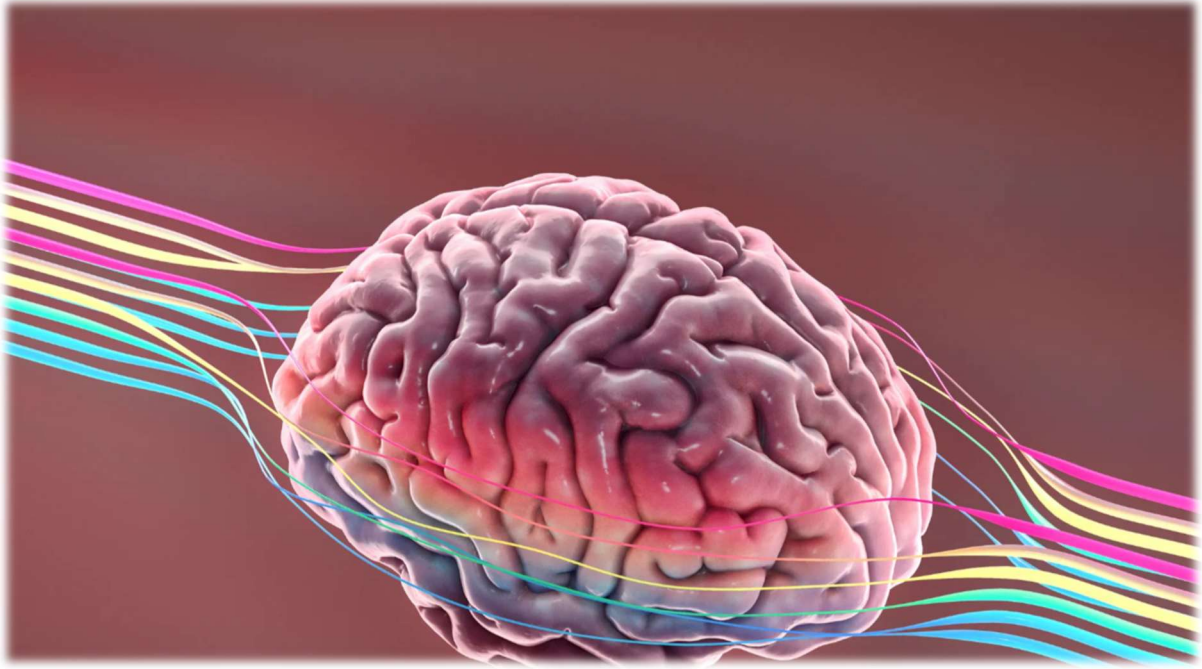


ALZHEIMER - PAMIO



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1. Keywords

Alzheimer's disease, Application, Training and prevention, MEMORY Center

2. Motivation for choosing a topic

My main motivation was the reason for the occurrence of Alzheimer's disease in my own family. After my grandparents were diagnosed with this disease, I thought about how such a disease even works. Is there a treatment for this? Can I help too? And these questions led me to this idea – a memory training app.

3. Aim of the thesis

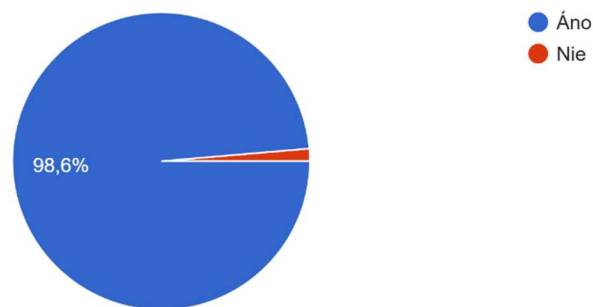
The aim of my work is to create an application to help prevent Alzheimer's disease, support cognitive functions and also memory training. I would like to achieve an application that is easy to use, accessible to everyone and completely free.

4. Exploration

I also wanted to verify the goal of my work in the field. I used a questionnaire that I expanded using social networks. My sample was 222 respondents whom I asked a question about this project. I wanted to find out awareness about Alzheimer's disease, about the MEMORY Center and whether the public can imagine the Slovak application as a good idea that could help.

Počuli ste už o Alzheimerovej chorobe?

