

# Possible Applications of Flotation-REST and its Effects on Human Psychophysiology Regarding Stress, Anxiety and Depression

Možnosti využití techniky flotation REST a její účinky na psychofyziologii člověka v oblasti stresu, úzkosti a deprese

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**Abstract** The study is a summary of the knowledge of the Flotation REST technique and its effects on stress, anxiety and depression from the point of view of psychophysiology. Flotation REST is a specific form of relaxing environment invented in the 1950s which has been researched in particular in the fields of psychology and physiology. It is a hydrotherapeutic device that utilizes the effect of environmental stimulation restriction. Hence the abbreviation REST (Restricted Environmental Stimulation Technique). In our country, the technique is usually used in spa centres and wellness facilities. In foreign research, in particular in the USA, Canada and Sweden, Flotation Rest has proved to be a unique method in the field of applied psychophysiology. It is a technique with predictable psychophysiological effects, a useful application tool that could help in the treatment of certain somatic as well as mental conditions. The goal of this article is to summarize the effects of the method both on the physiological and psychological level regarding stress, anxiety and depression, and to increase the awareness of this technique in view of its development and potential applications.

**Key words** flotation REST, floatation REST, psychophysiology, stress, anxiety, depression.

**Abstrakt** Studie shrnuje poznatky o technice flotation REST a její vliv na stres, úzkost a depresi z pohledu psychofyziologie. Flotation REST je specifická forma relaxačního prostředí vynalezená v 50. letech 20. století a výzkumně zkoumaná především v oblasti psychologie a fyziologie. Jedná se o vodoléčebné zařízení pracující s omezením vnějších stimulů. Odtud výzkumně etablovaná zkratka REST (Restricted Environmental Stimulation Technique). U nás je tato technika, pod názvem floating, využívána především v lázeňských centrech a wellness zařízeních. V zahraničních výzkumech, především v USA, Kanadě a Švédsku, se flotation REST ukázala jako jedinečná metoda na poli aplikované psychofyziologie. Prokázala se jako technika s předvídatelnými psychofyziologickými účinky a jako užitečný aplikační nástroj, který by mohl posloužit při léčbě některých somatických onemocnění a psychických onemocnění. Cílem příspěvku je shrnout účinky této metody jak na fyziologické a psychické úrovni v oblasti stresu, úzkosti a deprese a zvýšit povědomí ohledně této techniky s ohledem na její vývoj a potenciální využití.

**Klíčová slova** flotation REST, floatation REST, psychofyziologie, stres, úzkost, deprese.

## Introduction

The abbreviation REST is rather well known among foreign researchers, while it still remains unfamiliar among Czech scientists. Let us have a look at its meaning and content. The abbreviation REST includes methods that use special environments where any external stimulation is decreased to the lowest possible level. Coined by Peter Suedfeld (1980) in the 1970s, the acronym REST stands for *Restricted Environmental Stimulation Technique*. The Czech translation of the abbreviation is *Technika omezené zevní stimulace* (Kupka et al., 2012).

The first letter R (that means restriction or reduction) expresses essentially the main mechanism of the effect of the methods mentioned earlier – the **reduction** of external stimuli the influence of which on human psychophysiology is researched. The letter T in the acronym may also stand for *therapy*, depending on the context, in which the technique is applied (in research, the word technique is used most often, while in clinical practice it is primarily therapy). As mentioned before, the acronym includes several methods. At present there are two REST methods. The first method is flotation REST that uses water environment; the other one is called chamber REST and it consists in staying in isolation in a dark room. At present, this method is being researched in the Czech Republic mainly by dr. Malůš (Kupka et al., 2019; Malůš et al., 2016; Malůš, Kupka & Dostál, 2016; Suedfeld, Rank & Malůš, 2018).

Since the 1980s REST techniques have been gaining popularity among the general public and their commercial use has been on the rise. In the commercial context they are often called simply *floating* (instead of flotation REST) or *darkness therapy* (instead of chamber REST).

