World Health Organization (WHO) as ill-treatment of children under 18, including physical, sexual, emotional abuse and neglect coming from parents, guardians or authority figures. According to the Ministry of Health, the lack of support after episodes of violence in children and adolescence can lead to consequences such as depressive disorders, anxiety, poor performance in school and homework, memory changes, aggressive and violent behavior, suicide attempts and abuse of psychoactive substances (Ministry of Health, 2018).

Among these types of violence, sexual abuse is one of the most traumatizing for the victim. In this scenario, children tend to have a variety of psychopathological disorders, such as post traumatic stress disorder (PTSD), dissociation, depression, attention deficit hyperactivity disorder (ADHD), eating disorders, delinquent behavior, early initiation of sexual activity and substance abuse. PTSD, by definition, involves exposure to a traumatic stressful event, to which the victim reacts with intense emotional content, related to pain, dread, fear and terror. It is estimated that the prevalence of PTSD in children victims of sexual abuse can vary between 20 and 70% of cases, being a much higher number when compared to the general population. This can be explained since, although 50% of individuals in the population experience some significant stressful event during their lifetime, only a minority of them (around 5% to 8%) will develop PTSD. Thus, PTSD is identified as the psychological disorder most associated with sexual abuse against children and adolescents (Borges, 2008).

Also according to Borges (2008), sexually abused children have an increased risk of 21% for developing depression and suicide, 14% for promiscuous sexual behavior, 8% for maintaining the cycle of violence and 10% for deficits in school performance. A high incidence of anxiety and borderline personality disorder was also found in victims of childhood sexual abuse.

In this sense, the creation of the prototype mobile application Mind yourself (My) is based on the cognitive-behavioral theory (CBT) developed by Aaron Beck, in the 60s. which emphasizes its proactive and dynamic role in reaching a guided discovery (Pureza, 2014) (Scotto, 2020). According to Pureza (2014), its use has become greater for the treatment of children and adolescents from the 1980s onwards. Within this approach, an important tool is the therapy notebook, in which patients record their emotions and daily challenges, as well as stress-triggering situations. In addition, the notebook acts as a bridge between sessions, a fundamental step for CBT (Wright, 2018). Therefore, the prototype seeks to bring the notebook to the digital medium in order to facilitate the adherence of patients, who will use playful and textual resources, based on the six fundamental emotions, according to Caminha (2011), which are: love, sadness, joy, anger, fear and disgust. Furthermore, these records can be shared with the psychologist and psychiatrist through a database, with the patient's consent.

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2. Materials and methods

2.1 Research method

A literature search was carried out in the Pubmed and Academic Google domains with the keywords “child violence”, “child sexual violence” and “sexual abuse” where articles on violence and psychological disorders in children were selected. In addition, epidemiological data on these themes were collected from official sources of the Ministry of Health of Brazil and other information vehicles.

Furthermore, a review of cognitive-behavioral therapy, developed by Beck in the 1960s and improved over the years, was carried out, with an emphasis on its use for children and adolescents who were victims of violence. The concept of a therapy notebook was incorporated into the application's prototype.

Nine applications were analyzed whose main functions are to help patients with psychological disorders to improve their well-being, daily recording of emotions and an approach based on cognitive-behavioral therapy. This analysis is listed in table 1.

Table 1: Products on the market that are competitors, similar or have some degree of similarity with the proposed idea

Application Name	Reference	Functions	Function not covered	Proposed application contributes	Proposed application includes
iClinic Software Médico	– ICLINIC Desenvolvimento De Software Ltda	Clinic management app. Provides access to medical records, agenda, calls to the patient, financial transactions, patient charts. Centered on health professionals.	There is no possibility for the patient to report their routine in an application on their cell phone.	Record the patient's diary in his therapy notebook. Ability to share with psychologist and psychiatrist.	Office administration.
Autistic Spectrum Disorder and Mobile Applications	Silva et al. (2021)	Interconnects caregivers, teachers and physicians to assist in the treatment of autism spectrum disorder. Cloud storage, data analysis, crisis registration, notification of professionals in case of crisis.	Patient does not have access. There is no area for daily recording.	Daily record, in the therapy notebook, of the patient's emotions, based on cognitive-behavioral theory.	Does not notify the health professional in case of a serious crisis.
HEADGEAR, 2021.	Black Dog Institute.	Guide application for daily mental activities aimed at reducing stress, risk of depression and anxiety. It proposes	There is no access from the psychologist or	Assessment of the patient's routine through his therapy notebook.	It does not have daily tasks and challenges to be fulfilled