222 odpovedí

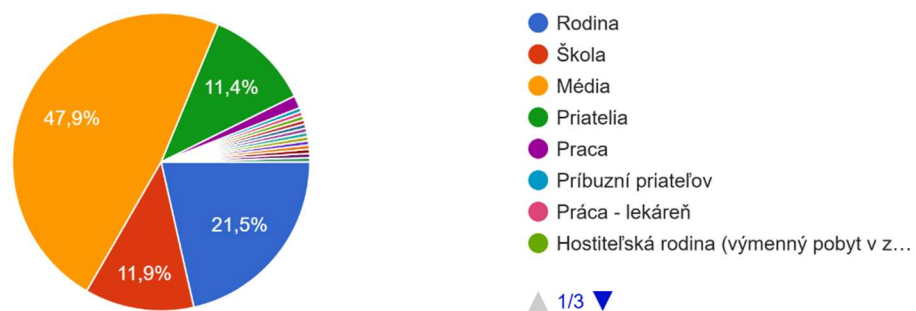


Overall awareness of this disease is high in the general population.

(ÁNO = YES, Nie = NO)

Kde ste s tým stretli?

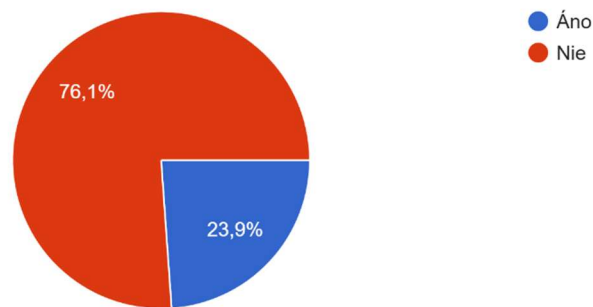
219 odpovedí



More than a fifth of respondents have encountered this disease in their own family (Rodina) and almost half know it at least from the media (Média).

Počuli ste už niekedy o zariadení Memory Centrum?

222 odpovedí

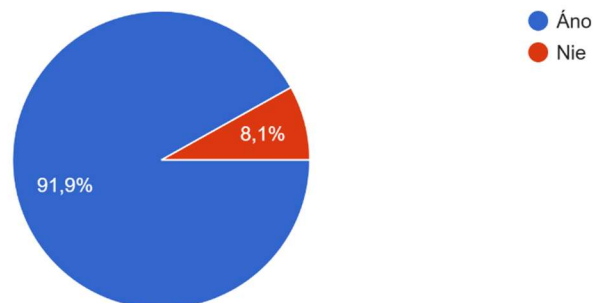


Since I am doing my project in cooperation with the MEMORY Centre, I have verified the awareness of my respondents about this organization. My research shows that less than a quarter of respondents know this organization.

(ÁNO = YES, Nie = NO)

Myslíte si že sa dá pomáhať s prevenciou proti Alzheimerovej chorobe aj pomocou aplikácie na tréning pamäte?

222 odpovedí



I also verified my hypothesis about the creation of a Slovak Application in cooperation with the MEMORY Center among respondents. Most of the respondents identified with my hypothesis.

(ÁNO = YES, Nie = NO)

5. Introduction to the issue

Alzheimer's disease is one of the most serious neurodegenerative diseases today. It is a brain disease that causes a gradual deterioration in a person's memory, thinking, orientation and other cognitive abilities. It is also the most common cause of dementia in the elderly.

The disease is named after the German neurologist Alois Alzheimer, who first described it at the beginning of the 20th century.

Currently, Alzheimer's disease is a significant health and social problem. With the increasing age of the population, the number of patients is constantly increasing. The disease affects not only the patient himself, but also his family and loved ones, who are often involved in the care of the patient.

The aim of this thesis is to bring Alzheimer's disease closer, explain its causes, symptoms, diagnosis and treatment options. The thesis also includes an introduction to the organization MEMORY Centre and a description of cooperation in the creation of a memory training application proposal.

6. Alzheimer's disease

Alzheimer's disease is a neurodegenerative disease of the brain that causes a gradual deterioration in cognitive function. These functions include memory, thinking, the ability to plan, orientation in space and time, as well as language skills and behavior. It is a progressive disease in which nerve cells in the brain are gradually damaged and die. This causes the accumulation of certain proteins in the brain. These are mainly beta-amyloid and tau protective. These substances are produced in the brain by structures called amyloid plaques and neurofibrillary joints. Their presence disrupts communication between nerve cells and gradually leads to their death. There is also a shrinkage of some parts of the brain, especially the hippocampus, which is important for memory and learning. As a result of these changes, the patient's mental abilities gradually deteriorate, which also leads to a disease known as dementia.