This article only deals with the flotation REST, or floating, both terms are used interchangeably as synonyms. The purpose hereof is to summarize the results of studies dealing with the effects of Flotation REST in the key areas of stress, anxiety and depression, and categorize the effects into two areas; psychological and physiological. We believe the distinction is useful, mainly due to the fact that so far the professional literature has usually dealt with only one of those two areas. This can help create a complex overview of the effects of the method. The analysis dealt with studies written in English published in accessible databases since 1983, mainly focused on researching the effects of Flotation REST in view of one or more key parameters, namely stress, anxiety and depression.

## What Is Flotation REST

As the term suggests, the main principle of flotation REST is floating. In practice it is a hydrotherapeutic device for weightless floating while as many external stimuli as possible are eliminated. Simply put, you bathe in a tank filled with saline water that enables your body to float on the surface.

In the Czech Republic, flotation REST is mainly used as a therapeutic and supportive treatment for various forms of skin conditions, for the treatment of musculoskeletal

system, and for relaxation. You can encounter it in spa facilities, medical and wellness centres, where it is called floating (Kavková et al., 2013).

A flotation tank, as we know it today, can have many different forms. However, most often it has the shape of a closable egg (fig. 1). The tank is usually made of plastic. Typically, resin reinforced with glass fibres is used. High-quality flotation tanks are made of acrylic or medical-grade stainless steel, materials resistant to the strong saline solution and, more importantly, to disinfectants. The tank has a lid controllable by the user. The usual dimensions are the length of 2.5 m, width of 1.6 m, and height of 1.3 m. Below the surface of the solution, there is soft lighting, in the casing there are loudspeakers for the transmission of relaxing music and the tank is sometimes equipped with jets. All the features are to provide the user with the maximum level of comfort. The user is able to select any of the features before the session and inside the tank there are control buttons on the side. There is a safety button in case of emergency. The flotation tank is connected to a control panel situated in a separate room that can be as far as 20 m away. The control panel is usually situated at the reception desk (Hutchinson, 2017).

There are also special flotation rooms (fig. 2). The manufacturers tend to experiment with the size and dimensions of the tank. Larger size can influence the comfort and experience in the tank. Often you can see a tank up to 8 meters long, 4–5 meters wide and 2–3 high so you can stand upright inside the tank. Rather than providing a better effect, such tanks can be better for beginners who for some reason are afraid of the confined, closed space of the tank. In the Czech Republic, such flotation rooms are not common. Usually the classic egg-shaped tanks are used. Beside the fact that flotation rooms are more spacious, they provide the same conditions as a flotation tank.

To create an environment simulating the feeling of weightlessness you can experience at the Dead Sea, usually a solution of  $\text{MgSO}_4$  (magnesium sulphate) also known as Epsom salt is used. Sometimes there are providers who create the solution with pure salt from the Dead Sea. The solution is so saturated (thick) that one can safely float on the surface. It is completely safe and comfortable to fall asleep in such a tank (Hutchinson, 2017). Sometimes people have concerns that if they fall asleep, they will sink, which would be unpleasant. However, one would have to make an effort to either submerge their face or even turn around. In the tank, an individual is lying on the back on the surface in a relaxing position, without submerging the face, and they are able to breathe freely and naturally. The depth of the saline solution is about 20–30 cm. A session usually lasts between 30 and 90 minutes; however, a session can also last several hours. People most often use this time to relax. Between individual sessions, the water is filtered and sterilized with UV or another disinfectant.

Restricted stimulation concerns the following senses – sight (the tank is closed with a lid controlled by the user, so it is dark inside), hearing (beside the fact that the ears are submerged, the session takes place in a silent and sound-proof room), touch (homogenous environment), proprioception (weightlessness is simulated by floating on the surface of the solution), and social isolation because one is alone inside the tank.

