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Nidappi: A mobile application for virtual communities of people with neurodevelopmental disorders

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Abstract

The present work describes the design process of a mobile application for users that have a neurodevelopmental disorder diagnosis. The proposal was called Nidappi which stands for Neurodivergent Interaction Diary Application Island. The main purpose of this proposal is to provide a safe space for neurodivergent users to connect with each other and hand them helpful technological tools for embracing their diagnosis. For this proposal it was followed a User-Centered Design (UCD) methodology, therefore the final users were involved in the steps taken for the proposal development. Neurodivergent participants were involved in the research process through a survey and a pilot user evaluation conducted after the design of the interactive prototype. Through the analysis of the obtained results and feedback from the participants, it was concluded that this tool would represent a significant asset for the autonomy of the neurodivergent community.

Keywords:

Mobile Application; Virtual Communities; Neurodevelopmental disorders; Neurodivergence; User-Centered Design.

1 Introduction

People with neurodevelopmental disorders face significant challenges due to a lack of access to appropriate opportunities or services. This comes from a marginalization process that was originated from a subjective consensus of which abilities are more valuable for general society [3]. To overcome these barriers, it is essential to promote accessible and effective technological solutions that provide the support necessary for these individuals to lead full and productive lives. The aforementioned includes the need to develop technological tools that can build up a more autonomous life for this population [6].

Due to the stigmatization received from others, the "neurodiversity" term has been used to promote a view that instead of perceiving the population with a neurodevelopmental disorder as a disease, they could be perceived as different [3].

The present proposal was designed by following the former approach to the target population, the Section 2 Background describes the background of already existing solutions for the neurodivergent population, the Section 3 covers the Proposal Design process, the Section 4 reports the User Evaluation process, in the Section 5 the Discussion is posed and finally, Section 6 details the Conclusion and Future Works.

2 Background

The World Health Organization (WHO) emphasizes the importance of addressing population health issues including neurodevelopmental disorders, such as Attention-Deficit/Hyperactivity Disorder (ADHD) and Autism Spectrum Disorder (ASD), to name a few. Several studies highlight the development of mobile applications and digital platforms that support this population, family members and professionals, improving time management, diagnosis and treatment through artificial intelligence [1], [3],[15]. In addition, the implementation of collaborative systems and assistive technologies in educational and therapeutic environments is promoted to foster self-regulation and well-being in people with ADHD, from childhood to adulthood [5], [6].

Table 1 below, shows the identification of some existing applications for neurodivergent users, based on a review of the literature. It specifies the type of application referred to, its objective and description of offered functionalities.

Table 1. Existing mobile applications for neurodivergent users.

Type	Description	References
Global Health & Mental Health Issues	WHO emphasizes the global importance of addressing mental health issues, including reducing stigma and strengthening responses.	[3], [4]

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	- Prioritization of mental health in public policies - Stigma reduction	
Digital & Technological Solutions	Thesis on the use of digital platforms to support parents of children with ADHD. Overview of AI applications in diagnosing and treating mental disorders. - Online support platforms for parents -AI-assisted diagnosis and treatment -Personalization of treatments based on the collected data	[6],[8]
Collaborative & Assistive Technologies	System implemented in schools to support mental health of children. Follow-up study on the use of assistive tech for ADHD. Voice robot designed to promote better mental health in ADHD patients through mobile apps. - Collaboration between students and professionals - Personalized assistance applications - Interaction with robots to improve mental health	[1],[2], 14]
Mobile & Web Application Design	Prototype app for managing physical activity in university students with ADHD. Tools supporting neurodivergent users in managing tasks and productivity. -Visual reminders and calendars - Productivity tools -Customization of the interface according to your needs	[7],[11] ,[12],[1 4]
Research & Methodology	Focus group methodology used to study ADHD in children, highlighting key issues and the importance of personalized approaches. -Identification of key problems in ADHD - Personalized methods of intervention and support	[5]

3 Proposal Design

For the design process of the present solution proposal, a UCD methodology was followed. This methodology was selected to create a solution that meets the needs of the target users [9]. In this scenario the mentioned process covers three main parts: Research and Discovery, Characteristics related to vulnerable populations and Interactive prototypes of the solution proposal.

