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Business Potential of an App Dedicated to Attention-Deficit

Investigating the Degree to which People would Adopt an App for Detecting and Overcoming Attention Deficit Symptoms

Jules Baudouin

Nicole Rengifo Botero

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Jules Baudouin – Nicole Rengifo Botero

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Abstract

In recent years, there has been an increased awareness of Attention Deficit Hyperactivity Disorder (ADHD) among the general population, leading to an improved understanding of the associated symptoms and difficulties faced by individuals with ADHD. Consequently, society has developed a more accepting and supportive attitude towards the condition and its consequences. However, many individuals with ADHD still encounter challenges in obtaining a proper diagnosis and receiving the necessary support. This study aimed to investigate the business potential of an app dedicated to attention deficit, specifically focusing on the degree to which people would adopt such an app for detecting and overcoming ADHD symptoms. The objectives of the study were to identify relevant previous work, gather knowledge about user experience (UX) satisfaction and its causal effect on app adoption intentions from selected publications, and generate new insights into the potential adoption of an ADHD app. To achieve these objectives, a mixed-methods design was employed, combining quantitative and qualitative data collection techniques and analysis methods. Quantitative data were analysed using statistical methods to gauge the prevalence of opinions among the sample of participants, while qualitative data provided the underlying reasons behind those opinions. The results of the study indicated that overall, the participants expressed satisfaction with the app idea and demonstrated a willingness to adopt it. However, participants emphasized the importance of ensuring the app's security, as well as the involvement and guidance of healthcare professionals in supporting and monitoring users throughout their journey with the app. In conclusion, this research contributes to a comprehensive understanding of the potential business value of an ADHD app. The findings suggest that there is a positive reception among individuals for such an app, highlighting the need to address the challenges faced by individuals with ADHD in accessing appropriate diagnosis and support. By providing insights into user preferences and requirements, this study can guide the development and implementation of an effective and user-friendly app for addressing ADHD symptoms and improving the lives of affected individuals.

Keywords/tags (subjects)

ADHD, Awareness, Diagnosis, Application, Detection, Overcoming

Miscellaneous (Confidential information)

For example, the confidentiality marking of the thesis appendix, see Project Reporting Instructions, section 4.1.2

Contents

1   Introduction

In recent years there has been an increased awareness of Attention Deficit Hyperactivity Disorder (ADHD) among the general population as we can understand in "*ADHD Diagnostic Trends: Increased Recognition or Overdiagnosis?*" (Kooij JJ et al., 2012). As a result of this, there has been an improved understanding of symptoms and difficulties encountered by individuals with ADHD, as well as a more accepting and supportive attitude towards the condition and the consequences. However, it can still be complicated for individuals with ADHD to receive a proper diagnosis and receive the support they need (Abdelnour, 2022). Some people still have limited knowledge about

ADHD and may misunderstand the condition or stereotype individuals with ADHD as lazy or uninterested for example.

ADHD can therefore interfere with learning processes through disorganization and thus disrupt academic and professional performance (Barkley, 2015). The disorder is characterized by persistent difficulty in modulating attention, resulting in inattention errors, difficulty in maintaining sustained attention, difficulty in organizing, starting, and completing tasks, forgetfulness, and a tendency to misplace or lose objects. Having ADHD very often implies "fidgeting", in other words, difficulty in controlling movements (motor hyperactivity), behaviors (impulsivity) and sometimes also emotions (emotional hyper-reactivity). The impacts of ADHD can be found in many areas of life, including day-to-day living, family life, social life, academic life, and professional life. ADD (Attention Deficit Disorder): Attentional disorder has been the mainstay of the ADHD syndrome since the late 1970s, under the influence of Virginia Douglas; the term "Attention Deficit" was first used in DSM III scientific journal entitled *"Diagnostic and Statistical Manual of Mental Disorders"* in 1980.

The three major axes of this neurodevelopmental disorder are: (i) inattention, a difficulty in maintaining attention over time, in selecting the object of attention without being distracted by external stimuli; (ii) impulsivity, an inability to wait to speak or to postpone an action as well as difficulty in managing emotions and maintaining composure; (iii) hyperactivity, increased and disordered motor activity, leading to incessant restlessness and inability to stay in place when conditions demand it.

According to research, it is crucial for adults with persistent symptoms of ADHD to engage in self-awareness work to better understand their strengths and weaknesses and adapt to their environment (Ramsay & Rostain, 2008). While ADHD is often considered a social and behavioral disorder, it is primarily a neurodevelopmental disorder with a genetic basis that affects brain function (American Psychiatric Association, 1994). The behavior of individuals with ADHD can be linked to their genetic makeup, leading to unique strengths and challenges. Therefore, ADHD can be viewed as a disorder with two sides, including behavioral deficits that can lead to social rejection and qualities of creativity and originality that set individuals with ADHD apart from the norm.

Furthermore, ADHD can result in differences in the way individuals think or perceive the world, and experience emotions, characterized by an increased impulsivity that may be viewed as a thirst for justice from a different perspective (Barkley, 2010). However, the syndrome's contours are still not well understood, and its symptoms can vary depending on individual personality, environment, and severity of the condition.

1.1   Background, motivation, and purpose

This study started in a research during the "Innovation Management" course undertaken at JAMK university in Jyväskylä, Finland. In September 2021. As a group, we became interested in creating an application aimed at preventing ADHD and assisting individuals in managing its symptoms. Our motivation grew significantly as we worked on the WeKare App throughout the semester.

Our decision to write a thesis on ADHD is driven by personal interest, the societal impact of the disorder, and the prevalent lack of understanding surrounding it. ADHD affects millions of individuals and their families, jeopardizing academic performance, social relationships, emotional well-being, task completion, and future work responsibilities.

The motivation of this study is the fact that ADHD continues to face partial recognition and a lack of serious consideration in public opinion, despite gaining increased publicity in recent years. We were intrigued by the marginalization of ADHD.

The purpose of this research study is to determine the extent to which people would adopt an app for detecting and overcoming ADHD symptoms. The envisioned app would assist individuals in self-identifying potential ADHD symptoms and provide guidance on effective strategies to manage the condition, particularly in academic and professional settings. Investigating the adoption potential of such an app is significant as it offers insights into its potential effectiveness and demand. While various treatments are available for ADHD, an app that detects and helps overcome symptoms can serve as a valuable adjunct to existing treatment options.

1.2   Research objectives, questions and approach

This study is conducted as a mixed-method survey. This study is going to look at the following: - the behavior of individuals who might be interested in using the app - the behavior of individuals who have never used the app but have known people who may need it - the behavior of individuals who use both the app and have known someone who has (combination report) - results about how people with ADHD would self-detect their potential symptoms and learn better under stress than others.

Here are the necessary research objectives to carry out this investigation: (i) Identify the most relevant previous work; (ii) gather the necessary knowledge about UX satisfaction and causal effect on intention to adopt an app from selected relevant publications; (iii) create new knowledge about the potential adoption of an ADHD app.

RQ1 - To which degree would students adopt an app for awareness to detect and overcome ADHD symptoms?

RQ1.1 What factors impact the degree of UX satisfaction?

RQ1.2 What factors impact the intention to adopt?

Therefore, our investigation applies a deductive approach through a mixed-method survey.

1.3   Thesis structure

The thesis consists of a total of 6 chapters. The introductory chapter presents the background, motivation and purpose, as well as the research objectives, questions and approach. The second chapter, Literature Review, presents the main concepts from previous work and existing theories, in order to gather and discuss the existing knowledge that helps us to develop our research framework. The third chapter details the research design, while the fourth chapter, Results, presents the analysis of collected data. In the fifth chapter, Discussion, we discuss the limits of this investigation, answering the research questions and comparing our results with the ones of the previous work as well as discussing the compliance with research ethic guidelines. Finally, the

Conclusion chapter highlights the key findings, discusses the managerial implications and suggests the eventual future research.

2 Literature review

2.1 Introduction

To identify the most relevant publications, Google Scholar searches has been conducted by using a combination of words related to ADHD, awareness, diagnosis, app-development. To gather information on the historical recognition and understanding of ADHD, the stigma associated with the condition, changes in diagnostic criteria over time, the effectiveness of apps in managing ADHD symptoms and the recent increase in public awareness.

2.2 Attention Deficit and Hyperactivity Disorder

According to Russell A. Barkley (2015), ADHD is defined as a neurodevelopmental disorder that affects the brain's executive abilities, such as the ability to plan, organize, initiate and complete tasks, modulate behaviors in response to situational demands, control impulses and maintain attention. He views ADHD as a multidimensional disorder, which includes deficits in sustained attention, difficulties in modulating behaviors in response to stimuli, and excessive impulsivity and motor hyperactivity.

In his work, Barkley also discusses the implications of ADHD for individuals with the disorder in terms of its impact on social, academic, and occupational functioning. He also emphasizes the importance of early and appropriate treatment of ADHD to prevent future complications such as learning problems, difficult social relationships, and behavioral problems. Finally, it emphasizes the need for a comprehensive and integrated approach to the treatment of ADHD, which considers the individual needs and strengths of each person with ADHD.

According to the DSM-5 of the American Psychiatric Association (2013), ADHD is a neurodevelopmental disorder that is characterized by three major areas of difficulty for an individual, a combination of attention difficulties, hyperactivity, and impulsivity. These differences can negatively affect a person's day-to-day functioning, particularly in the academic, occupational,

and social areas.

According to this DSM-5, to be diagnosed with ADHD, a person must exhibit six or more of the following symptoms of inattention, or hyperactivity-impulsivity, for at least six months to a degree that is age-inappropriate, and that causes significant problems in several areas of life.