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		challenges to be met every day. Suitable for people over 18 years of age.	psychiatrist. Does not provide contact between patient and healthcare professionals. There is no record of medications.	Registration of medications. Use for patients under 18 years of age.	that can help relieve stress. Suitable for children under 18 years old.
MindShift CBT - anxiety relief.	Anxiety Canada Association	Application seeks to face fears. Proposed weekly goals. Features articles related to mental health.	There is no access for health professionals. No information sharing.	Therapy notebook shared with psychologist and psychiatrist.	Does not provide articles on mental health.
MINDDOC: Your Mental Health Companion, 2021.	Minndoc Health GMBH	Daily mood log. Questionnaire three times a day, with interpretation of answers, which generate insights about the user's mental health. Provides statistics on past records. Provides stress and mood improvement guides such as meditation and sleep aid. Suitable for people over 18 years of age.	There is no information shared between patient, psychologist and psychiatrist. There is no record of medications.	Information from the therapy notebook shared with health professionals for their assessment according to cognitive-behavioral theory. Registration of medications. Use for patients under 18 years of age.	It does not provide the user with indications of their mental health based on their answers. It does not provide guides to help improve stress and mood. Suitable for children under 18 years old.
YOUPER AI THERAPY FOR ANXIETY AND DEPRESSION, 2021.	YOUPER INC.	Conversation with an artificial intelligence that incorporates cognitive behavioral therapy strategies, acceptance and commitment therapy, and behavioral dialectic therapy. The AI guides the user through mental exercises. Suitable for people over 18 years of age.	Daily records cannot be shared with psychologist and psychiatrist. There is no record of medications.	Medical, psychologist and patient access. Assessment of the patient's routine through his/her registration and guardian. Registration of medications. Use for patients under 18 years of age.	It does not have contact and conversation with artificial intelligence capable of guiding the user through relaxation exercises and anxiety reduction. Suitable for children under 18 years old.
Moodnotes	ThrivePort LLC	Mood monitoring.	It does not	Information	It does not

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		Possibility of recording memories with photos. Provides self-awareness articles written by mental health experts; encouragement for the development of healthier habits and thinking; report on “traps” in your thoughts and how to avoid them. You are supported to reduce anxiety and improve your sense of well-being. Increased new and useful perspectives for situations, and increased self-awareness.	have the ability to share information from the therapy notebook with a psychologist and psychiatrist.	shared with health professionals.	show the triggering factors for crises. No photo souvenirs available.
COMVC	Hospital das Clínicas - FMUSP	Displays educational videos about mental health, depression, anxiety and other disorders. Content is displayed according to the user's responses to a simple and playful quiz about their feelings over the past few days.	Contact between patient and health professionals.	Psychologist and psychiatrist access to the patient's therapy notebook.	Educational videos on mental health.

Source: Authors, 2022.

2.2 App inventor for application development

The App Inventor platform from the Massachusetts Institute of Technology (MIT) was used, which features an intuitive interface to facilitate application development. Through it, a prototype was developed whose objective is to reproduce the therapy notebook for the patient's daily record. Interfaces for the psychologist and psychiatrist were also created, with each party having access to different areas and different actions to be performed, all interconnected through a database. Access to the patient's diary is only possible after consent.

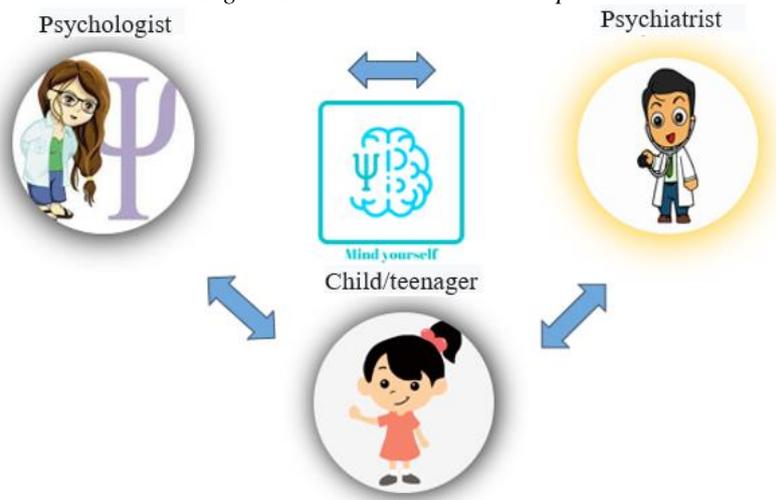
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2.3 Scope of the Process

