

Although it has been known for centuries and was described as early as antiquity, migraine still hides many secrets. What adds mystery to it is the so-called aura, comprising sensations such as photopsia and scotomas or symptoms referred to as Alice in Wonderland syndrome. They include an illusion of change in the size of one's body or parts of one's body, which seem too small or too big compared to the surroundings. But migraine is, first of all, a very strong headache, usually combined with nausea and light, sound, and smell sensitivity. This neurological disorder affects approximately 12% of the population a year and is the third most frequent disease in the world. Individuals suffering from migraine describe migraine headache as unbearable. *"Oh gods, what are you punishing me for? . . . No, there's no doubt, I have it again, this terrible incurable pain... hemicrania, when half the head aches... there's no cure for it, nothing helps... . . . Suddenly the tempting thought of poison flashed through the Procurator's mind."* Both Lewis Carroll and Mikhail Bulgakov suffered from migraine themselves, and through their characters they described the sensations associated with this ailment.

Nowadays there are medications that relieve migraine pain, but they are not always effective and usually have a short-term effect only. What is more, in some patients a headache syndrome develops as a result of abusing painkillers. In the treatment of migraine, emphasis is placed on the significance of using interventions other than pharmacological. It is therefore very important to look for psychological variables associated with the occurrence and intensity of migraine and at the same time susceptible to modification through exercise and therapeutic interventions. One of such variables is time perspective—the tendency to focus on the past, present, and future combined with a positive or negative evaluation of a particular dimension (area) of time.

Research results show that the most often reported migraine-inducing factor is stress. The dynamically changing conditions of everyday life require the ability to adapt to the situation and to react to it effectively. Problems with adaptation to the challenges that contemporary life brings induce tension, discomfort, loss of control, and overload. What is crucial in coping with the demands of everyday life is attitude towards time. Focus on the future is conducive to work and planning further activities. Focus on the past and on positive experiences boosts self-confidence and increases the sense of efficacy in coping with stress. Focus on the "here and now" helps to calm down and relax. The ability to focus on the future, on the positively evaluated past, and on the present is referred to as balanced time perspective. The link of balanced time perspective with psychological flexibility and well-being is emphasized.

The aim of the project is to investigate the relationships of time perspective and stress to migraine and to test the effect of using a mobile application developing a balanced time perspective on the frequency and severity of migraine. Migraine is defined as an outcome of allostatic load, which develops as a result of prolonged stress. Moreover, one of the characteristic features of migraine patients is rigidity, manifesting itself in problems adapting to the demands of the environment. We therefore expect that balanced time perspective will be negatively related to stress and to the frequency and severity of migraine; we expect that practice in balanced time perspective by means of the mobile application will alleviate migraine. We also surmise that the effect of balanced time perspective training will be changes in functional activity and connectivity of the insular cortex.

The project consists of two studies: (1) a cross-sectional study with a daily diary, and (2) randomized controlled trial. The sample will be composed of Poles and Americans experiencing episodic migraines. The aim of the first study will be to investigate the general relationships of balanced time perspective and stress to migraine. In the second study we will test the effect of a mobile application (the Time App) strengthening balanced time perspective on the frequency and severity of migraine and the associated disability.

The results of the planned research will enrich the knowledge on the psychological determinants of migraine. The use of the Time App will yield results indicating the effect of time perspective on the experience of migraine. We will prepare an English-language version of the application in cooperation with researchers from the University of Oxford, who will also help disseminate the results of the research. In addition, we will use a brain neuroimaging study to evaluate the effectiveness of balanced time perspective training, which will be conducted at one of the world's top research centers, Massachusetts General Hospital (Harvard Medical School). The study will also expand our knowledge of the still unexplored brain structure that is the insula, which is called "The Mysterious Island".