In this reference manual, ADHD can be diagnosed using the following criteria:

1. Inattention

At least six of the subsequent symptoms are persistent to a certain extent for a minimum of six months that is age-inappropriate and causes significant problems in several areas of life (such as social relationships, school or work activities):

- Difficulty in maintaining attention in meetings or play activities

- Prone to distraction by external stimuli

- Difficulty completing tasks or following instructions

- Frequent forgetfulness in daily activities

- Frequent loss of items needed for activities

- Avoidance or dislike of tasks requiring sustained mental effort

- Loss of attention in daily activities

2. Hyperactivity-Impulsivity

Six or more of the following symptoms are persistent for at least six months to a degree that is age-inappropriate and causes significant problems in several areas of life (such as social relationships, school or work activities):

- Physical agitation or uncontrollable anxiety

- Precipitation in formal situations

- Difficulty in playing quietly or relaxing

- Excessive or inappropriate talking

- Frequent interruptions when others are talking

- Impulsivity in social or financial activities

3. Symptoms must begin before the age of 12.

4. Symptoms cause clinically significant problems in several areas of life (such as social relationships, school, or work activities).

5. The symptoms cannot be attributed to any other mental disorder in a more plausible manner.

It is worth mentioning that ADHD can manifest differently among individuals and that its symptoms may undergo changes over a period. In addition, ADHD may be associated with other disorders, such as depression, anxiety or learning disabilities. Although the precise causes of ADHD are not entirely comprehended, it is generally believed that genetic and environmental factors are associated with the disorder. Treatment for ADHD can include medication, behavioral and educational therapies, and lifestyle adjustments. To determine personal requirements and create a successful treatment plan, seeking advice from a healthcare professional is crucial. Current treatments are therefore not limited to physiological or psychological treatments.

Therefore, the notion of a health professional is important: the diagnosis of ADHD must be made by a qualified professional, such as a psychiatrist, neuropsychiatrist, psychologist, or mental health professional, using a thorough assessment that includes interviews with the person and their family, as well as psycho-educational tests and questionnaires.

2.3   ADHD Awareness

According to Brown and Landgraf (2010), awareness around ADHD has increased over time, in part due to a better understanding of the nature of the disorder and a growing awareness of its impact on individuals and their functioning. They also note that awareness has led to improved diagnosis and treatment, as well as a reduction in the stigma associated with ADHD.

A study by Bussing et al. (2016) found that ADHD awareness can vary across demographic and socioeconomic groups. The researchers found that parents with low levels of education and ethnic minority families were less likely to be informed about ADHD and available treatment options. This study underscores the importance of targeting awareness campaigns to populations that may be underserved.

In addition, increased awareness of ADHD has led to increased demand for services and treatment for individuals with the disorder. In a study by Young and Amarasinghe (2010), the authors noted a 68% increase in physician visits for ADHD between 2000 and 2005 in the United States. This increase can be attributed in part to increased awareness and recognition of the disorder.

This phenomenon was analyzed by the medical profession as we can see that it is reflected in a rise of publications on ADHD awareness on Google Scholar. Analyzing the number of publications about ADHD Awareness per year showed a relevant increase.
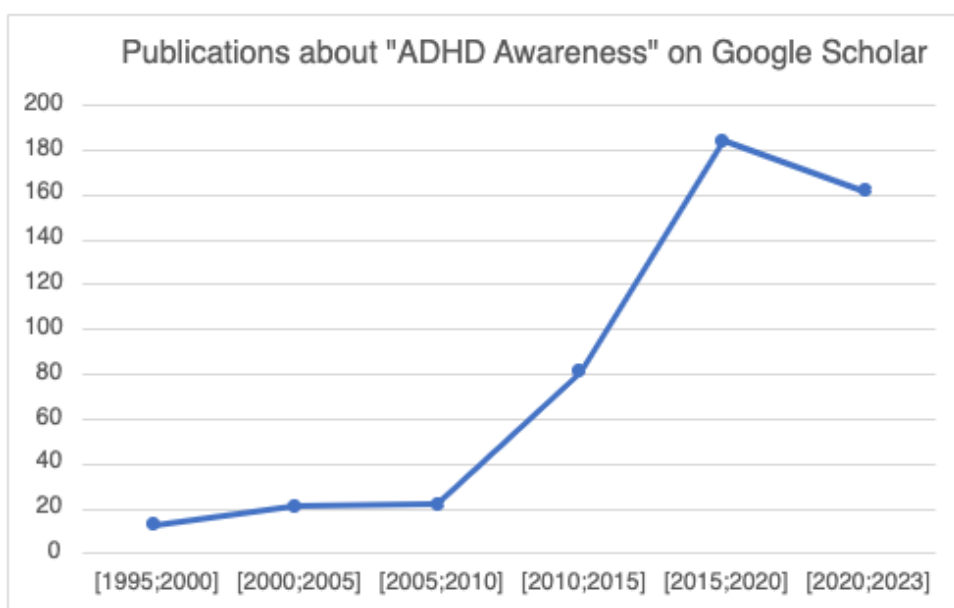
Figure 1: Number of publications per year related to ADHD Awareness

However, increased awareness does not always mean a better understanding of ADHD. According to Charach et al. (2013), although awareness of ADHD has increased, it often remains misunderstood and misdiagnosed. The authors note that this may be due to poor training of mental health professionals and a persistent stigma of the disorder.

Ultimately, analyzing awareness around ADHD can help identify gaps in understanding and recognition of the disorder. This can help target awareness campaigns and improve treatment and interventions for individuals with ADHD.

2.4   ADHD Applications

In recent years there has been a rise in the incidence of ADHD prompting the creation of several applications geared towards assisting individuals in managing their symptoms and enhancing their daily activities. People with ADHD may have trouble focusing their attention and controlling impulsive behaviors. They might be hyperactive or inattentive and their symptoms can change over time.

While some ADHD apps are specialized and specifically created for people with ADHD, others are more general applications that can be useful for managing ADHD symptoms.

We have identified five areas in which current applications have been created. These are 5 different areas in which people with ADHD have gaps, areas in which we can identify many different symptoms.

According to different media, online scientific newspapers they are nowadays multiple type of applications linked to ADHD awareness, ADHD detection but mostly on the ADHD treatment and overcoming the symptoms.

Many of these ADHD apps are specialized and specifically created for people with ADHD, while others are more general applications that may be useful for people with ADHD. For example, Evernote is a note-taking application that has not been specifically created for ADHD users, however organizing and managing thoughts and tasks can prove advantages for individuals with ADHD.

This classification is not necessarily entirely separate, and some apps may fall under more than one classification. However, this grouping can help people with ADHD identify which apps may be most useful for their specific needs.

Figure 2: Existing areas of creation ADHD Applications in 2023, in Android and Apple Store

Existing areas of ADHD Applications
on Android / Apple Store 2023
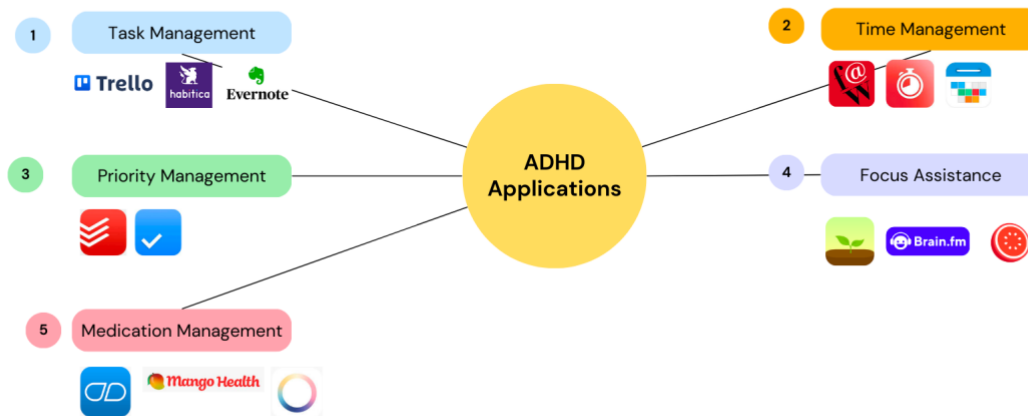
1. **Task Management**: Many ADHD apps have built-in task management tools, such as to-do lists and calendars, which can help individuals stay organized and on track with their daily responsibilities.

Trello: Helps users create lists and assign tasks to different categories.

Habitica: Turns daily tasks and habits into a game, allowing users to earn rewards for completing tasks.

Evernote: Allows users to capture and organize notes, ideas, and reminders.

2. **Time Management**: Time management can be a challenge for individuals with ADHD, and these apps can help by providing reminders, timers, and alerts for appointments and deadlines.

Focus@Will: Provides music designed to help users focus and concentrate.

Be Focused: Utilizes the Pomodoro technique which divides work into 25-minute intervals separated by brief breaks

Calendars by Readdle: A calendar app with built-in reminders and the ability to schedule recurring events.

3. **Priority Management**: Some apps allow users to prioritize tasks, helping them to fo-cus on the most important items and avoid getting overwhelmed by a long to-do list.

Todoist: Allows users to prioritize tasks and create custom labels and filters.

Any.do: Provides users with the ability to create reminders and to-do lists that can be organized by priority.

4. **Focus Assistance**: Some ADHD apps include games and activities designed to help improve attention and concentration, which can be beneficial for individuals strug-gling with focus.

Forest: Encourages users to focus by gamifying productivity, planting virtual trees that grow if the user stays on task.

Brain.fm: Provides music designed to enhance focus, relaxation, and sleep.

Focus Keeper: Uses the Pomodoro technique to help users break work down into 25-minute intervals with short breaks in between.

5. **Medication Management**: For individuals taking medication for ADHD, some apps have tools to help track when to take medication, set reminders, and monitor side effects.

Medisafe: Offers the function of reminding users to take medication notification for refills and the capability to monitor side effects and symptoms.

