

Åsenlöf, Kent, Susanne Olsson, Sven Å Bood and Torsten Norlander (2007). "Case Studies on Fibromyalgia and Burn-out Depression Using Psychotherapy in Combination with Flotation-REST: Personality Development and Increased Well-Being." Imagination, Cognition and Personality 26(3): 259-271.

Abstract—The aim of the study was to examine whether and how the combination of therapy and flotation tank could be used to treat patients with severe stress problems. Two women on long-term sick-leave, aged 55 and 58, participated in the study, which was carried out over a period of one year. One of these women was diagnosed as suffering from burn out depression and the other from fibromyalgia. The therapy program had several components: flotation-REST, group therapy, conversational therapy, and picture production. The clients kept journals and were the participants of deep interviews on two occasions. "The Empirical Phenomenological Psychological Method" (Karlsson, 1995) was used in the analysis, which generated four overarching themes: a) the therapeutic work model; b) transformation of feelings; c) self-insight; and d) meaning. These together constituted a "therapeutic circle" which after a while transformed into a "therapeutic spiral" of increased meaning and enhanced well-being.

Beissner, Florian and Irene Marzolff (2012). "Investigation of Acupuncture Sensation Patterns under Sensory Deprivation Using a Geographic Information System." Evidence-Based Complementary and Alternative Medicine 2012: 1-10.

Abstract—The study of acupuncture-related sensations, like deqi and propagated sensations along channels (PSCs), has a long tradition in acupuncture basic research. The phenomenon itself, however, remains poorly understood. To study the connection between PSC and classical meridians, we applied a geographic information system (GIS) to analyze sketches of acupuncture sensations from healthy volunteers after laser acupuncture. As PSC can be subtle, we aimed at reducing the confounding impact of external stimuli by carrying out the experiment in a floatation tank under restricted environmental stimulation. 82.4% of the subjects experienced PSC, that is, they had line-like or 2-dimensional sensations, although there were some doubts that these were related to the laser stimulation. Line-like sensations on the same limb were averaged to calculate sensation mean courses, which were then compared to classical meridians by measuring the mean distance between the two. Distances ranged from 0.83 cm in the case of the heart (HT) and spleen (SP) meridian to 6.27 cm in the case of the kidney (KI) meridian. Furthermore, PSC was observed to "jump" between adjacent meridians. In summary, GIS has proven to be a valuable tool to study PSC, and our results suggest a close connection between PSC and classical meridians.

Bood, Sven Å, Anette Kjellgren and Torsten Norlander (2009). "Treating Stress-Related Pain with the Flotation Restricted Environmental Stimulation Technique: Are There Differences between Women and Men?" Pain Research and Management 14(4): 293-298.

Abstract—The aim of the present study was to explore, for the first time, sex differences among patients diagnosed with stress-related pain before and after flotation restricted environmental stimulation technique (REST) treatment, delivered 12 times during seven weeks. The present study included 88 patients (69 women, 19 men) from three different studies (post hoc analysis). They had been diagnosed by a physician as having chronic stress-related muscle tension pain.

The analyses indicated that the flotation-REST treatment had beneficial effects on stress, anxiety, depression, sleep quality and pain and that there were few sex differences. Women were more depressed than men before treatment, but after treatment there was no difference between sexes. However, there was a sex difference in the ability to endure experimentally induced pain, suggesting that men exhibited greater endurance both before and after the flotation-REST treatment. The results also showed, for the first time, that both sexes improved their ability to endure experimentally induced pain (higher scores for upper pain threshold) following the successful flotation-REST pain treatment.

Bood, Sven Å, Ulf Sundequist, Anette Kjellgren, Gun Nordström and Torsten Norlander (2005). "Effects of Flotation-Restricted Environmental Stimulation Technique on Stress-Related Muscle Pain: What Makes the Difference in Therapy – Attention-Placebo or the Relaxation Response?" Pain Research & Management 10(4): 201-209.

Abstract—Introduction: The purpose of the present study was to examine the potential effects of attention-placebo on flotation tank therapy. Flotation-restricted environmental stimulation technique is a method whereby an individual lies in a floating tank and all stimuli are reduced to a minimum. Methods: Thirty-two patients were diagnosed as having stress-related muscular pain. In addition, 16 of the participants had received the diagnosis of burnout depression. The patients were treated with flotation-restricted environmental stimulation technique for six weeks. One-half of the patients were also given special attention for 12 weeks (high attention), while the remainder received attention for only six weeks (normal attention). Results: The participants exhibited lowered blood pressure, reduced pain, anxiety, depression, stress and negative affectivity, as well as increased optimism, energy and positive affectivity. The results were largely unaffected by the degree of attention-placebo or diagnosis. Conclusion: It was concluded that flotation therapy is an effective, noninvasive method for treating stress-related pain, and that the method is not more affected by placebo than by other methods currently used in pain treatment. The treatment of both burnout depression and pain related to muscle tension constitutes a major challenge for the patient as well as the care provider, an area in which great gains can be made if the treatment is effective. Flotation therapy may constitute an integral part of such treatment.

Bood, Sven Å, Ulf Sundequist, Anette Kjellgren, Gun Nordström and Torsten Norlander (2007). "Effects of Flotation REST (Restricted Environmental Stimulation Technique) on Stress Related Muscle Pain: Are 33 Flotation Sessions More Effective Than 12 Sessions?" Social Behavior and Personality 35(2): 143-156.

Abstract—The aim of the study was to investigate whether or not 33 flotation sessions were more effective for stress-related ailments than 12 sessions. Participants were 37 patients, 29 women and 8 men, all diagnosed as having stress-related pain of a muscle tension type. The patients were randomized to one of two conditions: 12 flotation-REST treatments or 33 flotation-REST treatments. Analyses for subjective pain typically indicated that 12 sessions were enough to get considerable improvements and no further improvements were noticed after 33 sessions. A similar pattern was observed concerning the stress-related psychological variables: experienced stress, anxiety, depression, negative affectivity, dispositional optimism, and sleep quality. For blood pressure no effects were observed after 12 sessions, but there was a significant lower level for diastolic blood pressure after 33 sessions. The present study highlighted the importance of finding suitable complementary treatments in order to make further progress after the initial 12 sessions.

Bood, Sven Å, Ulf Sundequist, Anette Kjellgren, Torsten Norlander, Lenneart Nordström, Knut Nordenström and Gun Nordström (2006). "Eliciting the Relaxation Response with the Help of Flotation-REST (Restricted Environmental Stimulation Technique) in Patients with Stress-Related Ailments." International Journal of Stress Management 13(2): 154-175.

Abstract—This study aimed to investigate long-term effects of the flotation-REST (restricted environmental stimulation technique) 4 months after treatment. Seventy patients, 54 women and 16 men, participated, diagnosed as having stress-related pain. Twenty-six participants had also the diagnosis of burnout depression. Participants were randomly assigned in equal numbers to either a control group or a flotation-REST group and participated in a total of 12 flotation-REST or control sessions. Results indicated that pain areas, stress, anxiety, and depression decreased, whereas sleep quality, optimism, and prolactin increased. Positive effects generally maintained 4 months after treatment, but prolactin returned to initial levels. It was concluded that flotation tank therapy is an effective method for the treatment of stress-related pain.

Börjesson, Marcus, Carolina Lundqvist, Henrik Gustafsson and Paul Davis (2018). "Flotation REST as a Stress Reduction Method: The Effects on Anxiety, Muscle Tension, and Performance." Journal of Clinical Sport Psychology: 1-25.

Abstract—The purpose of the study was to investigate the influence of flotation REST upon skilled and less skilled golfers' anxiety in terms of physiological indicators of stress, self-rated anxiety scores, muscle tension, and the effect on golf putting. Prior to performing the putting task participants underwent a treatment of flotation REST or a period of resting in an armchair. Participants completed both treatments in a randomized order with a two-week interval. The results showed that both flotation REST and the armchair treatment reduced systolic blood pressure and heart rate, with no differences between treatments or athlete skill levels. No significant differences between treatments were revealed regarding self-ratings, level of muscle tension or putting precision. The results indicate that flotation REST may be useful for reducing negative symptoms related to stress and anxiety in general; however, no support for direct positive effects on golf performance were found.

*Borrie, Roderick (1991). "The Use of Restricted Environmental Stimulation Therapy in Treating Addictive Behaviors." International Journal of the Addictions 25(sup7): 995-1015.