Alzheimer's disease is most common in older people, especially after the age of 65. With age, the risk of developing it increases significantly. The disease progresses slowly and its course can last for more than ten years. During this period, the patient's condition gradually deteriorates, and the person becomes more and more dependent on the help of others. Patients live an average of 8 years from diagnosis in the average. The reason is most often that the patient is at greater and greater risk over time: from a lack of nutrients, wandering, dehydration, hypothermia or some serious injury.

6.1 Stages

Alzheimer's disease is usually divided into three main stages – initial, intermediate, and advanced.

1. At the initial stage, the symptoms are mild. The patient has problems especially with memory, forgets names, dates or where he put things. However, it can still function relatively independently and without serious problems.
2. In the middle stage, the symptoms worsen. The patient has greater problems with communication, orientation and performing daily activities. He may need help with dressing, cooking, or personal hygiene. His mood often changes and he loses interest in some of the things he liked before.

3. In the advanced stage of the disease, the patient loses the ability to live independently. He is often unable to communicate, does not recognize his loved ones and needs constant care, which can be difficult for loved ones, and it is good to seek help from professionals as soon as possible so that it does not get to such a state very quickly.

6.2 Symptoms

The symptoms of Alzheimer's disease usually appear gradually and may be inconspicuous at first. The most common first symptom is short-term memory problems. For example, patients may forget recent events, lose objects, or repeatedly ask the same questions.

Gradually, more significant problems may appear, for example, the patient stops recognizing familiar people or gets lost in places he or she knew well. Later, patients may be irritable, anxious or apathetic.

Symptoms also include:- frequent forgetting of recent events or information- problems planning or solving simple tasks- problems with orientation in time and space- difficulty finding the right words during a conversation- changes in mood, behavior, or personality- decreased ability to concentrate

6.3 Causes

The exact cause of Alzheimer's disease is not yet fully known. Scientists believe that it is a combination of biological and environmental factors.

The main risk factors include: older age, unhealthy lifestyle, lack of physical and mental activity, heart and vascular diseases.

Some research suggests that a healthy lifestyle can reduce the risk of developing the disease. Heredity is not yet 100% confirmed.

It all depends on our brain stimulation by various stimuli and factors. Social life, education and physical activities play a big role.

6.4 Diagnosis of the disease

Diagnosing Alzheimer's disease is a complex process. There is no single simple test that can unequivocally confirm the disease. Therefore, doctors use a combination of different examinations, such as neurological examination, psychological tests to assess memory and cognitive function. These tests help determine how well the patient can think, remember information, and orient themselves.

In addition, imaging methods such as CT or MRI of the brain are also used. These tests help detect changes in the brain that may be related to Alzheimer's disease. An important part of the diagnosis is also a conversation with the patient and his family. This conversation helps doctors get information about changes in behavior, memory, or the ability to perform daily activities.

6.5 Treatment of the disease

Currently, there is no drug that can completely cure Alzheimer's disease. Treatment is therefore mainly aimed at relieving symptoms and slowing down the course of the disease. Various medications are used, such as the drug memantine. Memantine is a drug that acts on NMDA receptors in the brain and helps regulate nerve signals, which can slow down the deterioration of memory and thinking.

In addition to pharmacological treatment, psychological and social support of the patient is also very important. Prevention is also of great importance. Regular exercise, a healthy diet, getting enough sleep, social contacts, and mental exercises can help keep the brain active. However, the patient's family also plays a very important role. Close people provide support to the patient, help in everyday activities and create a safe environment.

7. MEMORY Centre

The MEMORY Centre is an organization operating in Bratislava since 2002 and specializes in diagnostics, prevention and training in memory disorders and dementia. Here, patients can undergo various tests and examinations that help detect incipient brain diseases, such as Alzheimer's disease. Early detection of these problems is very important, as it allows you to start therapy as soon as possible and thus slow down the progression of the disease.

They also provide social services and daily programs where patients can spend time in a safe environment under the supervision of professionals. The centre's activities also include helping families and caregivers who care for the sick, for example through counselling and courses.

Overall, the MEMORY Centre plays an important role in the care of people with memory disorders. It helps not only in diagnosis and treatment, but also in prevention, education and support of patients' families.

The MEMORY Center provided me with a workbook with tasks and is willing to supervise the creation of the application in the future when it comes to it, as at the current stage of work on the application it is not yet possible to contain professional comments on its content.

8. Application

All these issues of the disease bring us to the main topic of the whole work, namely the idea of how to help. So my idea is to create an application in cooperation with the MEMORY Center that would help with prevention and training against Alzheimer's disease.