**Figure 1.**  
*Flotation tank*



*Note Source:* <https://www.i-sopod.com/about>

**Figure 2.**  
*Flotation room*



*Note Source:* <https://www.oceanfloatrooms.com/>

## Development of Flotation REST

Let us have a short overview of the stages, through which the technique has developed into its current form. A fact that could potentially discourage a person without any knowledge of the context is that flotation REST is a successor technique to the methods of perceptual isolation or sensory deprivation first developed in the 1950s in the United States.

The research focused on establishing the effects of a drastic reduction of environmental stimulation (Suedfeld et al., 1990; Zubek, 1969). Most often, a person stayed in a closed dark room without any contact with other people or was tied to a bed with black goggles and bandaged joints, unable to move (Solomon et al., 1957). The common denominator of those studies was a lack of uniform methodology and unpleasant experiences of the subjects, such as anxiety, stress and hallucinations (e.g. Davis et al., 1960; Jacobs et al., 1984; Zuckerman et al., 1969).

At the end of the 1950s, deprivation tanks were invented (later known as immersion REST). Their purpose was to intensify the effect of isolation by the fact that the body of the subject was floating in the dark in an elongated cylindrical tank filled with warm water, which completely eliminated the perception of the body's interaction with the environment, the proprioception, or the body's existence (Lilly, 2006). The inventor of the tank was the American neurologist and psychoanalyst John C. Lilly, who later invented flotation REST. During the stay in the tank, the subjects were wearing diving gear or some sort of a breathing apparatus. The helmet and the surrounding water blocked the incoming light and sound (Cooper & Adams, 1988; Lilly, 1956). In that special environment, vast physiological and psychological changes were observed, of a negative nature at the beginning (e.g. Jacobs et al., 1984; Suedfeld, 1980; Zubek, 1969). Most sensory deprivation research attempts concentrated on descriptions of the negative impact of such a situation on human behaviour and experience. Cognitive and perceptual motor deficits were identified in the volunteers who participated in the studies (Zuckerman et al., 1969). The subjects reported anxiety, concerns or simply being bored. Typically, a desire for external stimuli, psychological and physical restlessness, and increased suggestibility occurred (Suedfeld, 1980). The researchers also described lively visions, lucid dreams and in extreme cases even hallucinations (Davis et al., 1960). Zubek (1969) in his book "Sensory Deprivation: Fifteen years of research" refers to 1300 researches of that kind. In the 1960s, in order to reduce the negative symptoms occurring in this type of isolation tank, in which many subjects felt stressed, Lilly invented another type of closable tank (flotation tank) where a person can lie in a horizontal position on the surface of Epsom salt solution. Thus floating does not require a complete submersion. The technique became widely popular among lay public, when floating centres and home flotation tanks started to emerge, as well as among researchers (in particular in the 1970s and 1980s thanks to Suedfeld). The method became popular because it provides a complex reduction of environmental stimulation that influences the greatest number of sensory modalities (Cooper & Adams, 1988). Beside the sight and hearing, touch is also reduced. The water temperature is adjusted in view of the heat generated by the body and the

brain. Lilly calculated the temperature as 34,5°C (Lilly, 1956). In order to emphasize the greater relaxing potential the method of flotation REST has compared to conventional types of relaxation, Lilly compared relaxation in a flotation tank and relaxation in bed with respect to the ambient temperature. When lying on a bed, conventional currents above the body cause a stream of air that cools down parts of the body. Those parts of the body not exposed to the cool air remain warm. As a result, some body parts can heat up too much due to the local tissue metabolism if they are not exposed to the air. This does not occur during floating and the tactile sensation remains constant, thus non-disturbing (Lilly, 1956).

The new method was called REST, mainly in order to distinguish itself from the unfavourable connotation connected with sensory deprivation. Compared to sensory deprivation, REST brought a significant mitigation of negative effects by providing a safe environment, staying in contact with the researcher and the freedom to influence or end the procedure. In this later stage of research only a handful of subjects showed stress symptoms, such as strong negative emotions, hallucinations or impaired cognitive and motor abilities (Suedfeld, 1999).