Abstract—Successful treatment of addictive behaviors is difficult because of the complexity of relevant contributing variables. Restricted environmental stimulation therapy (REST) is offered as a useful, flexible tool that can facilitate change in addictive variables at each level of complexity, from habitual acts through attitudes to self-concept and spirituality. The nature of REST is discussed in terms of processes and effects. Basically two processes, refocusing and rebalancing, contribute to the various physical and mental effects of restricted environmental stimulation. These effects include profound relaxation, relief from pain, and a shift in consciousness to a state that is more introspective, less defensive, and more receptive. Research in treating addictive behaviors with REST is reviewed with smoking, overeating, alcohol consumption, and drug misuse. There is a substantial body of literature demonstrating the effectiveness of REST in modifying smoking behavior. Very little research has been done on REST and drug misuse. Each of the other areas has a small number of preliminary studies that suggest REST as a promising treatment. In general chamber REST proves to be effective in facilitating attitudinal and behavioral change, and maintaining those changes. The scant research with flotation REST show it to be less effective in modifying behavior but more relaxing and pain alleviating than chamber REST. The characteristics of the REST experience that make it effective in treating addictions are discussed as follows: (1) the induction of a general relaxation response,

(2) substance misusers find serenity and relief by nonchemical means, (3) internal refocusing to concentrate on personal problems, (4) disruption of habits through removal of trigger cues and response possibilities, (5) increased feelings of control over addictive behaviors, and (6) enhanced learning processes. REST is a versatile, cost-effective treatment modality with demonstrated effectiveness in modifying some addictive behaviors and promising applications with others.

Driller, Matthew W and Christos K Argus (2016). "Flotation Restricted Environmental Stimulation Therapy and Napping on Mood State and Muscle Soreness in Elite Athletes: A Novel Recovery Strategy?" Performance Enhancement & Health 5(2): 60-65.

Abstract—Relaxation techniques and napping are very popular strategies amongst elite athletes recovering from the psychophysiological demands of training and competition. The current study examined a novel relaxation technique using restricted environmental stimulation therapy in a flotation tank (FLOAT). FLOAT involves reducing the level of environmental stimulation while achieving a sense of near weightlessness through floating in an enclosed, warm, saline-dense water tank. Sixty elite, international-level athletes (28 male, 32 female) across a range of 9 sports, completed a ~45 min FLOAT session following exercise training for their sport. Pre and post FLOAT, athletes filled out a multidimensional mood-state questionnaire (MDMQ) containing 16 mood-state variables as well as a question on perceived muscle soreness. Group data were analysed for pre to post FLOAT for all measured variables. Further analyses were performed on all variables for athletes that napped during FLOAT (n = 27) and compared to those that did not nap (n = 33). A single FLOAT session significantly enhanced 15 of the 16 mood-state variables ($p < 0.05$) and also lowered perceived muscle soreness ($p < 0.01$). Small (n = 3) to moderate (n = 6) effect sizes in favour of napping for 9 of the 16 mood-state variables were found when compared to the no nap group. FLOAT may be an effective tool for both physical and psychological recovery following training in elite athletes. Furthermore, napping in combination with FLOAT may provide additional benefits to enhance certain mood-state variables. This study serves as a pilot study for future research into the performance recovery of elite athletes following FLOAT.

Dunham, C Michael, Jesse V McClain and Amanda Burger (2017). "Comparison of Bispectral Index™ Values During the Flotation Restricted Environmental Stimulation Technique and Results for Stage I Sleep: A Prospective Pilot Investigation." BMC Research Notes 10(1): 640.

Abstract—Objective: To determine whether Bispectral Index™ values obtained during flotation-restricted environment stimulation technique have a similar profile in a single observation compared to literature-derived results found during sleep and other relaxation-induction interventions. Results: Bispectral Index™ values were as follows: awake-state, 96.6; float session-1, 84.3; float session-2, 82.3; relaxation-induction, 82.8; stage I sleep, 86.0; stage II sleep, 66.2; and stages III–IV sleep, 45.1. Awake-state values differed from float session-1 (%difference 12.7%; Cohen's d = 3.6) and float session-2 (%difference 14.8%; Cohen's d = 4.6). Relaxation-induction values were similar to float session-1 (%difference 1.8%; Cohen's d = 0.3) and float session-2 (%difference 0.5%; Cohen's d = 0.1). Stage I sleep values were similar to float session-1 (%difference 1.9%; Cohen's d = 0.4) and float session-2 (%difference 4.3%; Cohen's d = 1.0). Stage II sleep values differed from float session-1 (%difference 21.5%; Cohen's d = 4.3) and float session-2 (%difference 19.6%; Cohen's d = 4.0). Stages III–IV sleep values differed from float session-1 (%difference 46.5%; Cohen's d = 5.6) and float session-2 (%difference 45.2%; Cohen's d = 5.4). Bispectral Index™ values during flotation were comparable to those found in stage I sleep and nadir values described with other relaxation-induction techniques.

Edebol, Hanna, Sven Å Bood and Torsten Norlander (2008). "Chronic Whiplash-Associated Disorders and Their Treatment Using Flotation-REST (Restricted Environmental Stimulation Technique)." Qualitative Health Research 18(4): 480-488.

Abstract—In this study, we investigated for the first time whether flotation-REST might be used for treating chronic whiplash-associated disorders (WAD). Six women and one man, all diagnosed by licensed physicians as having chronic whiplash-associated disorder, participated. Two of the participants were beginners with regard to flotation-REST (2 or 3 treatments), and five of them had experienced between 7 and 15 treatments. The method for data collection was the semistructured qualitative interview. The empirical phenomenological psychological method devised by Karlsson was used for the analyses. Two qualitative models explaining the participants' experiences of flotation-REST emerged. The models describe the participants' experiences of flotation-REST, as well as the short-term effects of the treatment in terms of five phases: (a) intensification, (b) vitalization, (c) transcendation, (d) defocusation, and (e) reorientation. Results indicated that flotation-REST is a meaningful alternative for treating chronic whiplash-associated disorder.

Edebol, Hanna, Anette Kjellgren, Sven Å Bood and Torsten Norlander (2009). "Enhanced Independence and Quality of Life through Treatment with Flotation-Restricted Environmental Stimulation Technique of a Patient with Both Attention Deficit Hyperactivity Disorder and Aspergers Syndrome: A Case Report." Cases Journal 2: 6979.

Abstract—INTRODUCTION: The objective of this qualitative case report was to describe experiences of flotation-Restricted Environmental Stimulation Technique from the perspective of a woman with Attention Deficit Hyperactivity Disorder, Aspergers syndrome and experiences of depression and distress. CASE PRESENTATION: The respondent is a 36-year-old woman from Sweden, assessed and diagnosed by a neuropsychological multi-professional team in 2006. The 19-session flotation series prolonged during almost one year. CONCLUSION: The positive development of arousal control, activity regulation, sensory integration and interpretation, cognitive functioning and emotional maturity created experiences of personal independence and quality of life. Flotation-restrictive environmental stimulation technique was experienced as a meaningful treatment. Additional studies of treatment for Attention Deficit Hyperactivity Disorder and comorbid disorders in adults using the flotation-restrictive environmental stimulation technique are strongly encouraged.

Feinstein, Justin S, Sahib S Khalsa, Hung-wen Yeh, Colleen Wohlrab, W Kyle Simmons, Murray B Stein and Martin P Paulus (2018). "Examining the Short-Term Anxiolytic and Antidepressant Effect of Flotation-REST." PLoS ONE 13(2): e0190292.

Abstract—Flotation-REST (Reduced Environmental Stimulation Therapy) reduces sensory input to the nervous system through the act of floating supine in a pool of water saturated with Epsom salt. The float experience is calibrated so that sensory signals from visual, auditory, olfactory, gustatory, thermal, tactile, vestibular, gravitational and proprioceptive channels are minimized, as is most movement and speech. This open-label study aimed to examine whether Flotation-REST would attenuate symptoms of anxiety, stress, and depression in a clinical sample. Fifty participants were recruited across a spectrum of anxiety and stress related disorders (posttraumatic stress, generalized anxiety, panic, agoraphobia, and social anxiety), most (n = 46) with comorbid unipolar depression. Measures of self-reported affect were collected immediately before and after a 1-hour float session, with the primary outcome measure being the pre- to post-float change score on the Spielberger State Anxiety Inventory. Irrespective of diagnosis, Flotation-REST substantially reduced state anxiety (estimated Cohen's $d > 2$). Moreover,

participants reported significant reductions in stress, muscle tension, pain, depression and negative affect, accompanied by a significant improvement in mood characterized by increases in serenity, relaxation, happiness and overall well-being ($p < .0001$ for all variables). In reference to a group of 30 non-anxious participants, the effects were found to be more robust in the anxious sample and approaching non-anxious levels during the post-float period. Further analysis revealed that the most severely anxious participants reported the largest effects. Overall, the procedure was well-tolerated, with no major safety concerns stemming from this single session. The findings from this initial study need to be replicated in larger controlled trials, but suggest that Floatation-REST may be a promising technique for transiently reducing the suffering in those with anxiety and depression.

Feinstein, Justin S, Sahib S Khalsa, Hung-wen Yeh, Obada Al Zoubi, Armen C Arevian, Colleen Wohlrab, . . . Murray B Stein (2018). "The Elicitation of Relaxation and Interoceptive Awareness Using Floatation Therapy in Individuals with High Anxiety Sensitivity." Biological Psychiatry: Cognitive Neuroscience and Neuroimaging 3(6): 555-562.