3.1 Research and discovery

An online survey was conducted to find the components that would constitute the solution proposal. Based on the survey findings, user personas were defined, the solution proposal was refined, and finally interactive prototypes were designed.

3.1.1 Survey

The survey was created using Google Forms. The questionnaire covered information related to most used electronic devices, interactions with virtual tools, platforms and other neurodivergent people, among other topics of the participants.

As shown in Figure 1, a total of 21 people answered the survey, 40.9% indicated a diagnosis of ADHD, 31.8% ASD, 22.7% a combined diagnosis of ADHD and ASD, and 4.5% ADHD and moderate cerebral palsy.

For the definition of the deployment platform, 90.5% of the participants indicated that they usually use a cell phone to interact with virtual communities; likewise, 90.5% considered that there is no platform that promotes a virtual community for neurodivergent people.

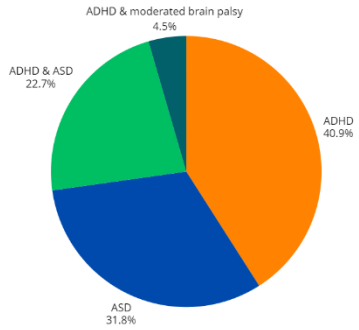

Figure 1. Survey population.

3.1.2 User-personas

Four user-personas were defined according to the identified main users of the solution proposal. The defined personas are listed below:

- Person with a neurodevelopmental disorder.
- Platform moderator.
- Mental health specialist (Psychologist, Psychiatrist)
- Relative of a person with a neurodevelopmental disorder.

3.2 Proposal characteristics related to vulnerable populations

After the analysis of the survey results and the design of the user-personas, the solution proposal condensed into the creation of a safe space for neurodivergent people to connect and interact with each other. It also aims to hand them useful tools that this population considers important for managing their daily lives. In this sense, the solution proposal was named Nidappi after Neurodivergent Interaction Diary Application Island. Through this concept, the present proposal becomes a personal application for neurodivergent users and a platform for building a virtual community.

The characteristics that are included in the solution are as follows:

- Online Platform for Community Building: These virtual spaces allow people with neurodevelopmental disorders, and their close ones, to interact, share experiences and receive mutual support. Examples are discussion forums, social networking groups and individual messaging.
- Virtual Mobile Tools: Tools designed to help with organization, time management and communication.

For example, reminders on calendars, sketching and notes can make a big difference in the daily lives of these individuals.

- Accessibility: Language configuration (Spanish, English, and Mexican native languages, such as Nahuatl from the Oriental Huasteca and Zapoteco) and voice command, to increase the accessibility of the proposal.

Promoting these characteristics on the present solution can contribute towards improving the quality of life for people with neurodevelopmental disorders. This is by the provision of needed tools and support to effectively address their daily challenges. By humanizing the approach, the solution proposal recognizes the importance of building a more inclusive and empathetic society.

3.3 Interactive prototypes

After the definition of the proposal characteristics, interactive prototypes were designed using Figma. The proposed prototypes display a navigation bar with five main items. The function of each section is described below:

- Home: Presents the feed of the user. Own posts and posts of related users are shown in this item (Figure 2).
- Sources: Presents information related to different neurodevelopmental disorders. This should be created by a mental health specialist (Figure 2).
- Community: Presents different communities and individual chat rooms (Figure 3).
- Diary: Presents virtual tools, such as calendar, notes, sketch, rewards (Figure 4).
- Profile: Presents the profile of the user defined by a customizable profile picture, background picture and a small biography. The posts made by the user are also intended to be displayed on this item (Figure 4).