The current scientific knowledge regarding the positive effects of this technique has resulted in an increased number of private floating centres (in particular in the USA, Canada, Sweden and even Poland). Flotation REST is the focus of scientific interest mainly in the United States of America and Sweden. However, in general, the technique is usually perceived as a method used in alternative medicine, in spite of the fact that in some European countries it is accepted as medical treatment (Jonsson & Kjellgren, 2014). Flotation REST has been recognized as medical treatment thanks to evidence-based research results in the field of pain and stress relief, which are two most researched effects of floating.

### Flotation REST and Human Psychophysiology

Flotation REST influences human physiology mainly due to the restricted environmental stimulation, which can have a potential favourable impact on physical as well as psychological functioning. In summary, comparing many studies and meta-analyses of Suedfeld (1999), Dierendock and Nijenhuis (2005), it can be concluded that flotation REST has a positive impact on human physiology (such as lowering cortisol levels, lowering blood pressure) and mental state (e.g. improvement of subjective well-being). Flotation REST has proven to be an effective method of treatment for many conditions and in Dierendock and Nijenhuis study (2005) it appears as more effective than other relaxation techniques (e.g. compared to muscle relaxation, biofeedback and meditation). Individual, scientifically confirmed effects of floating are described in the following chapters.

However, the principal precondition for such assertions is the unification of the methodology of such researches. The quantity and length of the sessions seem to be the key elements. In some cases, mainly regarding inducing of relaxation (which can be measured by devices and subjective assessment), even one session can be sufficient (Feinstein et al., 2018; Fine & Borrie, 2016). However, based on the summary of relevant

research, most researchers agree that ideally one should have 8–12 ca 45-minute sessions within 4 to 7 weeks (Jonsson & Kjellgren, 2017). Bood (2007) et al. also say that the optimum therapeutic benefit of floating does not necessarily improve with a higher number of sessions (i.e. more than 12 sessions).

## Stress and Anxiety Reduction – Physiological Indicators

From the beginning of the 1970s when flotation REST started to be applied, it has been recognized by many scientists as an effective means of achieving relaxation (see Dieren-donck & Nijenhuis meta-analysis, 2005). Due to the relaxed state, which floating is able to induce, it is mainly connected with the reduction of stress and anxiety. The reduction of the experience of gravity during the session itself provides a great help in achieving a relaxed state. The body does not have to fight gravity and thus it can relax much more easily. It is because gravity causes a slower blood supply in the skin and muscles of those body parts that are in contact with the surface if you lie during sleep or in various relaxing positions (Hutchinson, 2017). By floating in the solution, the veins in the muscles open and more blood is distributed to the peripheral parts of the body, which can bring healing to muscles and skin. It is a physical and chemical process, during which the space around muscle fibres increases, certain chemical bonds disappear and a deeper relaxation than what we know in our daily life sets in (Forgays & Belison, 1986).

The effect of flotation REST on stress reduction has been described in detail in many studies (e.g. Bood et al., 2007; Cooper & Adams, 1988; Schulz & Kaspar, 1994).

The objective indicators of stress reduction are physiological changes that occur during and after the session. Various studies dealing with the connection between stress or anxiety and flotation REST looked into various combinations of physiological changes and their parameters. Most often, the **biochemical hormonal changes** connected with stress reaction have been investigated. The hormonal parameters researched include ACTH, adrenalin, noradrenalin, cortisol, aldosterone. Turner and Fine, researchers who were dealing with this topic in the long term, found that hormones directly connected with the stress response (cortisol, ACTH and adrenalin) dropped in the course of the session, while luteinising hormone, which is not connected with stress response, did not show any change. In one of their studies, the authors proved that the decrease of cortisol level and the blood pressure lasted for hours after the session (Turner & Fine, 1983). 12 subjects were included in this study. It was established that the average concentration of cortisol around noon dropped from 13.5 to 10.5/ig dl<sub>1</sub> after one 40-minute float session repeated during 4 consecutive days. It is extremely interesting that the cortisol level decrease was observed even 4 days after the last session. Also ACTH concentration showed a descending tendency, however the changes were not significant. The levels of adrenalin and noradrenalin were reported to drop too.