Abstract—Background: Floatation-REST (Reduced Environmental Stimulation Therapy), an intervention which attenuates exteroceptive sensory input to the nervous system, has recently been found to reduce state anxiety across a diverse clinical sample with high levels of anxiety sensitivity (AS). To further examine this anxiolytic effect, the present study investigated the affective and physiological changes induced by Floatation-REST, and assessed whether individuals with high AS experienced any alterations in their awareness for interoceptive sensation while immersed in an environment lacking exteroceptive sensation. Methods: Using a within-subject crossover design, 31 participants with high AS were randomized to undergo a 90-minute session of Floatation-REST or an exteroceptive comparison condition. Measures of self-reported affect and interoceptive awareness were collected before and after each session, and blood pressure (BP) was collected during each session. Results: Relative to the comparison condition, Floatation-REST generated a significant anxiolytic effect characterized by reductions in state anxiety and muscle tension, and increases in feelings of relaxation and serenity ($p < .001$ for all variables). Significant BP reductions were evident throughout the float session and reached the lowest point during the diastole phase (average reduction > 12 mmHg). The float environment also significantly enhanced awareness and attention for cardiorespiratory sensations. Conclusions: Floatation-REST induced a state of relaxation and heightened interoceptive awareness in a clinical sample with high AS. The paradoxical nature of the anxiolytic effect in this sample is discussed in relation to Wolpe's theory of reciprocal inhibition and the regulation of distress via sustained attention to present moment visceral sensations such as the breath.

Fine, Thomas H and John W Turner Jr (1982). "The Effect of Brief Restricted Environmental Stimulation Therapy in the Treatment of Essential Hypertension." Behaviour Research and Therapy 20(6): 567-570.

Abstract—This pilot project investigated the effects of controlled frequent brief REST relaxation sessions on the blood pressure of three subjects with borderline essential hypertension. A floatation REST system was used and subjects had 2 or 3 sessions weekly for 2 months. All three subjects had blood-pressure reductions of a clinically significant magnitude across the treatment and follow-up periods.

Forgays, Donald G (1987). "Flotation REST as a Smoking Intervention." Addictive Behaviors 12(1): 85-90.

Abstract—The present study is an attempt to produce smoking cessation or reduction in persons who smoke cigarettes heavily but are motivated to stop. It makes use of the floating environment as an intervention, coupled with messages designed to shape attitudinal change. Subjects were followed up for twelve months post-intervention. Reduction at 12 month follow-up compares favorably with other interventional techniques, and floats of longer duration appear to be a more effective intervention than shorter floats. Messages did not add to effects found. Control subjects reduced their smoking more than the experimental subjects, suggesting that the procedures used on them were actually more effective interventions.

Forgays, Donald G and Maureen J Belinson (1986). "Is Flotation Isolation a Relaxing Environment?" Journal of Environmental Psychology 6(1): 19-34.

Abstract—The present study was an attempt to evaluate the relaxation potential of the flotation environment, employing both subjective and objective measures. The subjects were 20 male and 20 female adult volunteers who were floated in a commercially produced tank for up to 150 minutes for each of three runs at intervals of one week. Physiological monitoring of heart rate was done just before and just after each run and during all the flotation periods. Most subjects remained for about 2/3rds of possible time in tank. Heart rate appears to follow a general trend across and within floats starting at a higher value, proceeding to a lower value, and then increasing again. Post-run differences in subjective indices of well-being, relaxation, or anxiety appear to be associated with the age and sex of subjects. Thus, while this environment does seem generally to be a relaxing one, the degree of relaxation potential is related to individual subject differences.

Forgays, Donald G and Deborah K Forgays (1992). "Creativity Enhancement through Flotation Isolation." Journal of Environmental Psychology 12(4): 329-335.

Abstract—Research over the last 25 years on the contribution of aloneness to creativity enhancement has had mixed results. Early studies of sensory deprivation generally found negative effects while more recent research on flotation isolation has reported positive influence. Sports performance, for example, has been improved by means of directed imagery and flotation aloneness. However, there has been only one study which has attempted to enhance creativity through the flotation method and while this study reported positive results, it lacked several control features and was based on a very small sample of highly selected subjects. The present study was designed to evaluate directly the potential contribution of floating to creativity enhancement as measured by the Guilford fluency test and other measures. Subjects were male and female university students, half of whom spent one hour in a float environment and the other half in a darkened room. Each was tested before and after experimental trial on the Guilford and other creativity measures and on two personality/affect scales. Float subjects showed significant increases on the Guilford test from the pre- to post-float and meaningful increases on other thinking measures as compared to non-floating control subjects. Floating was associated with a decrease in anxiety/tension, depression, hostility, and fatigue, but with an increase in vigor and a maintenance of curiosity scores, and it is speculated that the creativity benefits may be a result of these state changes.

Forgays, Donald G and Deborah K Forgays (1994). "The Use of Flotation Isolation to Modify Important Type A Components in Young Adults." Journal of Environmental Psychology 14(1): 47-55.

Abstract—The Type A Behavior Pattern has been associated with increased risk for coronary-heart disease. Recently, some researchers in the field, including Friedman and colleagues, have attempted to modify global or component behaviors of the Type A pattern. However, early results

have been compromised by methodological difficulties such as lack of controls or small sample size. Effective modification programs have also proved to be time-consuming and complex. This study utilized flotation isolation and compared this technique with a control condition of a darkened relaxed environment, as a short-term method for impacting on self-reported Type A behaviors. Twenty male and 20 female extreme Type A and Type B subjects were randomly placed in a flotation or control environment for one hour. Comparison of pre-and post-scores on various measures suggest a greater reduction in Type A characteristics such as hostility, tension, and anxiety in flotation isolation than in the more standard restricted stimuli environment.

Forgays, Donald G, Deborah K Forgays, Miki Pudvah and Drex Wright (1991). "A Direct Comparison of the "Wet" and "Dry" Flotation Environments." Journal of Environmental Psychology 11(2): 179-187.

Abstract—The present study was an attempt to evaluate the relaxation potential of the recently introduced 'dry' float environment and to compare it systematically with the 'wet' float environment available for 20 years. In a balanced design, 10 female and 14 male young adult subjects spent one hour in a wet tank and one hour in the same tank modified to be a dry tank. Pre-/post-change measures included heart rate and POMS and SPI scales. Extensive post-float interview data were also obtained. Both environments were found to be relaxing and pleasant and both were associated with heart rate decreases. The wet tank, however, was somewhat superior in each of these regards and especially so for female subjects. Brief discussion is made of the use of these two environments for purposes of therapeutic intervention.

Hill, Sally, M. J. H. Eckett, C Paterson and Elaine F Harkness (1999). "A Pilot Study to Evaluate the Effects of Flotation Spa Treatment on Patients with Osteoarthritis." Complementary Therapies in Medicine 7(4): 235-238.

Abstract—Objective: To conduct a preliminary investigation of the effects on flotation spa therapy on quality of life in patients with osteoarthritis to see if controlled trials are warranted. Design: Uncontrolled clinical trial. Setting: Private flotation spa therapy centre. Patients: Fourteen patients with chronic osteoarthritis of the weight-bearing joints, of whom four dropped out. Intervention: Six weekly sessions of flotation spa therapy. Outcome measures: SF36, AIMS2 and MYMOP quality-of-life questionnaires. Main results: All patients improved. Differences between baseline and discharge scores showed statistically significant improvement for MYMOP, but not AIMS2 or SF-36. Conclusions: Controlled trials of flotation spa therapy for patients with osteoarthritis are warranted.

Iwata, Kazuki, Mitsuyuki Nakao, Mitsuki Yamamoto and Masayuki Kimura (2001). "Quantitative Characteristics of Alpha and Theta EEG Activities During Sensory Deprivation." Psychiatry and Clinical Neurosciences 55(3): 191-192.

Abstract—Our previous study showed that theta and alpha electroencephalographic (EEG) activities occurred together during sensory deprivations (SD). The respective activities are expected to manifest different physiological states. In this study, we investigate statistical properties of both types of EEG activities during SD. Wavelet analyses of the original EEG activities during SD and the corresponding surrogation data can distinguish meaningful alpha and theta activities in the original data from accidentally detected ones. As a result, the mean duration of the theta wave is found to be longer than that of the alpha wave. This result could be useful to disclose physiological processes during SD.

Iwata, Kazuki, Mitsuaki Yamamoto, Mitsuyuki Nakao and Masayuki Kimura (1999). "A Study on Polysomnographic Observations and Subjective Experiences under Sensory Deprivation." Psychiatry and Clinical Neurosciences 53(2): 129-131.

Abstract—We investigated the relationship between subjective experiences and polysomnographic observations under sensory deprivation (SD). The results can be divided into two types: (i) visual images were perceived frequently, accompanied by alpha waves or theta waves in electroencephalogram and frequent rapid eye movement (REM); (ii) the subjects fell in deep sleep without perception of visual images. The perceptions of visual images with alpha waves or theta waves and REM are supposed to be different from those in usual wakefulness and sleep. These results suggest that the SD could disclose different aspects of consciousness from the conventionally categorized states such as wakefulness and sleep.