Mango Health: Helps users track medication and supplement schedules and provides reminders and drug interaction warnings.

Round Health: Allows users to create medication schedules and set reminders and provides a medication history log.

ADHD has been recognized as a legitimate neurodevelopmental disorder by the medical community. The disorder has been described in medical literature since the early 1900s, and its diagnosis has evolved over time as our understanding of the disorder has improved (Barkley Russel, 2015).

During the initial stages ADHD was referred to as "minimal brain damage" or "minimal brain function" which implied that the condition was an outcome of impaired or damaged brain function. Nevertheless, subsequent research revealed that Turkey disorder was not caused by brain damage but rather a neurodevelopmental disorder with a genetic basis (Barkley Russel, 2015).

The first formal criteria for ADHD were established in 1980 in the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III). The criteria included symptoms of inattention, hyperactivity, and impulsivity that were persistent and impairing, with onset before age 7. The DSM-III criteria represented a significant improvement in the diagnosis of ADHD, as they were based on scientific evidence and standardized criteria Maria Christina Dehoust et al., (1980).

Since then, the diagnosis of ADHD has continued to evolve. In 1994, the DSM-IV revised the criteria to include onset before age 12 and the inclusion of subtypes based on symptom presentation. The most recent edition of the DSM, the DSM-5, further refined the criteria for ADHD and expanded the age range to include adults. The DSM-5 criteria also allow for the diagnosis of ADHD with or without hyperactivity (American Psychiatric Association, 2013).

The recognition of ADHD as a legitimate medical condition has had a significant impact on the way the disorder is treated. Treatment alternatives for ADHD comprise of behavioral therapy,

medication, or a blend of both. Medications used to alleviate symptoms of inattention, hyperactivity, and impulsivity in individuals with ADHD, such as stimulants and non-stimulants, have been demonstrated to be effective. Behavioral therapy can also be effective in teaching children and adults with ADHD coping strategies and organizational skills (Pelham & Fabiano, 2008).

In conclusion, the recognition of ADHD by the medical community has been an ongoing process. The identification of ADHD has undergone changes with time, and our understanding of the disorder has improved. Recognizing ADHD as a legitimate medical condition has significantly impacted the way the disorder is diagnosed and treated. While there is still much to learn about ADHD, the recognition of the disorder has allowed for greater understanding and better treatment options for those with the condition.

2.5   ADHD Diagnosis

2.5.1   Recognition of ADHD

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2.5.2   Diagnosis, Detection

According to the American Psychiatric Association (2013), the detection of ADHD usually takes place during childhood or adolescence because it is during this period that the symptoms are strongest and most easily recognizable (agitation in class, lack of concentration, etc).

The diagnostic process for ADHD usually consists of a thorough evaluation that includes a clinical interview, behavioral observations, rating scales, and neuropsychological tests as outlined in the DSM-5.There is no single test or assessment that can definitively diagnose ADHD. Instead, the

diagnosis is made based on a combination of factors, including symptoms, medical history, and psychosocial functioning. Typically, ADHD diagnosis is made by a licensed mental health professional, such as a psychologist, psychiatrist, or clinical social worker.

There are a variety of tools and techniques used to aid in the diagnosis of ADHD. A prevalent approach is to utilize standardized creating skills, such as the ADHD rating scale or Conner's Rating Scales, which are supplemented by parents, teachers and the individuals to gather information regarding the symptoms and severity of ADHD. The Conners' Rating Scales have been validated in research studies (Conners, 2014; DuPaul et al., 1998).

Additionally, behavioral observations, which involve observing the individual in various settings (e.g., home, school), can deliver important about their behavior and ability to focus and sustain attention. These observations can be informal (e.g., teacher reports, parent reports) or formal (e.g., direct observation, functional analysis).

Individuals with ADHD may experience impairments in attention, memory, and executive function which can be assessed using neuropsychological testing. Tests such as the Continuous Performance Test, Wisconsin Card Sorting Test, and Stroop Test, as discussed by (Barkley 2015) can offer precise assessments of cognitive abilities.

In summary, the identification of ADHD generally requires a thorough assessments procedure, which comprises of multiple sources of information, such as rating scales, behavioral observations, and neuropsychological tests. A diagnosis is made based on a combination of factors, including symptoms, medical history, and psychosocial functioning, and is typically made by a licensed mental health professional.

2.6   ADHD Treatment

ADHD is a neurodevelopmental disorder that impacts number of individuals globally and who persists over time. The condition is characterized by a range of symptoms, including inattention, hyperactivity, and impulsivity, that can interfere with daily functioning and quality of life. The severity and presentation of symptoms can vary widely between individuals, making it important

to develop personalized treatment plans that address the unique needs and preferences of each patient.

According to (Knon & Chung, 2018) the treatment for children with ADHD should involve a multiple approach. The authors suggest that the first treatment for ADHD is behavioral therapy, which can include parent training, social skills training, and academic support. The second includes meditation, which is usually a stimulant medication.

(Knon & Chung, 2018) also suggest that for children who do not respond to behavioral therapy or medication, or who have significant social or academic issues may benefit from other treatments such as cognitive-behavioral therapy. They emphasize the importance of creating a personalized treatment plan that considers the child's unique symptoms and needs.

(Cymmings & Gordon, 2014) suggest that treating depression in older adults should include both medication and non-medication approaches, such as psychotherapy or cognitive-behavioral therapy. They recommend monitoring and follow-up care to make sure the treatment plan is effective, and any side effects are addressed.

Pharmacological interventions, such as stimulant medications like methylphenidate and amphetamines, are commonly used to manage symptoms of ADHD. These medications are designed to improve focus and attention while reducing hyperactivity and impulsivity. However, medication alone is often not enough to manage the full range of symptoms associated with ADHD, and behavioral interventions are also an important component of treatment.

Behavioral interventions for ADHD typically involve strategies aimed at improving executive functioning skills, such as organization, planning, and time management. Examples of such interventions include cognitive-behavioral therapy, parent training, and social skills training. Research has shown that a combination of medication and behavioral interventions is often the most effective approach to treating ADHD (Banaschewskiet al., 2022).

One of the challenges in treating ADHD is the variability in treatment response among individuals. Some patients may experience significant improvement with medication alone, while others may

require a combination of medication and behavioral interventions. It is important to work with a healthcare professional to develop a personalized treatment plan that considers the unique needs and preferences of each patient.

In recent years, there has been growing interest in alternative or complementary treatments for ADHD, such as dietary supplements and mindfulness meditation. While there is some evidence to suggest that certain supplements or practices may be beneficial for some individuals with ADHD, further research is needed to establish their safety and efficacy (Kooij JJ et al., 2012july).

Overall, effective treatment of ADHD requires a comprehensive and individualized approach that addresses both the pharmacological and behavioral aspects of the disorder. By working with a healthcare professional to develop a personalized treatment plan, individuals with ADHD can improve their symptoms and quality of life.

2.7   Experience Design

Experience Design is a crucial aspect, particularly for applications, as the user's decision to continue using it or not is heavily influenced by their experience (Pallot & Pawar, 2012). The ultimate goal is to ensure widespread adoption of the application.

According to Aarts and Marzano (2003), experience design encompasses the practice of designing products, processes, services, events, and environments with a primary focus on the quality of the user experience and culturally relevant solutions. This definition emphasizes the significance of how users perceive and interact with the product. Functionality and design, while important, take a secondary role in shaping the user's experience. The product's design is what users encounter and explore, and it greatly impacts their overall experience.

It is essential to consider that users engage with products through their emotions and feelings, as highlighted by Forlizzi and Ford (2000). They argue that the user's cultural and social background, along with their aesthetic and utilitarian needs, greatly influence their experience. Therefore, the design of the product should not only be visually appealing but also serve a practical purpose.

The process of experience design consists of four iterative stages (Figure 3) as outlined by Pallot and Pawar (2012): (1) co-creation of innovative ideas, (2) exploration of alternative usage scenarios, (3) experimentation with potential solutions to support the identified usage scenarios, and (4) evaluation of the user experience within the defined scenarios. These activities aim to identify and assess valuable elements of the user experience.

Co-creation plays a crucial role in understanding user needs and adapting the User Experience (UX) accordingly. Involving users in the design process allows for anticipating the outcomes of the UX. Exploring usage scenarios can be facilitated through various techniques such as storyboarding, storytelling, short animations, or videos. Experimentation involves envisioning the UX based on usage scenarios and creating mock-up versions of the proposed ideas. The evaluation stage employs both quantitative and qualitative methods to gauge the effectiveness of the UX.

Figure 3: The Iterative Experience Design Process (Pallot & Pwar, 2021)
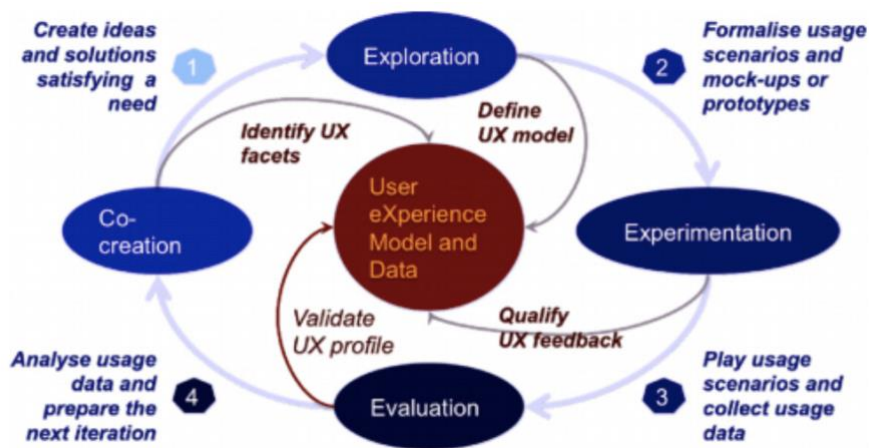
2.8   User Experience

The International Standard Organization (ISO) (2009) defines UX as the perceptions and responses a person has when using or anticipating they use of a product system or service. (DuPaul et al., 1998) expand upon this definition by stating that UX encompasses a user's emotions beliefs, preference perceptions physical and psychological responses, behaviors and accomplishments that occur before, during and after the use of the product, system, or service. Since each user has

a unique profile shaped by all their past experiences successful or not, it's essential to consider various factors while designing a UX.