Two follow-up publications released in the 1990s (Turner & Fine, 1990a in Schul-tz & Kaspar, 1994; Suedfeld et al, 1990) contain relevant additional information regarding the study mentioned above. Three subjects, who had two sessions in a week, experienced



a decrease in cortisol levels in urine from the basic value of 18.7% after 10 weeks and those values decreased even more during the following 2 weeks of monitoring without any further float sessions (Turner & Fine, 1990b in Schultz & Kaspar, 1994).

Among other physiological parameters, beside the hormonal changes, were **blood pressure and muscle tension**. Stress causes increased blood pressure, which can lead to hypertension in the long run. Studies that used stress indicators as a dependent variable confirmed a decrease in blood pressure and muscle (Ruzyla-Smith & Barabasz, 1993; Schulz & Kaspar, 1994; Turner & Fine, 1983; Turner et al., 1993). Researches into those physiological parameters were most popular in the 1980s and 1990s. In their meta-analysis from 2005, Dierendonck and Nijenhuis state that the results were so convincing that newer researches were rather scarce.

It is interesting that in the comparison of the levels of stress hormones and blood pressure with another type of relaxation such as biofeedback, floating showed a significant difference in the drop of the levels of stress hormones, however, the effects on blood pressure were similar (McGrady et al., 1987).

Another indicator of relaxation is a **change in EEG activity** during the session. A number of scientists research changes in brain waves in connection with the effects on psychological and physiological condition of the subjects. Many researchers have found slower EEG brain activity during and after a flotation REST session (Forgays et al., 1991; Schultz & Kaspar, 1994; Suedfeld et al., 1990). The indicators of a relaxed state are the alpha waves and waves that rather indicate the state of meditation (theta). In his meta-analysis Suedfeld (1999) summarizes that those waves indicate a reduction of stress, as evidenced by many studies. However, Jonsson and Kjellgren regard these results as unconvincing. They point out to the fact that even though many studies reported increased alpha activity, some observed decreased alpha activity (Jacobs & Friedman, 2004 in Jonsson & Kjellgren, 2014). As far as theta waves are concerned, there are several studies on the effects of flotation REST confirming their emergence (such as Forgays et al., 1991; Schultz & Kaspar, 1994; Suedfeld et al., 1990; Turner et al., 1993). Such EEG changes are connected with the feeling of calmness and decreased tension, excitement and anxiety.

### Reduction of Stress and Anxiety – Psychological Indicators

The state of relaxation induced during and after the session is confirmed by psychological testing of the subjects. In various types of studies, the psychological tests included mainly self-assessment scales, standardized psychometric scales and open sentences (such as Forgays et al., 1991; Kjellgren et al., 2001; Schulz & Kaspar, 1994; Suedfeld & Eich, 1995; Suedfeld et al., 1990). Fine and Borrie analysed over 1 000 descriptions of experiences with flotation REST and found that more than 90% of subjects responded that flotation REST is deeply relaxing (Fine & Borrie, 2016).

At the Medical College of Ohio, Turner and Fine carried out a number of studies in the psychophysiological effects of short-term flotation REST sessions. In these studies they combined standardized psychodiagnostic methods and self-assessment scales. The

research design consisted of 30–40 minute sessions that were repeated approximately every third day, the total number of sessions was between 4 and 20 per study. The first researched parameter was the subjective experience with REST reported using several indices of subjective utterances, including Spielberger's State-Trait Anxiety Inventory, Zuckerman's Multiple Affect Adjective Checklist (Turner & Fine, 1990a), Profile of Mood States (POMS) (Turner et al., 1989) and subjective rating scales of emotions and relaxation. All studies observed significant changes before and after the sessions that suggested relaxation, increased positive emotions and a decrease in negative emotions.