Jacobs, Gregg D, Robert L Heilbrunner and John M Stanley (1984). "The Effects of Short Term Flotation REST on Relaxation: A Controlled Study." Health Psychology 3(2): 99-112.

Abstract—The purpose of this study was to compare the effects of restricted environmental stimulation using a flotation tank (Flotation REST) to the effects of a normal sensory environment on relaxation. All of the subjects were first introduced to a simple relaxation program to be used during the experimental sessions. The program consisted of guided point-to-point relaxation, breathing techniques, and visual imagery techniques. Subjects were then pre-tested on measurements of electromyogram (EMG), galvanic skin response (GSR), peripheral skin temperature, and systolic and diastolic blood pressure. The experimental group experienced ten 45-minute sessions practicing the relaxation program in a Flotation REST environment. The control subjects practiced the same relaxation program in a similar body position for 45 minutes in a normal sensory environment. All subjects answered a five-question Subjective Relaxation Questionnaire on trials five through ten and were then post-tested on EMG, GSR, skin temperature, and blood pressure. The results indicated significant differences between groups from pre-test to post-test on systolic and diastolic blood pressure the experimental group showed greater reductions. Significant differences also were observed on three of five questions on the Subjective Relaxation Questionnaire the experimental group reported greater subjective relaxation and trends in a similar direction on the remaining two questions. The results of this study indicate that flotation REST enhances point-to-point relaxation, breathing techniques, and visual imagery techniques and, when combined with these techniques, can be an effective means of teaching normal subjects to lower systolic and diastolic pressure and heighten their subjective perception of relaxation.

Jonsson, Kristoffer, Katarina Grim and Anette Kjellgren (2014). "Do Highly Sensitive Persons Experience More Nonordinary States of Consciousness During Sensory Isolation?" Social Behavior and Personality: An International Journal 42(9): 1495-1506.

Abstract—Our aim was to investigate whether or not highly sensitive persons experienced more nonordinary/altered states of consciousness (ASC) during 45 minutes of sensory isolation in a flotation tank, than did less sensitive persons. Psychology students (N = 57) were allocated to 1 of 2 groups (high and low levels of sensitivity) depending on their score on the Highly Sensitive Person Scale. Prior to the flotation session participants completed questionnaires to assess their degree of depression, anxiety, optimism, absorption, and how often they had experienced a mystical state. After the flotation session we assessed degree of ASC. The main finding was that the highly sensitive individuals experienced significantly more ASC during flotation than did the individuals in the low sensitivity group. Further, the highly sensitive participants had significantly

more absorption and anxiety, and had experienced mystical states more frequently prior to flotation, in comparison to individuals with low-level sensitivity.

Jonsson, Kristoffer and Anette Kjellgren (2016). "Promising Effects of Treatment with Flotation-REST (Restricted Environmental Stimulation Technique) as an Intervention for Generalized Anxiety Disorder (GAD): A Randomized Controlled Pilot Trial." BMC Complementary and Alternative Medicine 16(1): 108.

Abstract—Background: During Flotation-REST a person is floating inside a quiet and dark tank, filled with heated salt saturated water. Deep relaxation and beneficial effects on e.g. stress, sleep difficulties, anxiety and depression have been documented in earlier research. Despite that treatments for generalized anxiety disorder (GAD) are effective; it is till the least successfully treated anxiety disorder, indicating that treatment protocols can be enhanced. The use of Flotation-REST as a treatment of GAD has not been researched. The aim of the present study was to conduct an initial evaluation of the effects in a self-diagnosed GAD sample. Methods: This study was a randomized, parallel group, non-blinded trial with 1:1 allocation ratio to waiting list control group (n = 25) or to a twelve session treatment with flotation-REST (n = 25). Inclusion criteria's were: 18–65 years and GAD (as defined by self-report measures). The primary outcome was GAD-symptomatology, and secondary outcomes were depression, sleep difficulties, emotion regulation difficulties and mindfulness. Assessments were made at three time points (baseline, four weeks in treatment, post-treatment), and at six-month follow-up. The main data analyses were conducted with a two-way MANOVA and additional t-tests. Forty-six participants (treatment, n = 24; control, n = 22) were included in the analyses. Results: A significant Time x Group interaction effect for GAD-symptomatology [$F(2,88) = 2.93, p < .001, \eta^2p = .062$] was found. Further analyses showed that the GAD-symptomatology was significantly reduced for the treatment group ($t(23) = 4.47, p < .001$), but not for the waiting list control group ($t(21) = 0.98, p > .05$), when comparing baseline to post-treatment scoring. Regarding clinical significant change, 37 % in the treatment group reached full remission at post-treatment. Significant beneficial effects were also found for sleep difficulties, difficulties in emotional regulation, and depression, while the treatment had ambiguous or non-existent effects on pathological worry and mindfulness. All improved outcome variables at post-treatment, except for depression, were maintained at 6-months follow. No negative effects were found. Conclusion: The findings suggest that the method has potential as a complementary treatment alongside existing treatment for GAD. More studies are warranted to further evaluate the treatments efficacy.

Jonsson, Kristoffer and Anette Kjellgren (2017). "Characterizing the Experiences of Flotation-REST (Restricted Environmental Stimulation Technique) Treatment for Generalized Anxiety Disorder (GAD): A Phenomenological Study." European Journal of Integrative Medicine 12: 53-59.

Abstract—Introduction: Among the anxiety disorders Generalized Anxiety Disorder (GAD) is currently the most treatment resistant, suggesting that treatment protocols could be enhanced. A promising treatment of GAD is flotation-REST (Restricted Environmental Stimulation Technique), which in earlier studies has been shown to alleviate symptoms in GAD. Although, research on flotation-REST as a treatment of GAD has shown promising result no study has explored how treatment is experienced. By applying a phenomenological perspective the present study aims to characterize the experiences of undergoing flotation-REST treatment while suffering from GAD. Method: Nine participants with GAD, as defined with self-report measures, participated. Data was collected by semi-structured interviews that were conducted after the completion of a twelve session treatment program with flotation-REST. The Empirical Phenomenological Psychological (EPP) method was used for gathering and analyzing the data. Results: The analysis resulted in six themes that characterize the experience of undergoing a

flotation-REST treatment while having GAD: (1) obstacles in treatment, (2) a relaxed and safe vantage point, (3) non-ordinary states of consciousness, (4) connecting with oneself, (5) new attitudes and coping strategies, and (6) enhanced life-quality. Conclusion: The results highlights that flotation-REST treatment of GAD was experienced as a comprehensive process that were both challenging and pleasant. The results indicate that the method positively affected symptoms and the core issue associated with GAD on an experiential level. The present study also generated some initial understanding regarding potential mechanism that might mediate and maintain positive treatment effects when flotation-REST is applied as an intervention of GAD.

Jonsson, Kristoffer; Kjellgren, Anette (2014). "Curing the Sick and Creating Supermen - How Relaxation in Flotation Tanks Is Advertised on the Internet." European Journal of Integrative Medicine 6(5): 601-609.

Abstract—Introduction: Flotation-REST (Restricted Environmental Stimulation Technique) is a complementary and alternative medicine therapy with evidence-based beneficial effects like pain and stress reduction. During flotation-REST a person is lying in a supine position inside a quiet and dark tank, filled with salt water maintained at skin temperature. The water is high in buoyancy, which makes it possible to float comfortably on the back. The method induces deep relaxation through minimization of sensory input. Contemporary scientific findings about beneficial effects resulting from floating have increased the number of private owned floating centers. The aim of this study was to investigate how these centers advertise the benefits of flotation to the public and compare these claims with published scientific evidence. Method: The Google search engine was used to localize web-sites hosting private floating center entrepreneurs. Described effects resulting from floating on these sites were systematically gathered and analyzed thematically. In addition, advertisements were compared to scientific studies on flotation-REST. Results: The analysis resulted in five overarching themes: (1) Physiological changes, (2) Alleviation of medical conditions, (3) Relaxation, (4) Personal growth and enhancement, and (5) Altered states of consciousness. Advertisements seemed to target four different interest groups: the inner explorers; the sick; the supermen; and the stressed out. Various effects of flotation were highlighted for the different groups and some limited scientific evidence identified. Conclusions: Although the advertisements described many evidence-based effects resulting from floating, information tended to be exaggerated, could be misleading to consumers, and was not always substantiated by published scientific studies.

Kjellgren, Anette, Hanne Buhrkall and Torsten Norlander (2010). "Psychotherapeutic Treatment in Combination with Relaxation in a Flotation Tank: Effects on" Burn-out Syndrome"." The Qualitative Report 15(5): 1243-1269.

Abstract—The focus of this study was to investigate experiences gained from treatment combining relaxation in flotation tank with psychotherapy for sufferers from "burn-out syndrome". Six people participated in a ten week program. They were all interviewed; the data were analyzed using the Empirical Phenomenological Psychological method. Five themes emerged: (a) direct experiences during flotation, (b) effects due to the treatment sessions, (c) psychological transformation, (d) reflections about the treatment program, and (e) demanding and rewarding psychological process over time. All participants went through psychological transformations and improvements in quality of life. At the end of the treatment program, all participants were able continue working full time. This combined program seems to be more therapeutically beneficial than flotation tank treatment alone.