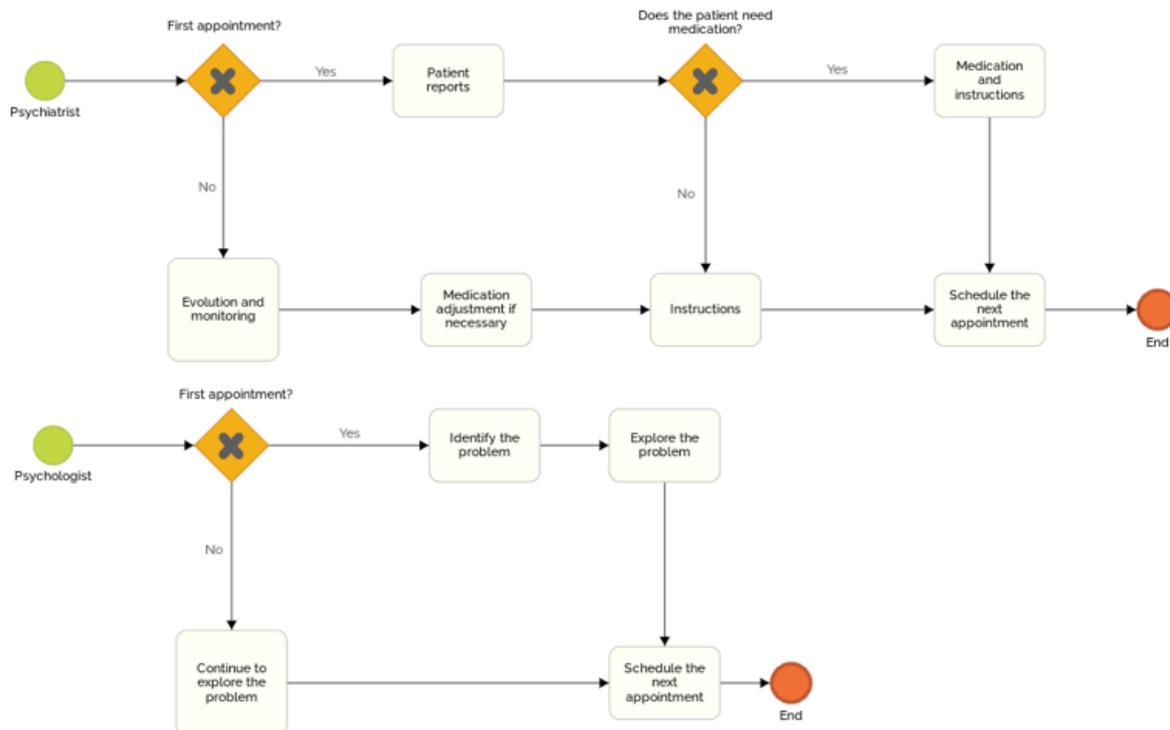
Initially, for the development of the system, the people involved were defined (Figure 1), as well as the process flow (Figure 2).

Figure 1: Parties involved in the process



Source: Authors, 2022.

Figure 2: Process Scope



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Source: Authors, 2022.

In this scenario, the patient's therapeutic approach is mediated by cognitive-behavioral therapy, through several therapy sessions, conducted by the psychologist. The role of the psychiatrist is to prescribe, when necessary, supportive medications, as well as follow up after the prescription. However, there is often an absence of communication between the two health professionals, which limits the multidisciplinary approach to the patient over time.