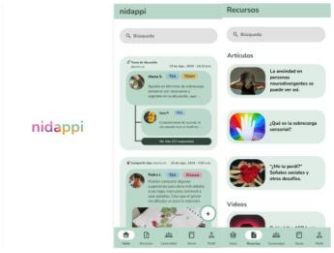

Figure 2. First version of the interactive prototypes of Nidappi part I – Splash, Home & Resources screens.

Figure 3. First version of the interactive prototypes of Nidappi part II – Community, Diary & Profile screens.

The first version of the interactive prototype can be visualized in this link.

4 User evaluation

For evaluation purposes, as intended in a UCD process, a pilot user evaluation of the posed solution proposal was executed. During the pilot evaluation, the first version of the interactive prototypes was evaluated by three participants with a previous neurodevelopmental disorder diagnosis.

4.1 Evaluation design

The main objective of the evaluation was to verify how suitable the first version of the interactive prototypes was according to the target users and if the prototypes reflected the concept introduced as the solution. For the achievement of the mentioned purpose, an in-person user evaluation was planned. The user evaluation was structured as:

- Presentation and introduction to the user evaluation procedure.
- Signing of the informed consent form (Paper).
- Answering sociodemographic questions (Google Forms).
- Execution of tasks in the interactive prototype (Google Forms & Figma).
- Answering open questions about the general opinion (Google Forms).
- Filling of SUS questionnaire (Paper).
- Group interview with the participants.

4.2 Evaluation execution

For the execution of the evaluation, three participants were contacted. The participants were informed of the procedure, then signed an informed consent form. After, the participants were given a Google Forms to fill a sociodemographic information section and proceed with a section of four task execution. The task executions were focused on the navigation within the prototype. Finally, there was a section for general questions about the perception of the idea and the selected components for the prototype.

4.3 Results

The results obtained from our participants indicated that there is a need for applications with more components specially customized for neurodivergent people. The evaluation results highlighted important points such as: the customization of themes to read in their applications, the oriented use for moments of crisis in their daily lives, the importance of sharing their experiences with other neurodivergent people and the importance of contemplating their privacy with the groups of people who can share their information.

5 Discussion

The proposal of a mobile application designed for neurodivergent individuals, including access to resources provided by professionals, moderation of interactions in virtual communities, personal control of daily activities and personalization per user, responds to a crucial need identified by the World Health Organization (WHO) regarding the care of neurodevelopmental disorders such as ADHD and ASD. This type of application has the potential to significantly improve the quality of life of users by integrating tools that promote self-regulation, time management and emotional well-being.

Several studies mentioned above highlight the effectiveness of digital solutions in the diagnosis and treatment of mental disorders, as well as the importance of artificial intelligence in these processes. For example, existing mobile applications, as mentioned in Table 1, have been proven useful in supporting both

neurodivergent individuals and their families and professionals through personalized resources and collaborative technologies.

The integration of collaborative systems and assistive technologies, such as ADHD speech robots, has been especially effective in educational and therapeutic settings, promoting self-regulation from infancy through adulthood. By centralizing and customizing these resources in a single mobile application, an accessible tool tailored to the specific needs of each user can be provided, contributing to the improvement of the overall well-being and inclusion of neurodivergent individuals in society.

6 Conclusion and Future Works

In conclusion, the proposal for this mobile application is not only consistent with the recommendations and needs identified by the World Health Organization (WHO), but also aligns with current trends in the implementation of digital solutions to improve mental health and support for neurodivergent individuals.

It must be considered that there are different characteristics in each of the people with neurodivergent disorders. Which leaves as a future work to evaluate the proposal with a larger group of participants that include a proportional ratio of people with different neurodivergent disorders. This is to verify the user satisfaction with the proposed solution. Another important point to mention as a future objective would be the development of an application which can be sustainable by national programs. It is relevant to mention that the discovery of the above features for neurodivergent people would promote a better use of the application by these population.

7 Acknowledgments

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