Kjellgren, Anette, Hanne Buhrkall and Torsten Norlander (2011). "Preventing Sick-Leave for Sufferers of High Stress-Load and Burnout Syndrome: A Pilot Study Combining Psychotherapy and the Flotation Tank." International Journal of Psychology and Psychological Therapy 11(2): 297-306.

Abstract—The aim of the present pilot study was to get information whether or not a 10-week combined treatment program with relaxation in a flotation tank and subsequent psychotherapeutic sessions, may be beneficial for persons suffering from high stress-load and 'burnout syndrome'. Four women and two men between the ages of 33 and 57 years old took part in the study. They were all diagnosed as on the brink for sick leave and suffering from 'burn-out syndrome' with symptoms of fatigue and problems organizing daily life. All clients participated in the 10-week treatment program consisting of flotation-REST (Restricted Environmental Stimulation Technique) treatments and conversational therapy with a psychologist. During the treatment program they continued their usual work, but were able to leave for 4 hours a week for participating in the treatments. The results revealed a significant decrease in degree of depression and anxiety and an increase in positive outlook on life. There was also a significant decrease in extent of painful areas and a significant decrease in their experienced worst pain-intensity. After the treatment period, they all continued to work, and there was no need for sick-leave. The conclusion is that this combined treatment program is promising and should be further evaluated in a randomized control trial.

Kjellgren, Anette, Hanna Edebol, Tommy Nordén and Torsten Norlander (2013). "Quality of Life with Flotation Therapy for a Person Diagnosed with Attention Deficit Disorder, Atypical Autism, PTSD, Anxiety and Depression." Open Journal of Medical Psychology 2(3): 134-138.

Abstract—The aim of this single-subject study was to report experiences from one and a half years of regular floating as described by a person with neuropsychiatric and mental health disorders. Floating, or Flotation Restricted Environmental Stimulation Technique, involves relaxation and sensory deprivation by means of resting in a tank with highly salted and body-tempered water. The subject, a 24-year-old woman diagnosed with attention deficit hyperactivity disorder, atypical autism, post-traumatic stress disorder, anxiety and depression floated regularly for one and a half years. Interviews regarding her experiences were analyzed and the main findings involved a subjective sense of improved quality of life, wellbeing and healthy behavior. There were no negative effects from treatment. Results suggest that floating may have beneficial therapeutic effects on mental health. Further studies that evaluate the efficacy and possible effects of floating with regard to mental health are needed.

Kjellgren, Anette, Andreas Lindahl and Torsten Norlander (2009). "Altered States of Consciousness and Mystical Experiences During Sensory Isolation in Flotation Tank: Is the Highly Sensitive Personality Variable of Importance?" Imagination, Cognition and Personality 29(2): 135-146.

Abstract—The aim of this study was to investigate if the highly sensitive personality variable affects the occurrence of mystical experiences and degree of altered states of consciousness during sensory isolation in flotation-tank. Forty-eight persons (20 males, 28 females) were included. Background variables and the Highly Sensitive Personality Scale (HSP) were assessed. The independent variable was derived from this scale, where two groups were formed: low sensitivity and high sensitivity. The treatment lasted 45 minutes in the flotation tank. Dependent variables were assessed through scales measuring mystical experiences and degree of altered states of consciousness. The group with highly sensitive persons experienced significantly more mystical experiences and higher degree of altered states of consciousness during the treatment compared to the other group. Also, the highly sensitive persons exhibited more stress and anxiety at arrival, but no differences in depression and optimism were found between the groups.

Kjellgren, Anette, Andreas Lindahl and Torsten Norlander (2009). "Searching for Placebo Effects: Do Sensitive Personality and Breathing Instructions Influence the Experience of Flotation-REST (Restricted Environmental Stimulation Technique)?" Individual Differences Research 7(4): 212-221.

Abstract—The aim of the present study was to investigate whether the experiences and effects of 45 minutes relaxation in flotation tank were influenced by breathing instruction or by a sensitive personality. A sample of 48 persons, 20 men and 28 females (mean age 27.40 years) were randomized into two groups; with or without a breathing relaxation instruction. The second independent variable was sensitive personality (low, high) derived from the Highly Sensitive Person Scale. Dependent variables were Subjective Flotation Experience (Kjellgren, Sundequist, Norlander, & Archer, 2001) and detection threshold and upper threshold pain endurance. Main results indicated that experiences during flotation with regard to comfort and stress reduction were not influenced by instructions or by sensitive personality. These results are in line with earlier findings indicating that flotation-REST is not particularly affected by expectancies, earlier experiences, personality or surroundings in the laboratory.

Kjellgren, Anette, Fransica Lyden and Torsten Norlander (2008). "Sensory Isolation in Flotation Tanks: Altered States of Consciousness and Effects on Well-Being." The Qualitative Report 13(4): 636-656.

Abstract—A qualitative analysis (The Empirical Phenomenological Psychological method) of interviews involving eight patients (depression, burn-out syndrome, and chronic pain) was carried out in order to obtain knowledge regarding the effects of flotation tank therapy. This knowledge might be helpful for both professionals and potential floaters. The analysis resulted in 21 categories, which were summarized as four themes: (a) experiences during flotation, (b) perceived effects afterwards, (c) technical details, and finally (d) the participants background, motivation, and expectations. Floating was perceived as pleasant. An altered state of consciousness was induced, varying from a milder state including profound relaxation and altered time perception, to more powerful with perceptual changes and profound sensations such as out-of-body experiences and perinatal experiences. patients (depression, burn-out syndrome, and chronic pain) was carried out in order to obtain knowledge regarding the effects of flotation tank therapy. This knowledge might be helpful for both professionals and potential floaters. The analysis resulted in 21 categories, which were summarized as four themes: (a) experiences during flotation, (b) perceived effects afterwards, (c) technical details, and finally (d) the participants background, motivation, and expectations. Floating was perceived as pleasant. An altered state of consciousness was induced, varying from a milder state including profound relaxation and altered time perception, to more powerful with perceptual changes and profound sensations such as out-of-body experiences and perinatal experiences.

Kjellgren, Anette, Ulf Sundequist, Torsten Norlander and Trevor Archer (2001). "Effects of Flotation-REST on Muscle Tension Pain." Pain Research and Management 6(4): 181-189.

Abstract—The purpose of the present study was to investigate whether the floating form of the restricted environmental stimulation technique (REST) may be applied within the field of pain relief. Flotation-REST consists of a procedure whereby an individual is immersed in a tank filled with water of an extremely high salt concentration. Thirty-seven patients (14 men and 23 women) suffering from chronic pain consisting of aching muscles in the neck and back area participated in the study. They were randomly assigned to either a control group (17 participants) or an experimental group (20 participants). The experimental group received nine opportunities to use

the flotation-REST technique in the water tank over a three-week period. The results indicated that the most severe perceived pain intensity was significantly reduced, whereas low perceived pain intensity was not influenced by the floating technique. Further, the results indicated that circulating levels of the noradrenaline metabolite 3-methoxy-4-hydroxyphenylethyleneglycol were reduced significantly in the experimental group but not in the control group following treatment, whereas endorphin levels were not affected by flotation. Flotation-REST treatment also elevated the participants' optimism and reduced the degree of anxiety or depression; at nighttime, patients who underwent flotation fell asleep more easily. The present findings describe possible changes, for the better, in patients presenting with chronic pain complaints.

Kjellgren, Anette, Ulf Sundequist, Ulla Sundholm, Torsten Norlander and Trevor Archer (2004). "Altered Consciousness in Flotation-REST and Chamber-REST: Experience of Experimental Pain and Subjective Stress." *Social Behavior and Personality* 32(2): 103-116.

Abstract—Twenty-three sportsmen were given one 45-minute exposure to flotation-REST and one exposure to chamber-REST on two occasions, incorporating random assignment to either flotation-REST followed by chamber-REST or vice versa. On each occasion, the Restricted Environmental Stimulation Technique (REST) procedure was followed immediately by testing experimentally induced pain to one arm using a blood pressure cuff. It was found that flotation-REST induced a significantly higher degree of altered states of consciousness (ASC), as measured with an instrument assessing experienced deviation from normal state (EDN), than did chamber-REST. Participants experiencing High EDN in the flotation-REST condition reported higher levels of both "experienced pain" and "experienced stress" than did those experiencing Low EDN. These results suggest that the particular distinguishing features of flotation-REST and chamber-REST may cause selective deviations from normal levels of consciousness, under experimental conditions, that may underlie the subjective experience of pain and stress thresholds.

Kjellgren, Anette and Jessica Westman (2014). "Beneficial Effects of Treatment with Sensory Isolation in Flotation-Tank as a Preventive Health-Care Intervention - a Randomized Controlled Pilot Trial." *BMC Complementary and Alternative Medicine* 14: 417.