After consulting with a clinical psychologist from the MEMORY Centre, we began to implement this idea. We set the criteria for implementation and after a mutual agreement, the MEMORY Center provided me with the necessary materials for the application.

The application would be aimed at preventing and combating Alzheimer's disease. It would contain exercises that would be divided into groups according to individual cognitive centers of the brain – provided by the MEMORY Center, digitized and adapted so that they can also be worked with online by the fact that the tasks from the MEMORY Center are currently only in paper form.

The name of the app would be **Pamio**. The appearance of the app would be playful to grab the user's attention. Individual icons according to individual cognitive functions would redirect the user directly to exercises that belong to this group.

1. **SPEECH** – exercises with a real voice, but also vocabulary practice. For example, as you repeat the spoken word, read the sentence aloud.
2. **VISION** – exercises focused on vision. For example, eight turn signals, find differences or discard items based on whether they belong to the group in the picture or not.
3. **HEARING** – hearing exercises. Listening comprehension or distinguish what a sound it is, such as animal sounds.
4. **MEMORY** – exercises to train and sharpen memory. Memorize some words and choose them from the menu of words later, memory game, add the wording of proverbs/sayings/proverbs and much more.

5. **MOTOR SKILLS** – motor exercises such as moving an object on the screen or tracing pictures.

6. **ATTENTION** – practicing attention. For example, tasks such as find all i's in the text, fill in spaces in the text or even sudoku.

7. **PERSONALIZATION I.** – photos of loved ones and their name (nickname), my relationship with the person, important dates – birthdays/anniversaries. The app would also try to remind family and loved ones so that the affected person does not forget about them.

8. **PERSONALIZATION II. – MY DAY** – it would be about the basic things of the day, clicking off the given events so that patients do not forget to eat, drink and exercise.

These would be things like:

- Food: breakfast, snack, lunch, afternoon snack, dinner...
- Drinking: interactive glasses turn blue when clicked
- Hygiene: Shower, brushing teeth
- Exercises: yes I did, no I didn't – scrolls directly to the main page to do some
- Movement: yes I moved today, no I didn't move – a range of simple exercises – circle your wrists, ankles...

The individual tasks divided into groups were provided from the workbook provided after consultation by the MEMORY Centre.

9. Budget

Domain registration, maintenance	Design and programming of the web/application interface	Pilot test (MEMORY Centre, selected DSS)	Promotion of the project for the general public (social networks)	Promotion of the project for the professional public (psychiatry, psychology, geriatrics, LDCH, DSS)	Promotional and training materials in print form
500€ (for 5 years)	3500€	1500€	1000€	3000€	2500€
Total budget: 12 000€					

I would obtain funding by addressing entities that deal with the issue of care for the elderly and pharmaceutical companies that deal with the symptomatic treatment of dementia.

Projected revenue:

- Pharmaceutical industry – 4000€
- Non-profit sector (foundations and civic associations) – 3000€
- Public collection via internet platforms – 3000€
- Private donors – 2000€

10. Conclusion

Alzheimer's disease is one of the most serious brain diseases. Gradually, it leads to a deterioration in memory, thinking and the ability to function independently.

Although there is currently no drug that can completely cure the disease, modern medicine can alleviate some symptoms and improve the quality of life of patients. Prevention, a healthy lifestyle and mental activity are also of great importance. Memory training can be one of the tools that help keep the brain active.

With the development of digital technologies, it also brings new opportunities to support mental health, for example through mobile applications focused on cognitive training.

11. Resources

- **Theory of the disease**
 - <https://www.alzheimer.sk/>
 - <https://agelclinic.sk/novinky/200921-alzheimer>
 - <https://www.tena.sk/starostlivost-o-blizkeho/inkontinencia-a-zdravie/demencia-a-inkontinencia/alzheimer>
 - https://www.wikiskripta.eu/w/Alzheimerova_choroba
 - <https://www.benulekaren.sk/alzheimerova-choroba-priznaky-dedicnost-a-liecba>
 - <https://www.projektewa.sk/alzheimer/index.html>
 - <https://www.symptomy.sk/choroby/alzheimerova-choroba>
 - Pharmacy Letters 10/25 Volume XXVII – Slovak Chamber of Pharmacists
- **Consultation on work**
 - MEMORY Centre - Simona Krakovská, Mgr., PhD.
- **Tasks to the application**
 - Centrum MEMORY
- **Application idea**
 - My own