In view of the fact that stress can cause a number of conditions, many researchers studied the change of stress level in their subjects through a change in the symptoms of such conditions. An example of such research is Ballard's study where flotation REST was compared to relaxation in the **treatment of stress disorder** and primary **psychophysiological insomnia**. 36 patients suffering from insomnia participated in the study. They were assessed by subjective scales and objective assessment of sleep. During 2 weeks following the initial evaluation those individuals underwent flotation REST, autogenic training or a combination of the two techniques. Three months after the treatment, it was clinically as well as statistically proved that those who had flotation REST sessions (either separately or in combination with autogenic training) shortened the sleep latency both in subjective and objective assessment (Ballard, 1993).

A research on patients appear to be predictable within the principle of homeostasis (the greater the deviation from the standard, the greater the probability of achieving a positive change). However, how about people who are considered to be healthy? Researchers in Sweden tried to answer this question.

Kjellgren and Westman (2014) aimed to evaluate the psychological effects after a series of float sessions in healthy individuals. The subjects had 12 sessions spread over 7 weeks. Before the beginning of the study and after the sessions the following questionnaires were administered: Stress and Energy – a questionnaire created by Kjellgren, Hospital Anxiety Depression Scale, Mindful Attention Awareness Scale, Life Orientation Test – assessing optimism. After the sessions, a significant drop in stress, depression and anxiety levels was observed while optimism increased significantly.

Regarding **anxiety disorders**, Jonsson and Kjellgren have recently studied the effect of floating on generalized anxiety disorder (Jonsson & Kjellgren, 2017; Jonsson, 2018). Nine patients underwent twelve float sessions. Data were collected in the form of empirical phenomenological psychological method from semi-structured interviews focused on experiencing. The analysis identified six topics that characterized experiences during and after the session in people suffering from generalized anxiety disorder: 1) barriers to treatment, 2) relaxing place, 3) non-typical states of mind, 4) connection with oneself, 5) new attitudes and coping strategies, 6) increased quality of life. The results show that flotation REST is experienced by the subjects as a comprehensive process that leads to new challenges as well as enjoyment. The results show that the method has a positive effect on the symptoms connected with generalized anxiety disorder on experimental level (Jonsson & Kjellgren, 2017). In the overall evaluation, the results show that flotation

REST can be a useful instrument for coping with stress, either in combination with or independently on other stress management techniques.

Another piece of evidence that the topic is still current is the latest study of Feinstein and his colleagues (2018). The purpose of their study was to establish whether a single flotation REST session is able to alleviate the symptoms of anxiety, stress and depression in a clinical sample. Fifty subjects were included in a spectrum of **anxiety and stress disorders** (posttraumatic stress, generalized anxiety, panic, agoraphobia and social anxiety), most of them ( $n = 46$ ) with unipolar depression comorbidity. Data were collected from self-assessment scales and Spielberg's STAI inventory. The subjects underwent pre-test assessment, a 60-minute float session and post-test evaluation. No matter what the diagnosis, flotation-REST alleviated anxiety significantly. On top of that, the subjects experienced a significant reduction of stress, muscle tension, pain, depression and negative affects, accompanied by a significant improvement of mood, characterized by increased calmness, relaxation, happiness and general well-being. The effect was more pronounced in anxious subjects compared to those who were not anxious. Further analysis showed that the most anxious subjects experienced the greatest benefits. The findings of the study must naturally be repeated in larger controlled studies; however, they suggest that flotation-REST can be a promising technique for a temporary alleviation of suffering in those who suffer from anxiety and depression.

### Reduction of Depressive States – Physiological Indicators

Many studies proved that flotation REST, thanks to the effect of deep relaxation, causes a shift in mood (Raab, 1994; Schulz & Kaspar, 1994; Suedfeld, 1999; Turner & Fine, 1990). This is because of the functional link between the body and mind - if the muscles in the body relax, the mind relaxes too.