Abstract—BACKGROUND: Sensory isolation in a flotation tank is a method known for inducing deep relaxation and subsequent positive health effects for patients suffering from e.g. stress or muscle tensions pains. Very few studies have investigated this method as a preventive health-care intervention. The purpose of this study was to evaluate the effects in healthy participants after receiving a series of flotation tank treatment. METHODS: Sixty-five participants (14 men and 51 women) who were all part of a cooperative-health project initiated by their individual companies, were randomized to either a wait-list control group or a flotation tank treatment group where they participated in a seven weeks flotation program with a total of twelve flotation sessions. Questionnaires measuring psychological and physiological variables such as stress and energy, depression and anxiety, optimism, pain, stress, sleep quality, mindfulness, and degree of altered states of consciousness were used. Data were analysed by two-way mixed MANOVA and repeated measures ANOVA. RESULTS: Stress, depression, anxiety, and worst pain were significantly decreased whereas optimism and sleep quality significantly increased for the flotation-REST group. No significant results for the control group were seen. There was also a significant correlation between mindfulness in daily life and degree of altered states of consciousness during the relaxation in the flotation tank. CONCLUSIONS: It was concluded that flotation-REST has beneficial effects on relatively healthy participants.

Klockare, Ellinor, Henrik Gustafsson, Paul Davis and Carolina Lundqvist (2015). "Track and Field Athletes' Experiences and Perceived Effects of Flotation-REST. An Interpretative Phenomenological Analysis." International Journal of Sport Psychology 46(5): 409-428.

Abstract—Research has highlighted flotation-REST as a promising method for relaxation and performance enhancement in sport; however, to further evaluate the use of flotation-REST in an athletic environment, additional research is warranted. Semi-structured interviews were conducted with six elite track and field athletes about their experiences and perceived effects of flotation-REST. Athletes were interviewed twice; once for their immediate response and again to explore their perceptions of flotation-REST over time. The data was analyzed using interpretative phenomenological analysis. Flotation-REST was perceived as pleasant and relaxing. Five athletes reported less stress and an overall increase in well-being for one or two days afterwards, although they felt physically tired during training sessions. Being in a better mood, placing fewer demands on themselves, and feeling more optimistic and present were also perceived effects. This study shows the potential of flotation-REST as a technique for health promotion, stress management, and a means to practise mindfulness.

Klusemann, Markus J, Jonathon Headrick, Christos K Argus, David B Pyne, Adam D Gorman and Eric J Drinkwater (2013). "Video-Based Training Combined with Flotation Tank Recovery Does Not Improve Three-Point Shooting in Basketball." International Journal of Performance Analysis in Sport 13(1): 1-10.

Abstract—Video-based training combined with flotation tank recovery may provide an additional stimulus for improving shooting in basketball. A pre-post controlled trial was conducted to assess the effectiveness of a 3 wk intervention combining video-based training and flotation tank recovery on three-point shooting performance in elite female basketball players. Players were assigned to an experimental (n=10) and control group (n=9). A 3 wk intervention consisted of 2 x 30 min float sessions a week which included 10 min of video-based training footage, followed by a 3 wk retention phase. A total of 100 three-point shots were taken from 5 designated positions on the court at each week to assess three-point shooting performance. There was no clear difference in the mean change in the number of successful three-point shots between the groups (-3%; $\pm 18\%$, mean; $\pm 90\%$ confidence limits). Video-based training combined with flotation recovery had little effect on three-point shooting performance.

Landström, Annika, Sven Å Bood, Anette Kjellgren and Torsten Norlander (2007). "Treating Stress-Related Pain in a Clinical Sample with Flotation-REST: A Further Report on Improvements in Pain Assessed by the Pain Area Inventory (Pai)." Social Behavior and Personality 35(9): 1279-1280.

Abstract—The aim of this study is the treatment of stress-related pain in a clinical sample with flotation-REST. Thirty-two patients (29 women and 3 men) with stress-related ailments were recruited through the Community Health Care Centre in the city of Lidköping, Sweden. The mean age was 47.75 years (SD = 8.30). Pain Area Inventory (PAI) was used. Participants were randomized in equal numbers to either a control group or a flotation-REST group. A mixed ANOVA with PAI (before, after) as within-subjects factor and Group (control, flotation-REST) as between-subjects factor showed a significant interaction effect for Test and Group indicating no change in regard to pain for the control group but an improvement for the flotation group.

Lee, Alan B and Jay Hewitt (1987). "Using Visual Imagery in a Flotation Tank to Improve Gymnastic Performance and Reduce Physical Symptoms." International Journal of Sport Psychology 18(3): 223-230.

Abstract—36 female gymnasts (aged 9–17 yrs) who were high or low in the personality trait facilitating anxiety and who were classified as either beginning or intermediate in competitive performance skill were assigned to 1 of 3 treatment conditions: visual imagery practiced while on a mat, visual imagery practiced in a flotation tank, or control. Performance scores averaged across 3 State qualifying meets and responses to a physical symptoms checklist served as the dependent variables. Performance scores were highest and physical symptoms lowest when Ss practiced visual imagery in a flotation tank. High facilitating anxiety was associated with both greater performance scores and higher scores on the physical symptoms checklist.

McAleney, Patrick J, Arreed F Barabasz and Marianne Barabasz (1990). "Effects of Flotation Restricted Environmental Stimulation on Intercollegiate Tennis Performance." Perceptual and Motor Skills 71(3, Pt 1): 1023-1028.

Abstract—The study investigated the effects of flotation Restricted Environmental Stimulation (REST) with an imagery message on the competitive performance of intercollegiate tennis players (10 men, 10 women). Pre- and posttreatment athletic performance was measured during intercollegiate competition. Posttreatment results indicated that subjects exposed to flotation REST with an imagery message performed significantly better than subjects exposed to imagery only on a measure of first service accuracy. Findings suggest that flotation REST can be used to enhance the performance of a well learned skill by athletes of high ability.

McGrady, Angele, John W Turner Jr, Thomas H Fine and James T Higgins (1987). "Effects of Biobehaviorally-Assisted Relaxation Training on Blood Pressure, Plasma Renin, Cortisol, and Aldosterone Levels in Borderline Essential Hypertension." Clinical Biofeedback & Health: An International Journal 10(1), 16-25.

Abstract—Studied the effects of 2 relaxation-based treatment modalities, biofeedback-assisted and restricted environmental stimulation therapy (REST), on blood pressure, cortisol and aldosterone levels, and plasma renin activity in 17 persons (aged 30–64 yrs) with essential hypertension. All Ss received 20 treatment sessions over 10 wks 11 Ss were assigned to the biofeedback condition and 6 Ss to the REST condition. Results show that 67% of Ss in both groups achieved significant blood pressure reductions across treatment. Decreases were also observed in the average levels of each hormone, but in some Ss the blood pressure changes were not associated with changes in hormone levels. 83% of REST Ss showed decreases in all measured hormones, compared to 33% of biofeedback Ss.

Morgan, Paul M, Amanda J Salacinski and Matthew A Stults-Kolehmainen (2013). "The Acute Effects of Flotation Restricted Environmental Stimulation Technique on Recovery from Maximal Eccentric Exercise." Journal of Strength and Conditioning Research 27(12): 3467-3474.

Abstract—Flotation restricted environmental stimulation technique (REST) involves compromising senses of sound, sight, and touch by creating a quiet dark environment. The individual lies supine in a tank of Epsom salt and water heated to roughly skin temperature (34-35 degrees C). This study was performed to determine if a 1-hour flotation REST session would aid in the recovery process after maximal eccentric knee extensions and flexions. Twenty-four untrained male students (23.29 +/- 2.1 years, 184.17 +/- 6.85 cm, 85.16 +/- 11.54 kg) participated in a randomized, repeated measures crossover study. The participants completed 2 exercise and recovery protocols: a 1-hour flotation REST session and a 1-hour seated control (passive recovery). After isometric muscle strength testing, participants were fatigued with eccentric isokinetic muscle contractions (50 repetitions at 60 degrees·s⁻¹) of the nondominant knee

extensors and flexors. Blood lactate, blood glucose, heart rate, OMNI-rating of perceived exertion for resistance exercise (OMNI-RPE), perceived pain, muscle soreness, and isometric strength were collected before exercise, after treatment, and 24 and 48 hours later. A multivariate analysis of covariance found that treatment had a significant main effect on blood lactate, whereas subsequent univariate analyses of variance found statistical significance with the immediate posttreatment blood lactate measures. The results indicate that flotation REST appears to have a significant impact on blood lactate and perceived pain compared with a 1-hour passive recovery session in untrained healthy men. No difference was found between conditions for muscle strength, blood glucose, muscle soreness, heart rate, or OMNI-RPE. Flotation REST may be used for recreational and professional athletes to help reduce blood lactate levels after eccentric exercise.

Norlander, Torsten, Henrik Bergman and Trevor Archer (1998). "Effects of Flotation REST on Creative Problem Solving and Originality." Journal of Environmental Psychology 18(4): 399-408.