3. Results

3.1 Scope of action

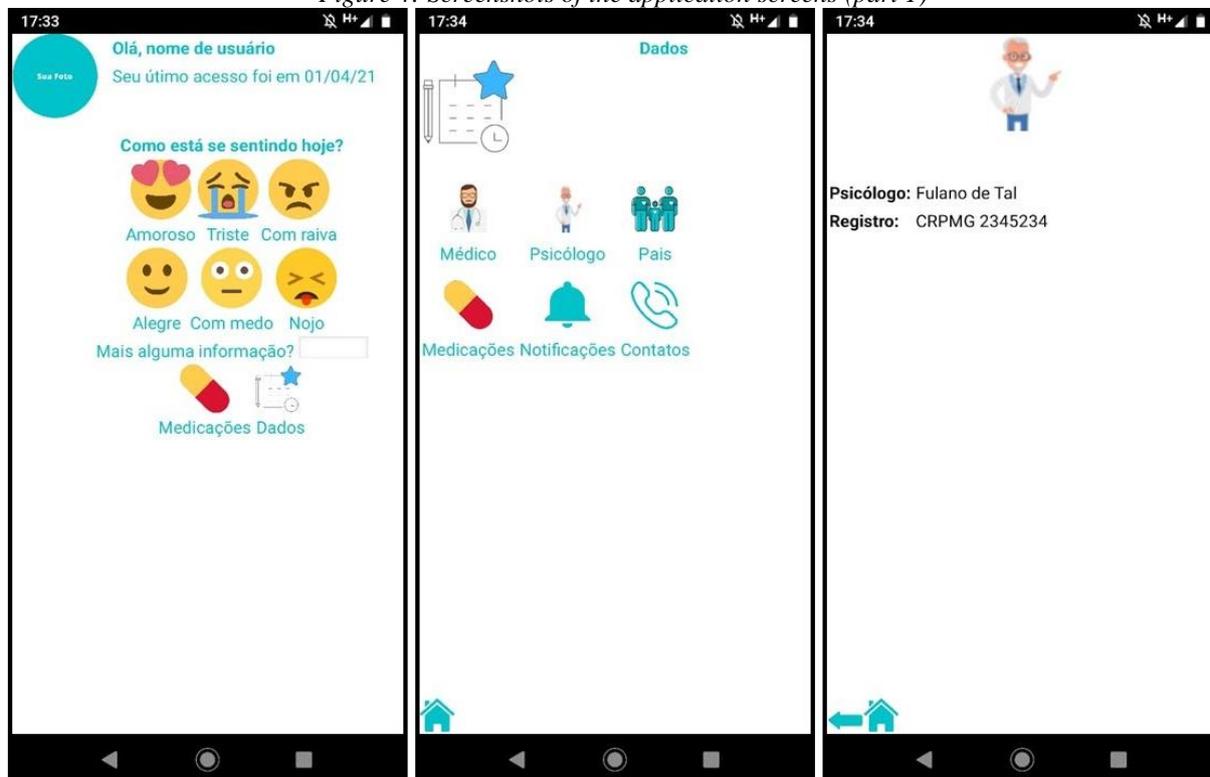
The application's scope of action was defined (**Appendix I**). It acts as a therapy notebook and mediating platform between the three main people. In it, the patient registers daily how he is feeling based on the six basic emotions, which he assigns whole or fractional grades between 1 and 5, with the possibility of textual recording. This record turns into a weekly mood graph, which can be viewed by the psychologist and psychiatrist. The psychologist observes the notebook at each session and proposes therapeutic improvements, as well as recording relevant information addressed in the consultation. The psychiatrist, in turn, records the patient's medications, dosage and other significant information about the consultation, when their intervention is necessary. In addition, there is the possibility of contact between both health professionals.

The application's main objective is to identify patterns in the patient's routine that enable a better understanding of their problem, based on the cognitive-behavioral theory, as well as the possible recognition of child violence.

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Figure 4: Screenshots of the application screens (part 1)