Designing an effective app for ADHD requires an understanding of the unique needs and challenges of people with this condition. We believe that User Experience (UX) is important to create a friendly and effective app for the users.

The concept of UX was introduced by Alben which covers all aspects of how people use an interactive product, including how it feels, how well they understand it, their feelings while using it, how well they understand it, their feelings while using it, how well it serves their purpose, how it fits into the context of use, and how it contributes to their overall quality of life (DuPaul et al., 1998)

People with ADHD often experience difficulties with complexity and distractions, which can make it challenging for them to stay organized and focused on tasks (Cortese et al., 2018). As a result, it is essential to develop digital tools and apps that are simple and streamlined to avoid overwhelming the user (Joel Nigg, 2013).

In particular, providing clear and concise information that is easy to navigate and understand can help individuals with ADHD stay on track and focused on their goals (Kooij JJ et al., 2012july). For example, an app designed to help individuals with ADHD manage their time and tasks might feature a customizable interface that provides visual cues or color-coded systems to help users stay organized (Joel Nigg, 2013). Additionally, including customizable notifications and reminders can help users stay on task and avoid getting sidetracked by distractions (Kooij JJ et al., 2012july). Overall, designing digital tools and apps that are accessible and user-friendly for individuals with ADHD requires careful consideration of their unique needs and preferences (Cortese et al., 2018).

In addition to simplifying the user interface, it is also important to consider the needs and preferences of individuals with ADHD when designing digital tools and apps. For example, some individuals with ADHD may prefer visual cues or color-coded systems to help them stay organized, while others may prefer audio or tactile feedback to help them stay focused and engaged.

Overall, designing digital tools and apps that are accessible and user-friendly for individuals with ADHD requires a thoughtful and considerate approach. By providing a simple and streamlined user interface that avoids unnecessary complexity and distractions, digital tools and apps can help individuals with ADHD stay organized and focused, improving their overall productivity and quality of life.

The main objective is to assist students towards their health and facilitate their life.

While we want to make sure that simplicity and usefulness are important, we also want our app to be visually attractive and engaging. It can stimulate and motivative users to download our app.

2.9   Anticipated User Experience

Anticipated User Experience plays a significant role in the ideation and rapid prototyping of new product ideas, as described by Mulgan (2014). Eynard et al. (2016) emphasize that UX enables a better understanding of the expectations of both users and designers, ultimately leading to the delivery of a highly satisfying experience. Furthermore, it allows for a more accurate prediction of the potential adoption of a solution by future users.

Marti and Iacomo propose a specific definition for Anticipatory UX, referring to the period before the first use of a product, service, or system. During this stage, the focus lies on the expectations that individuals have regarding the product's performance (Eynard et al., 2016).

Concannon et al. identify additional approaches to anticipate user experience. Firstly, they highlight the assessment of perceived user satisfaction as a means to anticipate UX. Secondly, they suggest the intermediation of communication between designers and users, a concept proposed by Botturi et al. (2007) and Conole & Fill (2012). By fostering active dialogue and collaboration, this approach enhances the anticipation of user needs and expectations.

Yogasara et al. (2011) have already outlined the general characteristics of anticipated user experience. They argue that Anticipatory UX enables project stakeholders to immerse themselves in a virtual representation of a new idea, be it a physical or virtual object (such as a service), or a

combination of both (like a system). This immersion allows stakeholders to perceive various aspects of the idea and predict to what extent it aligns with their expectations.

This definition aligns with the ISO UX standard, which states that UX can arise from the anticipated use of a product, service, or system (Ergonomics of human-system interaction - Part 210: Human-centred design for interactive systems, 2009). A virtual representation of an application idea can be achieved through different means, leading to the prototyping of a usage scenario.

In summary, Anticipated User Experience serves as a valuable tool in the early stages of product development. By understanding and addressing user expectations, fostering communication between designers and users, and leveraging virtual representations, project stakeholders can anticipate and shape the UX to meet user needs effectively.

Figure 4: The General Characteristics of Anticipated User Experience (Concannon et al. 2011)
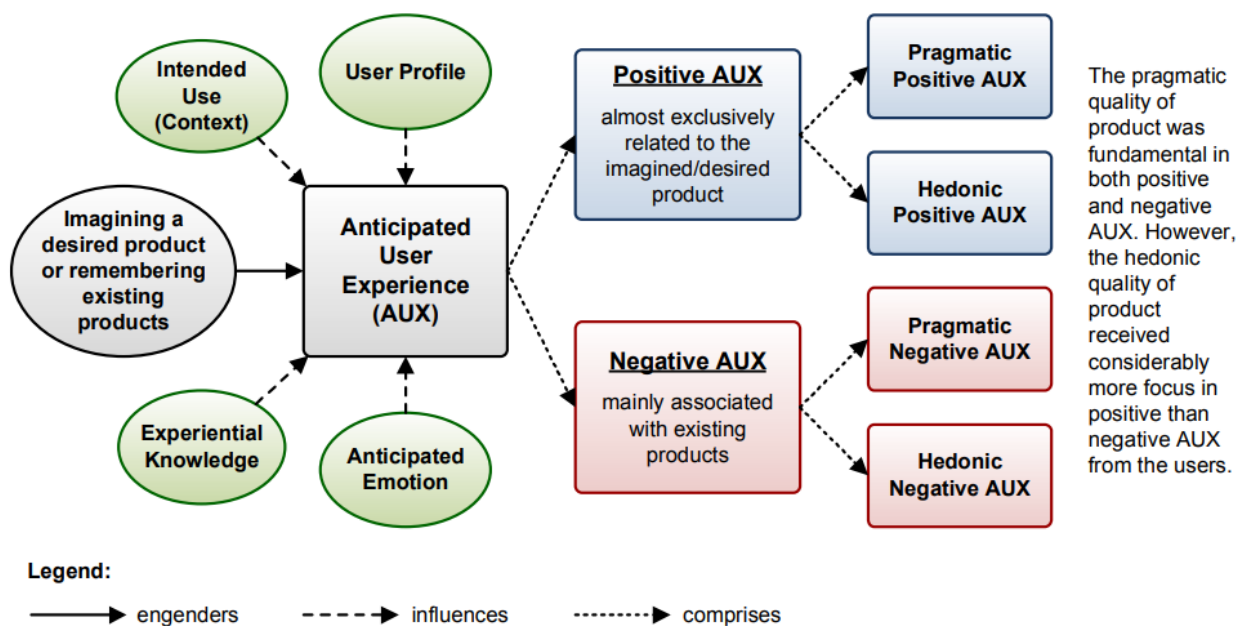
2.10 Adoption Theories and Models

2.10.1 TAM-based Adoption Models

The adoption and acceptance of technologies by users have been the subject of numerous theories and models, as highlighted by Topolewski et al. Their research has focused on enhancing

our understanding of these models and extending the Technology Acceptance Model (TAM) to include additional factors that influence perceived usefulness and subjective norms. These factors encompass social influence, such as conformity, internalization, and identification, as well as cognitive instruments like work relevance, image, quality, and demonstrability of results, which impact adoption.

Moreover, Topolewski et al. (2020) point out that researchers have conducted studies specifically on mobile app adoption and switching behavior. These studies investigate and evaluate various aspects, including the willingness to switch from the familiarity and convenience of desktop or laptop computers to mobile apps, the impact of ease of use on usage behavior, and the antecedents of adoption and app use. Venkatesh (2000) emphasizes the importance of these factors and their real effect on user behavior.

Several other factors influencing mobile app adoption have been identified. Social aspects play a role, particularly in the case of social networking applications. Enjoyment also influences users' attitudes towards the intention to use mobile applications. Peer recommendations for adopting or purchasing mobile applications and the perception of social status can trigger a sense of sufficiency, influencing the intention to use.

Although there has been limited research conducted from a user-centered perspective on the evaluation of application use and potential adoption, efforts have been made to create an application usability rating scale. Additionally, Tam et al. (2018) have expanded the Expectation Confirmation Model (ECM) to shed light on critical factors influencing the intention to continue using mobile apps. These factors include satisfaction, habit, performance expectations, and effort expectations.

In summary, the field of technology adoption and acceptance is rich with theories and models. The TAM has been extended to incorporate factors such as social influence and cognitive instruments. Studies on mobile app adoption have explored various aspects, including switching behavior, ease of use, and the influence of social aspects and enjoyment. Researchers have also investigated the intention to use mobile apps based on factors like peer impact, social status, satisfaction, habit, performance expectations, and effort expectations. While more user-centered research is needed,

progress has been made in assessing application usability and understanding critical factors affecting app adoption and continued usage.

2.10.2 UX-based Adoption Model

In our study, we focus on the UX-based Adoption Model, where UX facets and dimensions represent users' expectations. UX, as a second-order construct, reflects the user's perception of satisfaction, which ultimately influences the "Intention to Adopt" as proposed in the TAM model (Davis, 1989).