Abstract—Explored whether or not flotation restricted environmental technique (REST) facilitates the creative problem-solving ability and originality. Sample 1 consisted of 40 Ss (aged 19–31 yrs), 20 men and 20 women, randomly assigned in equal numbers to either a nonREST group (armchair-sitting) or to a floating REST group. Both groups worked on a "chain puzzle" for 5 min and were then interrupted with 45 min of sitting or floating. The Ss were then given the task of continuing with the creative problem-solving test. Sample 2 consisted of 54 Ss (aged 19–33 yrs), 27 men and 27 women, randomly assigned in equal numbers to either a nonREST group (armchair-sitting), a dryREST group (lying on a couch in a dark room) or a flotation REST group. The groups then had to fill in a couple of paper-and-pen tests and were given scores on fluency, obvious answers, original answers, elegance and deductive thinking. The results (impaired creative problem-solving ability and higher originality for the floating group) were interpreted as an indication of cognitive function where the primary process still dominates over the secondary process.

Norlander, Torsten, Henrik Bergman and Trevor Archer (1999). "Primary Process in Competitive Archery Performance: Effects of Flotation REST." Journal of Applied Sport Psychology 11(2): 194-209.

Abstract—The purpose of the present study was to investigate whether or not the floating form of Restricted Environmental Stimulation Technique (REST) may be exploited within the field of competitive archery to reinforce primary process (inner-directed) orientation and thereby enhance the quality of coaching and training. Flotation REST consists of a procedure whereby an individual is immersed in a water-tank filled with saltwater of an extremely high salt concentration. The experiment was performed over the course of two weekends with a 6-week interval. Twenty participating archers, 13 male and 7 female, were recruited. The between-group factor was "adjudged skill." The within-group factor was provided by an Armchair condition in which the participants sat in an armchair for 45 minutes after which they were required to shoot four salvo series of three shots each, as a comparison to the Flotation-REST condition whereby the participants were required to lie in a floating tank for 45 min just prior to shooting. Results indicated that (a) the participants experienced less perceived exertion during marksmanship in the floating condition, (b) the elite archers performed more consistently in the Flotation-REST condition, (c) the least and most proficient archers had lower muscle tension in the Extensor Digitorum in the Flotation REST condition.

Norlander, Torsten, Anette Kjellgren and Trevor Archer (2000). "The Experience of Flotation-REST as a Function of Setting and Previous Experience of Altered State of Consciousness." Imagination, Cognition and Personality 20(2): 161-178.

Abstract—The purpose of this study was to investigate if experiences induced by flotation-Restricted Environmental Stimulation Technique (REST) in a flotation-tank are affected by experimental contextual setting (i.e., strict-fantasy) or by Ss' earlier experiences of altered states of consciousness (ASC). Ss were 14 former drug-users and 14 participants without drug experience. No significant differences were found relating to previous experiences or contextual setting. Significant effects owing to flotation-REST were found regarding reduction in experienced pain and enhancement of mood. Flotation-REST was considered a pleasurable technique. Different kinds of visual and acoustic effects, altered time perception, and a sense of weightlessness have been reported. Also, deep transpersonal experiences were quite common, and could be categorized into 3 types: experiences of one's own childbirth/delivery; feeling of cosmic unity; and experiences of losing contact with the body or out-of-body experiences. Flotation-REST must be regarded as a consciousness-altering method with promising potential for clinical and therapeutic use.

Norlander, Torsten, Anette Kjellgren and Trevor Archer (2002). "Effects of Flotation-Versus Chamber-Restricted Environmental Stimulation Technique (REST) on Creativity and Realism under Stress and Non-Stress Conditions." Imagination, Cognition and Personality 22(4): 343-359.

Abstract—Two studies examining different aspects of the Restricted Environmental Stimulation Technique (REST) were carried out. In the first study, 38 participants were assigned randomly to either a group that floated on one occasion or a group that was given floating on three occasions. Following this, the subjects performed a test of divergent creativity and a test of logic. In the second study, 32 participants were assigned randomly first to two groups, Flotation-REST or Chamber-REST groups, and then randomly assigned to two more groups, namely to either a Stress-group or to a Non-stress group. The most important dependent variables of this second study were derived from essay-writing which was adjudged on the basis of elaboration, liveliness, originality, and realism. The results did not indicate any differences deriving from one or three flotation; both groups performed worse on the test of logic but tended to be better on the test of creativity. Both REST groups were similarly relaxed after treatment although the Flotation-REST group showed altered states of consciousness to a greater degree. The Flotation-REST group showed more originality whereas the Chamber-REST group showed more elaboration and realism. The results are discussed from the standpoint of fluctuations within the primary-secondary process continuum.

Raab, Jody and John Gruzelier (1994). "A Controlled Investigation of Right Hemispheric Processing Enhancement after Restricted Environmental Stimulation (REST) with Floatation." Psychological Medicine 24(2): 457-462.

Abstract—Two groups of 16 subjects, 8 of each gender, were examined on two occasions, one group before and after restricted environmental stimulation with floatation, and the other group without floatation was the control group. They were examined with a tactile object discrimination task carried out with each hand separately while blindfolded, and with a recognition memory test for words and unfamiliar faces, a test validated on neurological patients with left and right hemispheric lesions respectively. Consistent with both tasks the floatation group showed a significantly greater enhancement of right hemispheric processing after floatation than was found when retesting the controls. The results were distinguished from previous research on hypnosis

where the same relative state of hemispheric imbalance was achieved with the same tasks, but largely through inhibitory influences on the left hemisphere.

Rogan, Anthony, Tony Morris and Peter Gibbons (2001). "Pain Management in Osteopathic Medicine: The Efficacy of Flotation REST as an Adjunct to Spinal Manipulation for Acute Non-Specific Low Back Pain. A Case Report." Journal of Osteopathic Medicine 4(1): 25-30.

Abstract—Spinal manipulation is a commonly used modality for the treatment of low back pain with increasing evidence of positive outcomes. Adjunctive therapies such as hydrotherapy, flotation and exercise prescription are also used with effect for a range of clinical conditions including low back pain. This report introduces the potential role of combining spinal manipulation and adjunctive Flotation Restricted Environmental Stimulation Therapy (Flotation REST) in the treatment of acute nonspecific low back pain. Outcome measures were used to assess the effectiveness of this combination of therapies and demonstrated both amelioration of pain and improvement in level of disability. The results support implementing a more detailed study with larger numbers of participants.

Sakata, Shogo, Junko Shinohara, Tadao Hori and Sukeo Sugimoto (1995). "Enhancement of Randomness by Flotation REST (Restricted Environmental Stimulation Technique)." Perceptual and Motor Skills 80(3 Pt 1): 999-1010.

Abstract—This study was conducted to evaluate the positive effect of flotation REST on the production of random sequences, employing both behavioral and physiological measures. The subjects were 7 student volunteers who spent a 40-min. session lying alone on a bed in an isolation box and two 40-min. sessions floating in a commercially produced tank. Polygraph recordings (EEG, EOG, ECG and respiration) were made continuously. Randomness of orally generated sequences was measured by RIP scores based on the Polya-Eggenberger distribution in three test sessions, e.g., pre-, during, and post-REST period. Randomness increased in the floating condition, while those parameters decreased in the bed condition. Sleep-stage analysis and EEG spectral analysis showed that the flotation REST induced a more hypnagogic state and light sleep than did in-bed REST. It is speculated that the hypnagogic state and light sleep induced by floating enhanced random generation.

Sandlund, Erica S, Moira Linnarud and Torsten Norlander (2001). "Effects of Stress Versus Flotation-REST Relaxation on Creativity and Literacy Skills in Advanced English as a Second Language (ESL) Composition." International Journal of Language and Communication 15: 95-113.

Abstract—This study explores whether or not stress or relaxation (induced by flotation REST) facilitates creativity and literacy skills, as measured by advanced English as a Second Language (ESL) composition. 60 students, 49 females and 11 males were recruited, all undergraduates in their first semester of advanced English studies. Participants were randomly assigned to three experimental groups, namely a Control group, a Flotation-REST group, and a Stress group. Results indicated that flotation-REST relaxation showed a positive effect on originality, and that the Stress group produced more social realistic compositions. These results were interpreted in terms of fluctuations on the primary-secondary continuum.

Schulz, Pierre and Charles-Henry Kaspar (1994). "Neuroendocrine and Psychological Effects of Restricted Environmental Stimulation Technique in a Flotation Tank." Biological Psychology 37(2): 161-175.

Abstract—The restricted environmental stimulation technique or REST is a method of relaxation where the level of environmental sensory inputs is kept very low. A particular REST technique called tank flotation, or flotation REST, consists of 1 h sessions in a tank containing water with a high salt content and maintained at 35.5 degrees C. In this protocol, five normal subjects were studied before and during 2 h after a 60 min flotation REST session and a control session of 60 min in a supine position on a bed. Cortisol, thyroid stimulating hormone (TSH), thyroxine (T4), prolactin, melatonin, luteinizing hormone (LH), growth hormone (GH), beta-endorphin, vasopressin (ADH), gamma-aminobutyric acid (GABA) and homovanillic acid (HVA) were measured in plasma. HVA, 5-hydroxy-indolacetic acid (5-HIAA) and vanilylmandelic acid (VMA) were measured in urine. There were no changes in hormones concentrations that could be attributed to flotation REST. The urinary excretion of VMA was lower after the flotation REST session. The psychological consequences of flotation REST were more easily demonstrated than the neuroendocrine changes that are assumed to reflect the state of relaxation. Flotation REST increased subjective levels of sedation and euphoria. The possible mechanisms by which flotation REST induces relaxation are discussed.