Physiological parameters related to depression are more or less identical with the physiological parameters related to stress. The research studies dealt mainly with the following: **heart rate, blood pressure, production of lactic acid, production of cortisol and serotonin.**

In summary, heart rate and blood pressure tend to decrease after a float session (Bood et al., 2006, 2007; Turner et al., 1993), the production of lactic acid and cortisol (which are related to anxiety, depression, fatigue and helplessness) also decrease during and after a session (Schultz & Kaspar, 1994; Turner & Fine, 1989; Turner et al., 1993). Many website offering floating commercially also describe that during and after a float session, endorphins are produced. However, one should be careful with such a conclusion; the results regarding the levels of endorphins are mixed. Still, a positive effect of floating on endorphin production could explain its effect on alleviating depression.

## Reduction of Depressive State – Psychological Indicators

The effects of flotation REST on depression have been researched mainly by Swedish scientists. Studies that focus on this particular issue mostly concentrate on complex phenomena where depression research is part of test sub-scales or one of several parameters studied (Bood et al., 2005; Kjellgren et al., 2001, 2004; Kjellgren & Westman, 2014).

In the study of Kjellgren and Westman (2014) mentioned above HADS (Hospital Anxiety Depression Scale) was applied. The scale contains 14 questions focused on anxiety and 14 questions focused on depression. In the group that underwent floating (n = 38) a significant decrease in depression was found compared to the control group (without any intervention) after twelve float sessions during 7 weeks.

Another example is a study where a decrease in anxiety, hostile behaviour as well as depressive self-assessment was observed after floating. The subjects were regular people who had weekly sessions in the course of about six months. With the exception of one subject, the psychological effects were not cumulative in the course of time (Pudvah & Rzewnieki, 1990 in Suedfeld et al., 1994).

However, previous studies were aimed at subjects who primarily did not suffer from depression. The aim of the studies was to treat pains or insomnia. If the depression is a reaction to a physical injury or an illness, floating can improve mood, probably due to the effect of deep relaxation and optimism experienced during physical relief. Regarding depression, flotation REST was compared with counselling, relaxation training and physical therapy. The patients (n = 27) were divided into groups according to the type of intervention. The floating group reported a greater relief compared to the other types of interventions. The patients also said that floating had extra benefits for them such as improved sleep (65%), mental concentration (77%), improved energy levels (46%), ability to cope with pain (88%), ability to cope with stress (92%), and feelings of well-being (65%). The results were achieved after sixteen float sessions (Fine & Borrie, 2016).

In the study of Bood and his colleagues (2005) the subjects who underwent float sessions were patients diagnosed with depression (n = 16). Half of the patients underwent a six-week flotation REST programme and the second half, who suffered from more severe symptoms, a twelve-week programme. Each week the patients had two float sessions. The post-test assessment with HADS showed a significant decrease of depression in all of the patients. There was also a significant difference in the decrease of depression between the two groups of patients with less and more severe symptoms. Those with more severe symptoms showed greater improvement.

If depression is a primary diagnosis, flotation REST appears to be a beneficial addition to psychotherapy and pharmacotherapy (Cooper & Adams, 1988; Suedfeld, 1980). However, Fine and Borrie point out to the fact that caution is essential when using flotation REST for depressive patients in view of the obsessive nature of their negative thoughts they may be entertaining during the session. If the patients' view of their condition improves, flotation REST can improve their mood, which could accelerate their recovery. This in particular happens if the session is accompanied by directed imagination (Fine & Borrie, 2016).

## Clinical Use in Psychophysiology and Psychotherapy

A flotation tank is a place for natural introspection and self-realisation, which is in perfect alignment with the therapeutic process. Results in the field of inhibiting stress response of the body strongly support the hypothesis that flotation REST induces relaxation, and thus has a potential for the application in clinical practice when working with people suffering from any disorders related to stress. There are several clinical studies that included flotation REST as treatment for essential hypertension, tension headaches, anxiety disorder, chronic pains, psychophysiological insomnia (Goldstein & Jessen, 1990; Rzewnicki et al., 1990; Turner et al., 1993). All studies showed positive results of the use of flotation REST.