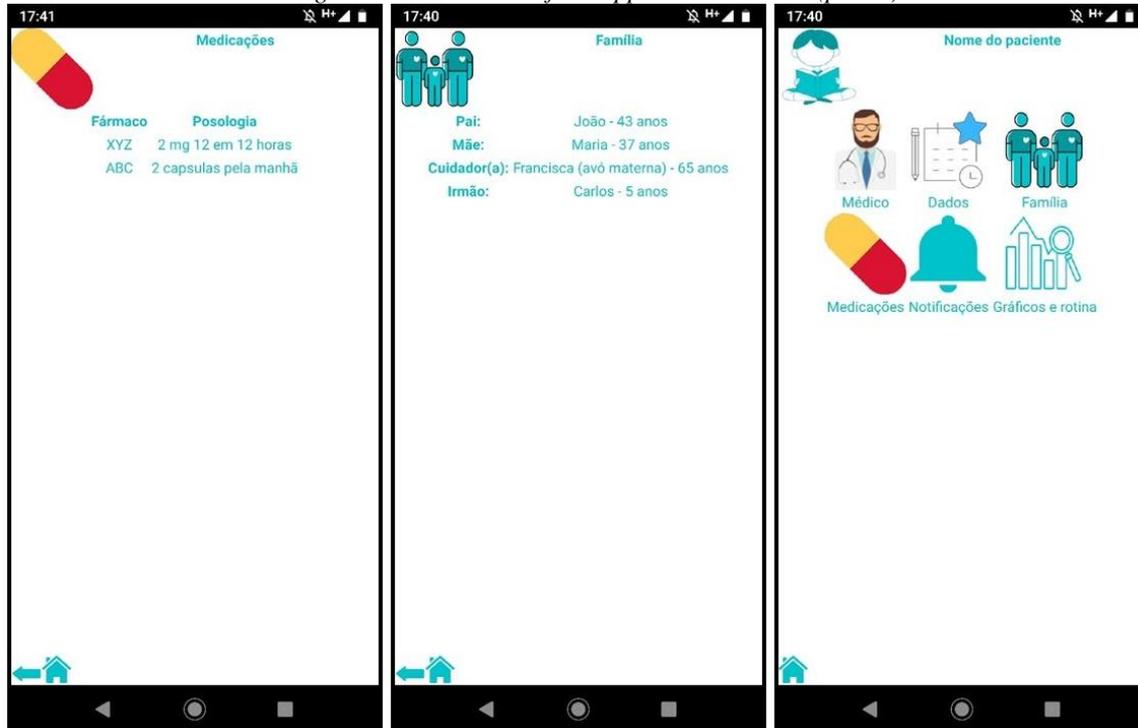


Source: Authors, 2022.

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Figure 5: Screenshots of the application screens (part 2)



Source: Authors, 2022.

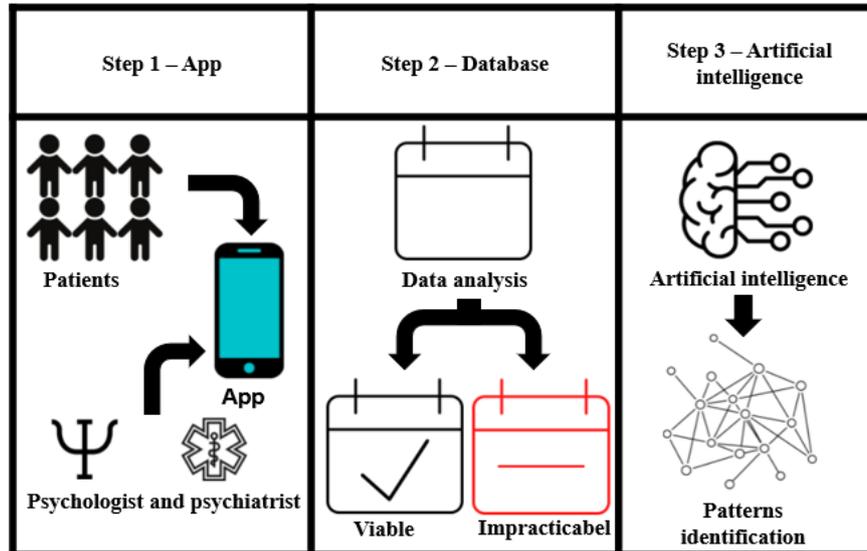
3.2 Future implementations

In the future, after analysis of various data by health professionals, artificial intelligence may be developed, through a machine learning process, capable of automatically identifying pathological patterns. The therapist will receive a warning of that pattern and will be able to investigate it further. This proposal ensures agility in the patient's improved therapy, something important in moments of vulnerability, such as child violence

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Figure 6: Future Implementations



Source: Authors, 2022.

4. Conclusion

The proposed prototype is important, especially in the current scenario (in front of COVID-19), to help identify and treat children and adolescents who are victims of child violence. According to Fontes (2017), physical violence against children under 18 is the second most prevalent in Brazil, followed by sexual violence, which demonstrates the relevance of effective therapy proposals. The analysis of self-reported data from the patient's routine by the psychologist is one of the bases of cognitive-behavioral therapy, which, according to Pureza (2014), is essential not only for the treatment, but for the prevention of mental disorders resulting from child violence. Still, according to Scotto (2020), CBT proves to be quite effective in the treatment of post-traumatic stress disorder.