Figure 5: 4 TAM model (Davis, 1989)
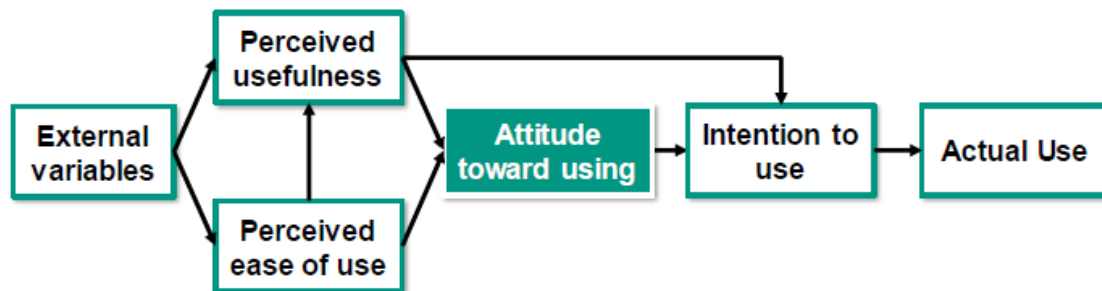
The "Intention to Adopt" is supported by three distinct factors: (i) "Convincingness to adopt the App Idea," (ii) "Willingness to use the App when it is ready," and (iii) "Readiness to recommend the App Idea to colleagues." These factors aim to gauge the level of users' potential adoption. Therefore, our chosen UX model, which considers the causal effect on adoption (Topolewski et al., 2019), provides a more detailed understanding of their potential impact on UX by incorporating UX facets and dimensions. It offers a lower granularity level compared to the TAM model. The UX model is designed to better comprehend the influence of UX through the composition of UX facets and dimensions. These facets and dimensions, specific to the context of app ideas being evaluated, refine the previous research model. Figure 1 depicts the refined model, consisting of UX properties (formative factors) that contribute to UX facets, which in turn make up UX dimensions (higher-order constructs). The combined effect of these dimensions forms the UX (higher-order construct), which ultimately impacts the adoption potential through the "Intention to Use" and its reflective factors.

Figure 6: UX Model & Casual Effect on Adoption (Topolewski et al; 2019)
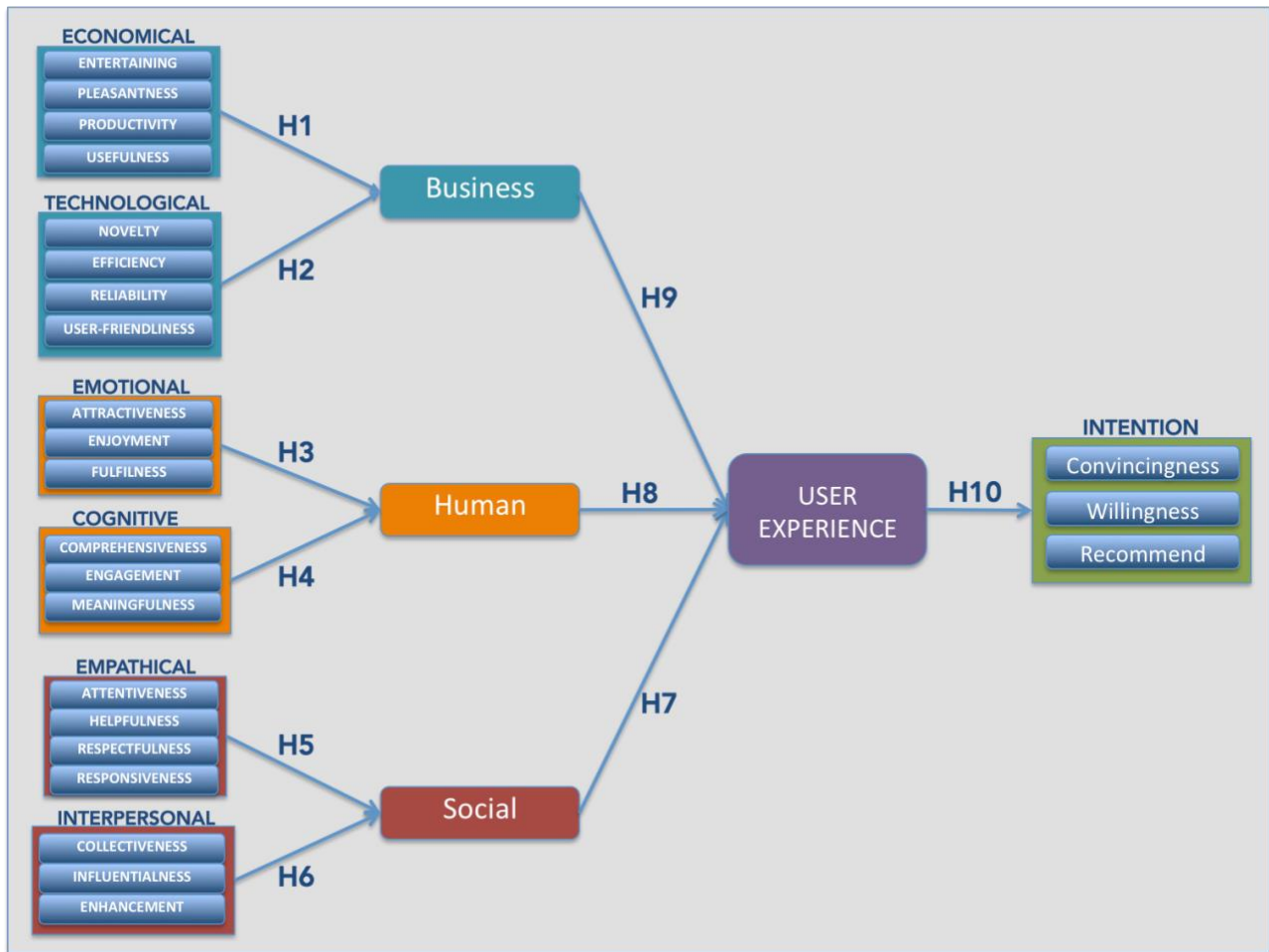
In our study, the UX model incorporates three dimensions: Business, Human, and Social. The Business dimension encompasses the Economical and Technological facets, focusing on the economic and technological aspects of the app idea. The Human dimension comprises the Emotional and Cognitive facets, which delve into the emotional and cognitive aspects of the user experience. Lastly, the Social dimension encompasses the Emphatical and Interpersonal facets, highlighting the social elements and interpersonal interactions associated with the app idea.

By considering these dimensions and facets within the UX-based Adoption Model, we aim to gain deeper insights into the potential impact of UX on users' adoption decisions. This refined model allows us to explore the specific context of app ideas and better understand how different factors contribute to the overall user experience and adoption potential.

2.11 Identified Research Gap

After years of investigation, we have identified a gap in the market for an effective ADHD management application that focuses on detection, symptom management, and access to professional medical support. While awareness of ADHD has been growing in recent years, there is still a lack of effective tools and resources to help young people and parents manage the symptoms of ADHD. Awareness about ADHD can help increase understanding about the disorder, which can encourage people to seek help and support. It can also lead to improved education and resources for those living with ADHD, and most importantly their way of living. A proper diagnosis is the first step forward managing and overcoming ADHD symptoms. Giving access to treatment options.

We realized through the years of investigation that while awareness was growing the development of diagnosis was slower. The research made in the earliest year were focusing on learning about disabilities and problems in the families in the *Child Psychology and Psychiatry Review, Volume 5 Issue 4* we have an example of practical guidance given for assessment, diagnosis, and treatments for clinicians. The book provides behavioral interventions, educational strategies for children and adolescents with ADHD, most of all giving tools to clinicians to manage the disorder.

At the time of our study, there were no existing applications specifically designed for ADHD. Furthermore, there was a lack of awareness among both young individuals and parents regarding the syndrome and its implications. Existing applications were primarily focused on young children or assisting with specific tasks, lacking comprehensive features for detecting the syndrome, assisting with symptom management, and facilitating communication with healthcare professionals. This gap can highlight the need for similar effective applications tailored to the needs of young people encompassing detection, symptom management, and enhanced communication with healthcare providers

2.12 Research Framework

2.12.1 WeKare App Description

During the Innovation Management course at JAMK, we participated in workshops following the XD method to collaboratively develop a mobile application idea. The objective of this app idea was to help detect and overcome ADHD symptoms.

The workshop was conducted in multiple stages, introducing and refining the app idea. We explored various alternative usage scenarios and utilized storyboarding techniques. Once, the necessary scenes were designed and incorporated into the storyboard, an animation was created, resulting in a short video that served as a teaser for the application idea.

The app idea we developed includes supporting individuals with ADHD and their families as well. Some important functionalities as an Easy Access to Professionals is dedicated to a contact section where users can connect with various experts, such as coaches, neuropsychiatrists, psychiatrists, psychologists, and others. This allows individuals to seek guidance and support from professionals who specialize in ADHD. The application is a User and Parent Support method whether the user is personally dealing with ADHD or the parent is concerned about the child, the app provides separate options for users and parents to connect. This way, it effectively detects and identify the syndrome not just in the user but also in those around, offering timely support and understanding. Plus, the app offers an interactive test or quiz that helps individuals determine if they exhibit symptoms of ADHD. This feature serves as an initial step towards better understanding one's condition and seeking appropriate support. Understanding the challenges faced during crisis situations, the app includes a crisis monitoring feature. It allows users to track their emotional well-being and provides resources or immediate assistance during difficult moments.

Managing medication can be a crucial aspect of ADHD treatment. The app offers convenient reminders to ensure individuals take their prescribed medications on time, helping them maintain their treatment regimen effectively. To promote mental well-being, the app includes a dedicated section for sophrology. It offers various relaxation techniques and exercises specifically designed to assist individuals in managing their ADHD-related symptoms and promoting a sense of calm. The app incorporates a helpful feature that acts as a memory aid. It assists individuals in

remembering important tasks, appointments, and deadlines, helping them stay organized and reduce potential stress.