Floating seems to be a promising addition to psychotherapy too (e.g. Åsenlöf et al. 2007; Jessen, 1990). It can be utilised as supportive treatment in the psychotherapeutic process. Some studies claim (Adams, 1965, 1980; Adams, Cooper & Carrera, 1972, 1977; Suedfeld, 1980) that the greater the degree of disorder or difference from optimum levels of functioning before floating, the greater the change towards optimal functioning was. A group of psychiatric patients and emotionally disturbed individuals showed a greater shift towards an optimum level than a “normal person”, whose everyday functioning is more adaptable. REST methods, including floating, facilitate natural processes so that all individuals have a tendency to make a shift towards an optimal scope of adaptive functioning (Cooper & Adams, 1988).

Floating can be applied to facilitate the process of counselling and psychotherapy and to overcome barriers to treatment (Suedfeld, 1980). The exclusion of the disturbing external variables during the REST method can be applied constructively in clinical practice to help clients be more open and sensitive to a planned, positive, therapeutic change. That is particularly significant for individuals, whose excessive agitation, lack of verbal fluency, repression and denial make them relatively poor candidates for conventional verbal techniques of counselling and psychotherapy (Cooper & Adams, 1988). In such cases the non-verbal REST techniques have proven to be particularly effective (Adams, 1965, 1980 in Suedfeld, 1980; Fine & Turner, 1985; Kammerman, 1977).

Another possible effect of floating as part of therapy for psychological disorders is the fact that REST can increase the effectiveness of imagination (Barabasz, 1982; Suedfeld & Bruno, 1990). That has been demonstrated in patients suffering from obsessive compulsive disorder (Walker et al., 1994).

Confrontational techniques that are often used in psychotherapy can be perceived as a form of criticism or attack, which leads to stronger refusal, increases agitation and denial. REST offers a positive alternative, which can be more emotionally sensitive and less dangerous e.g. for alcohol and drug addicts (Cooper & Adams, 1988). Studies have shown that REST methods are useful for a more accurate and realistic self-perception, while at the same time they increase self-respect and self-acceptance (see meta-analysis in Suedfeld, 1980).

## Conclusion

Human body is controlled by the principle of homeostasis, the purpose of which is to maintain all our functions in balance. The balance can be disturbed even with mild stress. It is obvious from previous researches that most relatively strong experiences can originate in the tendency to restore the state of homeostasis. Flotation REST can facilitate this homeostasis thanks to the specific properties of the environment where one is not disconnected from their body and mind by external stimuli.

From the biofeedback perspective, the REST environment can be seen as a system that strengthens the connection between consciousness and physiology. The connection is established through a reduction of external stimuli and an intensification of the internal stimuli. Fine and Borrie (2016) describe biofeedback as a process that amplifies and displays information regarding processes that happen unknowingly or that we are not able to discern from a multitude of external stimuli. REST reduces environmental stimuli and in the flotation REST environment, a person is thus able to realise a large quantity of physiological information (such as the muscle tension, heart rate), of which we normally are not aware even in a regular quiet environment. Thus a person becomes more sensitive to their own body.

The relation between flotation REST and improved psychophysiological functioning was researched in many studies. In many of them statistical analyses were carried out as well as interviews. Thus we can conclude that flotation REST can potentially contribute to an improvement of the psychophysiological parameters discussed above. It appears to be an effective form of relaxation, thus it is suitable as intervention for a number of psychophysiological conditions where deep relaxation is a component of a treatment programme.

It is obvious that most early studies focused predominantly on physiological parameters. In time, more sophisticated measuring methods were applied also to measure psychological parameters in the form of standardized methods. Thus the results shifted from the area of assumptions to a more objective level. For further development of the knowledge, it would be beneficial to continue to implement more specific applied studies with rigorous methodology, using telemetric physiological data collection. In the Czech Republic, Flotation REST is mainly used as a physiological component of treatment programmes. It is not commonly used in psychological or therapeutic practice. In order to develop this field, newer research would be beneficial, mainly in Czech language publications.

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