Furthermore, the future implementation of artificial intelligence will make the tool more automated. With this, the AI will be able to identify pathological modes of information processing in that patient and will help them to reframe them, which will enhance one of the pillars of CBT, the speed of therapy (Wright, 2018).

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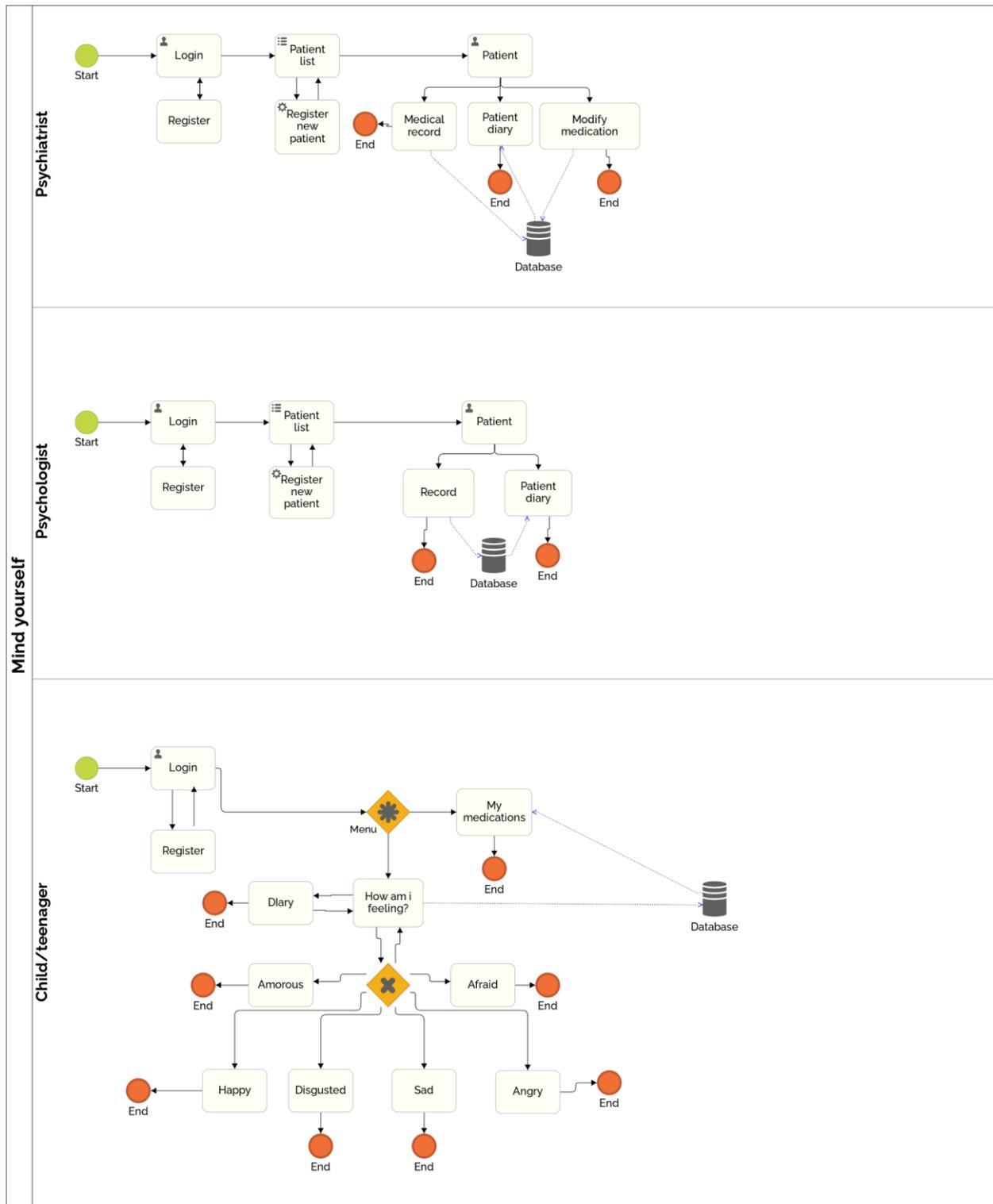
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Appendix I: Application Flow



Source: Authors, 2022.