In the subsequent parts of this research, the author analyzed the collected data to evaluate the level of adoption of this application among Generation Z.

Figure 7: The WeKare app-idea Storyboard

Followed by the link to watch the author's video: https://youtu.be/UioF963wTbg

The authors have classified and analysed in a table the different value element that this app could bring to the interrogated students.

Table 1: Value Dimension and Value Element of WeKare (From the authors of this thesis)

Value Dimension	Value Element	Justification
Emotional	Attractiveness	It will only be attractive for people who have ADHD or think they do.
Social	Group Dynamics	This application will help people with ADHD to better integrate into society
Empathical	Caring	Potential users will reinforce their capacity to help themself and others and belonging to a community
Economical	Affordability	This application will be completely free as we'll try to find partners or organizations that are agree to help ADHD people.
	Usefulness	App benefits include saving food, recipes for cooking, food community, reduce costs to buy food
Technological	Innovativeness	There is no existing application that helps people with ADHD so it will be the first one.
	Performance	There will be many different tools to make the application very effective, such as the fact that the application can be connected to a connected watch
	User-Friendliness	App will be easy-to-use

2.12.2 UX-based Adoption Model

Table 2: Description of UX Properties

UX Property	Description
Entertaining	Degree to which the App idea entertains users
Pleasantness	Degree to which the App idea looks like pleasant to use
Productivity	Degree to which the App idea could help users to be more productive
Usefulness	Degree to which the App idea allows users to carry out specific tasks
Novelty	Degree to which the App idea looks new to the user
Efficiency	Degree to which the App idea allows users to be more efficient
Reliability	Degree to which the App idea looks reliable enough
User-Friendliness	Degree to which the App idea looks easy-to-use and intuitive enough

For this investigation, we concentrate on some of the above-mentioned UX Properties that are the most related to this App-Idea. Attractiveness, Collectiveness, Affordability, Usefulness, Newness, Reliability, Efficiency. This led us to study the potential adoption of the App-Idea to our respondent's feedback.

3 Research methods and implementation

3.1 Research context

This study has been carried out in the context of the Innovation Management course in 2021 at JAMK. The course was designed to teach practical and evidence-based techniques, methods, tools, and resources to help manage innovation, technology, and new product development. Through a series of workshops, group works were made to design an app idea, applying the course concepts a research topic and the App Idea description were created. We started studying the usefulness of creating an application about preventing ADHD and overcoming the symptoms.

3.2 Research design

The author used the "onion research design" proposed by (Saunders et al., 2009).

Figure 8: Onion research design (Saunders et al., 2009)
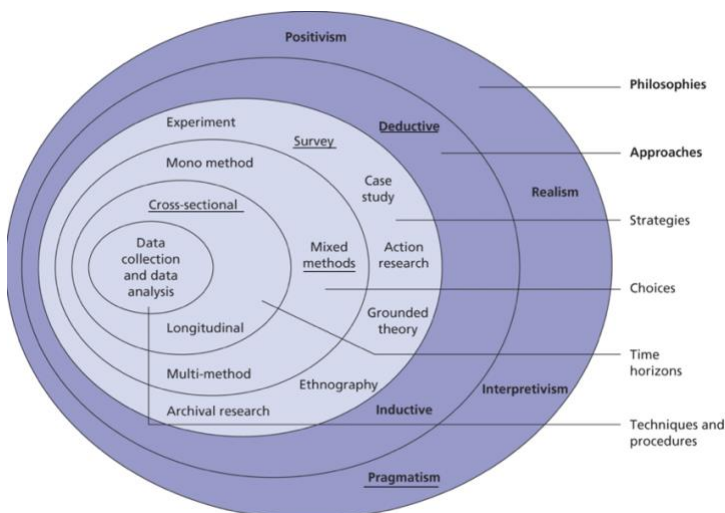
3.2.1 Research purpose

(Saunders et al., 2009) distinguish three types of research purpose: explanatory, descriptive, and explanatory. Exploratory studies seek to gain deeper insight into a subject by exanimating what is happening. The purpose of this study is explanatory. Explanatory studies aim to understand the

relationships between variables in a specific situation. Data has been collected through a survey on the WeKare application to understand.

3.2.2 Research philosophy

The philosophy of this research is pragmatism, an objective and subjective point of view (Saunders et al., 2009) it involves examining the usefulness of a possible application for detecting and overcoming ADHD and assessing the degree to which people would adopt it. Pragmatism is a research philosophy focused on the application of knowledge to solve real world problems. The research is based on existing literature of ADHD disorders and the use of adaptable approaches to overcome it.

3.2.3 Research approach

The research approach is deductive with mixed-methods, it begins with a theory or hypothesis and through our study and collection of data we tested. The data were collected through a survey carried out on the WeKare app with quantitative and qualitative answers.

3.2.4 Research strategy/method/s

According to (Saunders et al., 2009) various research techniques can be employed, including survey, experiments, action research, grounded theory, case study, ethnography, and archival research. For this study, a **survey** approach was chosen.

Using a survey approach enables the researcher to collect quantitative data that can be analysed using inferential statics. By using the questionnaire that included open-ended questions (mixed methods) both quantitative and qualitative data could be collected.

3.2.5 Methodological choice

This thesis utilizes a **mixed-methods design**, involving the application of quantitative and qualitative data collection techniques and analysis methods gaining a more complete understanding of the research problem as the two methods complement each other. (Saunders et

al., 2009) point out that quantitative data is analysed using quantitative methods, and qualitative data is analysed using qualitative methods.

This approach provides us the statistical information about the currency of opinion among the sample of students, while the qualitative data provided us with the reasons behind those opinions.

3.2.6   Time horizon

The time horizon of this study is Cross-sectional as the data is collected only once. This type of study gave us the exposure of people's attitudes and behaviours at a single time. The questionnaire was distributed to students. We analysed the data to see how many people are comfortable with technology.

3.3   Data collection

3.3.1   Sample

The sample for this study consists of anonym students of the author's surroundings. This study has a total number of 43 participants. The participants were recruited by sharing the questionnaire in social media, emails, and announcements in classes. Both qualitative and quantitative data are collected.

3.3.2   Research Instrument

To investigate the degree to which people would adopt an application detecting ADHD symptoms, a survey mixed methods approach was used. The survey consisted of a quantitative part and an embedded qualitative part through open-ended questions. The survey questionnaire was divided into four sections: demographic questions, profiling questions, UX properties rating and adopting factors rating. The Demographic Questions (DQn) aimed to gather information about the participant's age, gender, if they have a smartphone and if they use applications. Profiling questions (Pq1) were used to find out about the participant's experience with ADHD symptoms, whether they have used any apps to manage those symptoms before and how they generally feel about using any other application. The use of UX Properties Rating questions gave us feedback on how participants perceived the application user experience. They were asked to rate based on

how useful, friendly, helpful, and secure they perceived it. In order to evaluate the practicality and market potential of the application idea for helping people with ADHD, the Adoption Factors Rating (AQq) was used to gain insights into its relevance and potential success.

3.4 Data analysis Methods

The analysis of the data involves a range of procedures and techniques used to explain, , and illustrate data, with the purpose of deriving meaningful conclusions (Bazeley 2013; Miles et al., 2014). Depending on the type of data collected, whether it is qualitative or quantitative, different methods can be applied during this stage (Creswell, 2014). As highlighted by Morse and Niehaus (2009), during data analysis, the researcher can link the data with the research question to identify pattern's themes and insights. Mixed methods research entails the integration of both qualitative and quantitative data, and as such, the researcher may employ a variety of techniques to analyze the data (Greene et al, 2011).

3.4.1 Quantitative data analysis

Quantitative analysis is a crucial component of many theses, particularly those in fields such as business and economics (Hair et al., 2019). The primary purpose of quantitative analysis is to provide a rigorous and objective evaluation of data, which can help to inform decision-making and identify patterns or trends that might otherwise go unnoticed (Bryman, 2016).

By using statistical methods to analyze large datasets, it is possible to identify correlations and relationships that might otherwise go unnoticed (Creswell & Creswell, 2017). This can be particularly useful in fields such as healthcare and social sciences, where identifying patterns and trends in data can help to inform policy decisions and improve outcomes. Therefore, a quantitative analysis is necessary for the thesis to establish the validity and reliability of findings, test hypotheses and theories, and identify patterns and trends (Hair et al., 2019; Bryman, 2016; Creswell & Creswell, 2017).

Quantitative data involves the measurement of numerical or categorical data through structured and standardized surveys, questionnaires, or experiments (Babbie, 2017). In the case of the App

Idea, six questions were asked using a 5 point Bi-polar scale with the antonyms useful to most useless.

Table 3: Example of bi-polar questions of the survey

Quantitative Part
XQ1 - How would you rate the degree of USEFULNESS of our App Idea?
XQ2 - How would do you rate the degree of NOVELTY of our App Idea?
XQ3 - How would do you rate the degree of FRIENDLINESS of our App Idea?
XQ4 - How would do you rate the degree of RELIABILITY of our App Idea?
XQ5 - How would do you rate the degree of HELPFULNESS of our App Idea?
XQ6 - How would do you rate the degree of SECURITY of our App Idea?

Value elements and value dimensions are used in quantitative analysis to provide a comprehensive understanding of the value that a particular product or service provides to its users (Kim & Park, 2011). Value elements refer to the specific attributes or features of a product or service that contribute to its overall value. Value dimensions, on the other hand, are the different aspects of value that a product or service can provide to its users.

By incorporating value elements and dimensions into a quantitative analysis, researchers can gain a more nuanced understanding of the value that a product or service provides to its users (Wu et al., 2020). This can help to identify areas of strength and weakness and inform strategies for improvement.

For example, in the context of an application that aims to help people detect and overcome symptoms of ADHD, researchers could use value elements such as usefulness, simplicity, feasibility, novelty, and attractiveness to evaluate the app's overall value. These elements could then be further broken down into value dimensions, such as ease of use, effectiveness, and practicality. By analyzing both the value elements and dimensions, researchers can gain a more comprehensive understanding of the app's value and identify specific areas for improvement.

The questions of the survey have been designed according to the value elements that as been the most suitable to the objective of this thesis. The value dimension is multiple, it has been divided in five different parts: "Emotional", "Social", "Emphatical", "Economical", "Technological".

Table 4: Table of Value Dimension and Value Element

Value Dimension	Value Element	Justification
Emotional	Attractiveness	It will only be attractive for people who have ADHD or think they do.
Social	Group Dynamics	This application will help people with ADHD to better integrate into society
Empathical	Caring	Potential users will reinforce their capacity to help themself and others and belonging to a community
Economical	Affordability	This application will be completely free as we'll try to find partners or organizations that are agree to help ADHD people.
	Usefulness	App benefits include saving food, recipes for cooking, food community, reduce costs to buy food
Technological	Innovativeness	There is no existing application that helps people with ADHD so it will be the first one.
	Performance	There will be many different tools to make the application very effective, such as the fact that the application can be connected to a connected watch
	User-Friendliness	App will be easy-to-use

The value element "Usefulness" can be divided into value dimensions such as "Effectiveness," "Practicality," and "Reliability." To assess the helpfulness dimension, a bipolar question such as "

How would do you rate the degree of HELPFULNESS of our App Idea? " Can be used. The respondents can indicate their level of agreement or disagreement with the statement on a scale ranging from "Strongly agree" to "Strongly disagree".

By using bipolar questions, researchers can obtain more precise and nuanced information about the value dimensions of the app. These types of questions force the respondents to take a position and choose from a range of options, which can be more informative than open-ended questions.

Moreover, bipolar questions can help to overcome the problem of "acquiescence bias," which is a tendency for respondents to agree with statements regardless of their true beliefs. By providing both positive and negative options, bipolar questions can help to reduce this bias and obtain more accurate data (Peytchev, A., & Ridenour, J. 2007, 465-482).

In conclusion, bipolar questions are an effective tool for assessing the value dimensions of a product or service. By designing bipolar questions that align with the value elements of the ADHD app, researchers can obtain more precise and nuanced information about the app's value and identify specific areas for improvement.

3.4.2   Qualitative data analysis

According to (Rambos and Gama 2013), Sentimental Analysis (SA) is rooted in psychology, sociology and anthropology and is linked to the theories of affective stance and appraisal, which explores how emotions influence cognitive processes. SA involves analyzing online expressions in a systematic manner. The authors suggests that emotions are reflected in both mental and bodily responses and can be either positive or negative. Turned into qualitative. The utilization of Sentimental Analysis technique is determined by the research questions and objectives of this study. They also describe a specific SA process (Fig 8).
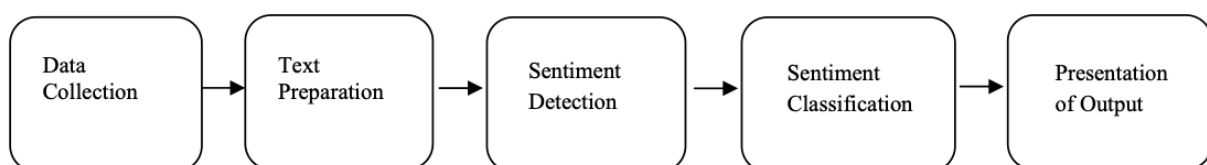
The SA process has five stages: data collection, text preparation, sentiment detection, sentiment classification, and output presentation. The process involves identifying data to be processed in our case the rather small set of data comes from a WeKare app survey. Filtering and grouping data, detecting polarized opinions, classifying sentiments, and visualizing them in a table and bar graph per Ux property and facet. The small size of the data allows manual conversion of rating justifications to polarized sentiments for increased accuracy. Calculating the percentage of polarized sentiments and organizing them into a table and bar graph per UX property and facet (Figure 5) aids in visualizing the results and contributes to enhanced accuracy in sentiment classification.
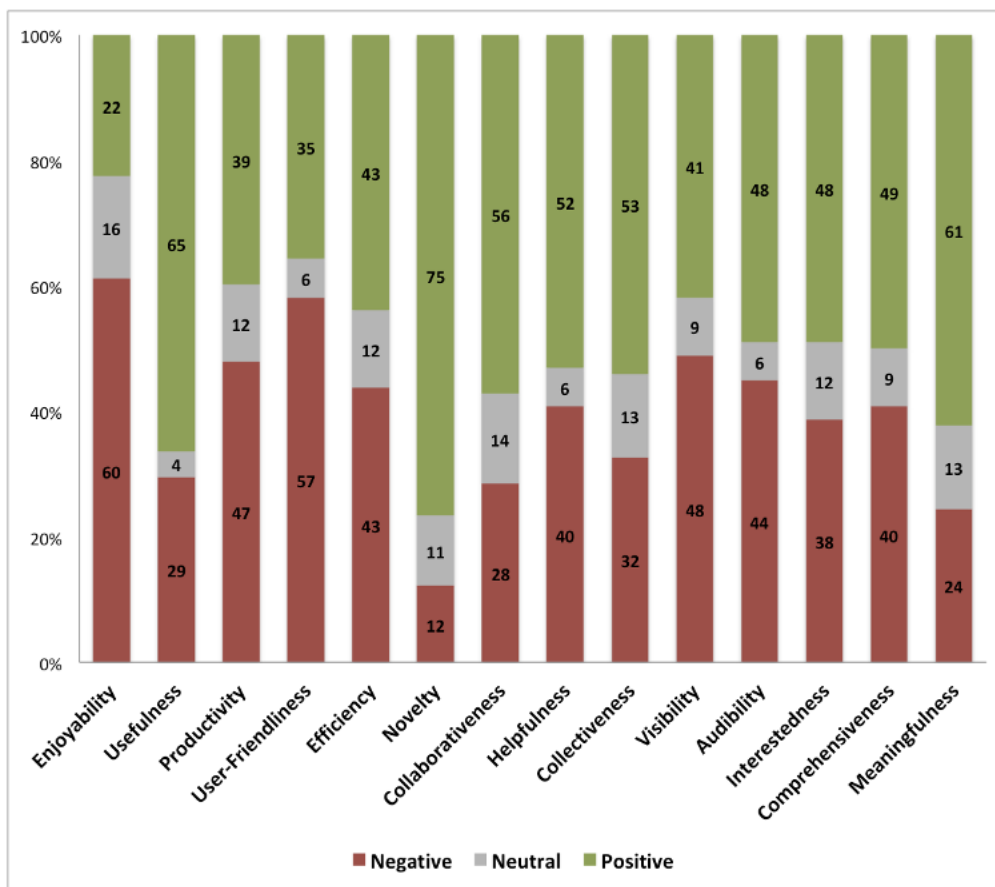

Figure 9: Example of Resulting Polarized Sentiments Presented per UX Property (Pallot et al., 2020)

3.5   Ethical considerations

In fact, there are different ethical considerations. However, because we are not running experiments the only thing, we consider is the anonymity of the respondents as our primary ethical consideration. In order to have a clear and objective survey, the respondents were asked various questions with necessary information. They were able to know the survey's purpose and how it was conducted. For instance, we have provided the necessary information to the respondents.

4   Research Results

4.1   Data Gathering

To gather information for analysis, the App-Idea was introduced to a group of participants via a teaser and presentation. This enabled them to understand how it could be executed and what it entailed. The investigation helped the authors to gather both quantitative and qualitative data from the WeKare app.

An overview of the ratings and the total number of ratings for each UX Property and Intention to Use is demonstrated by the quantitative data. Meanwhile, the qualitative data presents a summary of the opinions expressed by the reviewers, along with the detailed percentage of polarized sentiments for each UX Property and Intention to Use factor.

By examining the results from different angles, the authors were able to identify the potential level of adoption for the App-Idea. The analysis of the UX Properties helped comprehend how it could benefit potential users and identify areas for improvement.

This App-Idea could serve as tool for managing innovation and a guide for best practices.

4.1.1   Quantitative Data

Table 5: Table of the App-idea survey collected data

Criterion	Average rating	Max	Min	Synthesis		Potential Improvement
				Positive feedback	*Negative feedback*	
Usefulness	3,83	1	5	"Help people to have assistance towards their health and facilitate their life"	"People have to know and be able to define their symptoms alone"	Put description of the symptoms to help people identify them (daily life examples signs easy to recognize)
Feasibility	3,52	3	5	"Feasible but may needs lot of stakeholders regarding the medical approach"		The medical information has to be strictly done by medical professionals, the coordination between all the professionals has to be well done
Simplicity	3,47	3	5	"It covers a specific subject so the information is targeted and relevant"	"a lot of variables to take into account"	Provide clear explanation of each of our features in a tutorial after the installation of the app that users are going to be able to look at any time they need
Novelty	3,95	2	5	"Other similar apps exist but they are not as		Highlight our innovative features

				complete as the one proposed"	
Attractiveness	3,9	2	5	"Attractive for the people concerned by ADHD; have to be well targeted"	Proceed to a good targeting, awarness of the subject has to be developped

According to the data collected by the questionnaire, we can observe that the lowest average value is the UX Property "Simplicity" with 3,47-point in average. It is therefore important to take into account the fact that the subject addressed by this application is a complex and precise subject. This highlights the importance of creating an application with a clear and simple UX Experience so that it can be adopted by a large audience. The ergonomics of the application is therefore a major factor for the adoption of this application.

In addition, the data collected from the questionnaire also highlights the importance of providing clear information on the symptoms of ADHD to help users identify them. This is suggested by the negative feedback received regarding the criterion of "Usefulness", where respondents expressed the need for users to be able to define their symptoms alone. Therefore, providing descriptions of symptoms in the app that are easy to recognize in daily life could be a potential improvement to increase the usefulness of the app.

Moreover, the "Feasibility" of the application received an average rating of 3.52, indicating that the development of the app may require a significant amount of coordination between various medical professionals. To address this issue, it is essential to ensure that the medical information provided within the app is strictly verified by medical professionals and that there is a good coordination between them.

Lastly, the "Novelty" of the application was rated highly, with an average of 3.95. However, the attractiveness criterion received an average rating of 3.9, indicating that the app needs to be well

targeted to attract the right audience. Therefore, it is essential to develop an effective targeting strategy and raise awareness about ADHD to ensure that the app reaches its intended audience.

In summary, by analyzing the results from the questionnaire, it is evident that the app's success relies heavily on providing a simple and clear UX experience and presenting information in a straightforward manner. Furthermore, coordination between medical professionals and effective targeting strategies are critical factors in ensuring the app's success.

4.1.2   Qualitative Data

The sentimental analysis was carried out on all the comments from the WeKare survey. After providing a rating for each UX elements, reviewers have the option to express their opinions about what they enjoyed or didn't like in a free form textual format by leaving comments. The total of opinions collected per UX Property are 42. The detailed opinion can be found in the following table.

Table 6: Table of UX elements

| Value Element	UX Dimension	UX Type of Experience	UX Element	UX Properties
Attractiveness	Human	Emotional	Emotional Connection	Attractiveness
Group Dynamics	Social	Interpersonal	Group Dynamics	Collectiveness Influentialness
Caring		Empathical	Caring	Helpfulness Comprehensiveness
Affordability	Business	Economical	Satisfaction	Affordability
Usefulness				Usefulness
Innovativeness		Technological	Innovativeness	Newness
Performance			Performance	Reliability Efficiency
User-Friendliness			User-Friendliness	Easiness-to-use

Table 7: UX Properties Sentiments Expressed by Respondents

UX Property	Sentiment			Total
	Negative	Neutral	Positive	
USEFULNESS	4	5	33	42
NOVELTY	0	2	40	42
FRIENDLINESS	0	10	32	42
RELIABILITY	0	14	28	42
HELPFULNESS	1	3	38	42
SECURITY	1	15	26	42

In summary, the majority of opinions are positive, with 196 out of 252. However, there are also instances of neutral and negative sentiments, accounting for 49 neutrals and 6 negatives.

The UX Properties that stand out as they are the most positively reviewed are: "Novelty", "Helpfulness" and "Usefulness" (Figure 6). This is encouraging as it means the app idea is perceived as potentially new, helpful, and useful.

Figure 10: Resulting Polarized Sentiments Presented per UX Property
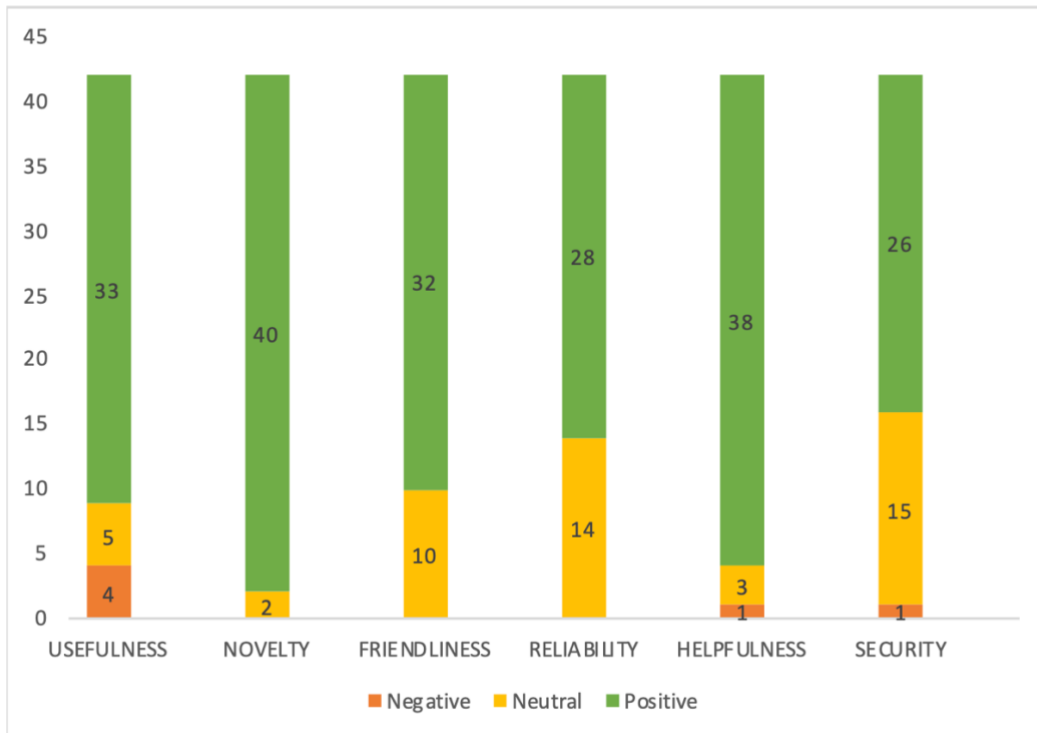
5 Discussion

5.1 Limitations, reliability and validity

Our investigation aims to analyze the most relevant previous work, gather the necessary knowledge about UX satisfaction and causal effect on intention to adopt an app from selected relevant publications and finally create new knowledge about the potential adoption of an ADHD application. The main limitation is the number of participants; indeed, we were able to have a panel of 43 participants a larger scale would have been more relevant.

We have employed a previously validated model and survey tool developed by Topolewski et al. (2019) to examine the adoption of user experience (UX). The selected UX attributes for our study were drawn from three dimensions: Business, Social, and Human. Additionally, it is important to acknowledge that our research findings may not be universally applicable to the entire new generation.

5.2 Dialogue between key results and knowledge base

In our research, we have observed a noticeable increase in the awareness surrounding ADHD over time. When we began working on our thesis in 2021, ADHD symptoms were not as widely acknowledged as they are today. Remarkably, there were no ADHD applications available in the market at that time, indicating the limited resources and attention given to the disorder.

However, in recent years, there has been a significant shift. Various reputable sources, such as online scientific newspapers like PsychCentral (June 2022) and BetterHelp (August 2022), as well as specialized media focusing on ADHD like ADDitude, have reported on the emergence of multiple types of applications linked to ADHD awareness, detection, treatment, and symptom management.

These ADHD apps offer several noteworthy advantages. First and foremost, they are highly accessible and convenient, allowing individuals to use them anywhere and at any time. This feature greatly aids individuals in managing their symptoms on-the-go. Moreover, ADHD apps can provide a sense of anonymity and privacy, catering to those who may be hesitant to seek traditional face-to-face help for their ADHD symptoms. However, these applications are not made by medical professionals. They provide multiple types of medication, but their usefulness is not proven.

It is important to acknowledge these relevant publications and sources as they shed light on the growing recognition of ADHD and the increasing efforts to address the disorder through innovative technological solutions.

5.3 Compliance with research ethics guidelines

In this thesis, all respondents were assigned a reference number instead of using their names, to maintain their anonymity and confidentiality. For instance, respondent n_ was assigned a reference number and their identity was not disclosed in any way. The implementation of this approach was carefully planned and executed to ensure compliance with research ethics guidelines. The reference numbers were assigned to each participant at the beginning of the study

and were used throughout the research process to refer to them. This helped to protect their identities and ensured that their responses were kept confidential.

6   Conclusions

6.1   Key Findings

Through our literature review, we have highlighted a major gap, which is about the evolution of awareness in ADHD. With the rapid advancement of technology, it is imperative to explore the potential impact of these novel applications on ADHD management, symptom alleviation, and overall well-being.

We were able to collect, analyze and interpret the participants' opinions through a mixed methods survey with a quantitative and qualitative study. Their feedback, both positive and negative, provided valuable insights into the usability and potential benefit of the application.

Overall, users perceived the application as highly helpful, useful. While the respondents indicated that they had not heard of this specific type of application before. This suggests a potential market competition and emphasizes the need for the proposed application to differentiate itself through unique features. Users expressed the importance of being assured that they were utilizing a secure device. It is crucial to emphasize the inclusion of health professionals in the application to enhance the overall user experience. By integrating health professionals, such as therapists or doctors specialized in ADHD, users can benefit from their expertise and guidance throughout their journey with the application. This involvement can ensure that the content and features provided are accurate, reliable, and tailored to meet the specific needs of individuals with ADHD.Managerial implications

The findings of this study have important value helping manager interested in supporting ADHD individuals with ADHD symptoms. Firstly, because the prevalence of ADHD in workplaces is important and its impact on employee performance and well-being. This could involve developing strategies to support employees in this condition.

The study highlights the potential benefits of using this application, this could involve providing access to a follow-up that could help employees manage their symptoms more effectively.

6.2 Recommendations for future research

Overcoming the current limitations of our investigation and the main limitations of our participants, it made more sense to us to get more participants to be able to do a complete statistical analysis with more than one hundred respondents.

The respondents are mainly students from different EU countries, it is interesting to questions more participants from over the world especially where ADHD symptoms are aware by a bigger amount of the population. By questioning them we can gather more diverse and comprehensive data that can help us understand the effectiveness across different cultures and populations.

As technology has advanced significantly and there are now numerous applications available that claim to help individuals with ADHD manage their symptoms. It is important to explore further the relevance and efficiency of the application to provide individuals with ADHD more treatment options and improvement in their quality of life.

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