*Suedfeld, Peter (1990). "Restricted Environmental Stimulation and Smoking Cessation: A 15-Year Progress Report." International Journal of the Addictions 25(8): 861-888.

Abstract—The first successful use of restricted environmental stimulation therapy (REST) as a method of smoking cessation was reported in this journal in 1972. Since then, close to 20 papers and articles have further investigated this application. The results have been consistently positive and have further shown that-unlike most techniques-REST combines synergistically with other effective treatment modalities. The effect of REST seems to target primarily the major problem with other known treatments in this area: It substantially reduces the relapse rate among clients who quit smoking at the end of treatment. Furthermore, REST is safe, has no known adverse side effects, and is easily tolerated by most participants. Nevertheless, the method has not found wide acceptance among practitioners. This paper explores and answers some of the concerns that may be involved in its relative lack of popularity. As opposed to chamber REST, the flotation technique appears to be ineffective, at least in the session numbers and durations tested so far (Baker-Brown and Suedfeld, 1986; Forgyas, 1987). To summarize, the most effective procedure is the 24-h session lying in darkness and silence, with either no messages or the messages distributed across the entire period.

Suedfeld, Peter and Gloria Baker-Brown (1987). "Restricted Environmental Stimulation Therapy of Smoking: A Parametric Study." Addictive Behaviors 12(3): 263-267.

Abstract—Restricted environmental stimulation therapy (REST) has been shown in several studies to be an effective technique in smoking intervention. The most common procedure has been 24 hours in a dark, silent chamber in several cases, messages designed to facilitate smoking cessation have been presented every few hours over an intercom. This study parametrically varied 12 versus 24 hour chamber REST sessions and four message presentation schedules (massed, distributed, or self-demand presentation of five messages, and a no message condition). A ninth group of volunteer subjects spent five one hour sessions in a flotation REST tank. In this condition, no message was presented during the first session one message was given during each of the next three sessions and two messages were given in the last session. Previous findings of therapeutic efficacy were confirmed for chamber REST, with 3- and 12-month follow-ups showing means of 51% and 35% reduction, and 34% and 21% abstinence, respectively. The 24-hour distributed message group, representing the modal technique, showed a mean reduction rate of 51% and an abstinence rate of 36% one year after treatment. There were no significant differences as a function of the two main factors nor the interaction. Most chamber REST groups

showed significant smoking reductions on both follow-ups. Flotation REST led to a significant decrease three months after the treatment, but not at one year. The data have theoretical as well as practical implications for future uses of REST.

Suedfeld, Peter, Elizabeth J Ballard and Margaux Murphy (1983). "Water Immersion and Flotation: From Stress Experiment to Stress Treatment." Journal of Environmental Psychology 3(2): 147-155.

Abstract—Evolving from the water immersion sensory deprivation techniques of the 1960s, tank flotation has recently become a popular recreational activity, with commercial manufacturers and facilities available in most major American cities. This paper reviews research using two versions of the technique, and evaluates the responses of 27 customers using one such commercial facility. These customers indicate relaxation and pleasant mood, findings that are compatible with popular treatments and other reports but differ widely from earlier stereotypes about the experience.

*Suedfeld, Peter and Roderick A Borrie (1999). "Health and Therapeutic Applications of Chamber and Flotation Restricted Environmental Stimulation Therapy (REST)." Psychology and Health 14(3): 545-566.

Abstract—Basic research has documented reliable changes in emotional, cognitive, behavioral, and psychophysiological functioning as the effects of two related techniques that drastically reduce the level of environmental stimulation: chamber and flotation restricted environmental stimulation therapy (REST). Studies applying these findings in medical, psychotherapeutic, and behavioral health contexts have shown reductions in stress and inappropriate behavior among patients suffering from drug-induced mania, agitation, autism, and Alzheimer's syndrome; reduced phobic symptoms; significantly lower relapse in habit modification interventions (e.g., smoking, alcohol intake, and weight loss); improved stress management and the amelioration of tension headaches; insomnia, and other stress-related symptoms; reduction of chronic pain; and better muscle control among cerebral palsy patients and others. The broad benefits of chamber and flotation REST, used alone or in combination with other intervention techniques, warrant further investigation and clinical use.

Suedfeld, Peter and Talino Bruno (1990). "Flotation REST and Imagery in the Improvement of Athletic Performance." Journal of Sport and Exercise Psychology 12(1): 82-85.

Abstract—None provided.

Suedfeld, Peter, Drew E Collier and Bruce D Hartnett (1993). "Enhancing Perceptual-Motor Accuracy through Flotation REST." The Sport Psychologist 7(2): 151-159.

Abstract—Previous studies using flotation Restricted Environmental Stimulation Technique (REST) to enhance motor performance have focused on relatively gross arm and leg movements and have combined the technique with a variety of imaginal practice and relaxation training procedures. This study independently varied REST and an imaginal training and relaxation script to improve accuracy among 40 novice, intermediate, and expert darts players. REST by itself and REST combined with the script were equally effective at enhancing performance. The imagery script alone and a no-treatment control condition resulted in no change on test-retest measures. The results indicate that in the area of perceptual-motor coordination, REST is not merely a potentiator of other techniques, but a useful and efficient unimotor intervention, which takes a short time and does not require further rehearsal or repetition.

Suedfeld, Peter and Eric Eich (1995). "Autobiographical Memory and Affect under Conditions of Reduced Environmental Stimulation." Journal of Environmental Psychology 15(4): 321-326.

Abstract—Two experiments were conducted to study the effects of 1-hour sessions of flotation REST (restricted environmental stimulation technique) on mood and autobiographical memory. In Study 1, flotation was shown to produce a significant decrease in self-rated anxiety and arousal. Subjects in Study 2, who experienced similar changes in mood and arousal, reported that autobiographical memories retrieved in REST were more pleasant and intense, and had been more frequently recalled in the past, than those recollected in a control environment.

*Suedfeld, Peter and Jean L Kristeller (1982). "Stimulus Reduction as a Technique in Health Psychology." Health Psychology 1(4): 337.

Abstract—The uses of the Restricted Environmental Stimulation Technique (REST) in health psychology, and theoretical explanations for its effectiveness, can be understood in the context of its impact on cognitive processes and on behaviors related to information overload in the normal environment. Cognitive effects, including openness to new information and better concentration, have been applied in the induction of habit change (cessation of smoking, weight reduction); the interruption of stimulus bombardment is central in the utilization of REST in stress management (hypertension, childhood dysfunctions). This paper reviews data on the inclusion of REST in health psychology programs, and suggests directions for further clinical research.

Suedfeld, Peter, Janet Metcalfe and Susan Bluck (1987). "Enhancement of Scientific Creativity by Flotation REST (Restricted Environmental Stimulation Technique)." Journal of Environmental Psychology 7(3): 219-231.

Abstract—Five psychology faculty members each spent six 90-min sessions sitting alone in their office and six 1-hour sessions floating in a restricted environmental stimulation tank (REST) (warm saline solution, darkness and silence). The order of environments was counterbalanced. During the office sessions and for 30 min after each REST session, subjects dictated ideas concerning their research into a tape recorder. Subsequent self-ratings showed that novel ideas generated after REST were 'better' (more creative) than those developed in office sessions. Interview reports identified experiences compatible with the hypothesis that REST induces a 'twilight state.' Mood ratings showed that REST was associated with trends towards a higher level of vigor and lower levels of tension, anger, depression, fatigue and confusion. These findings support the prediction that REST would facilitate high-level creative behavior and positive affect.

Suedfeld, Peter, G Daniel Steel, Alistair BC Wallbaum, Susan Bluck, Nigel Livesey and Lorianna Capozzi (1994). "Explaining the Effects of Stimulus Restriction: Testing the Dynamic Hemispheric Asymmetry Hypothesis." Journal of Environmental Psychology 14(2): 87-100.

Abstract—The Restricted Environmental Stimulation Technique (REST) has been used in hundreds of studies investigating the effects of drastically reducing the accustomed flow of ambient information and stimulation. Some of this research has explored changes in basic psychological and psychophysiological processes; other portions have been directed toward the application of REST, especially in clinical and health psychology. Although a substantial data base now exists, no adequate theoretical explanation has been offered for the wide range of consistent and striking effects of REST on human beings. This paper describes several original experiments, and reviews the literature, assessing the evidence relevant to one promising explanation: the Dynamic Hemispheric Asymmetry (DHAI model, which proposes that in REST the normally non-dominant cortical hemisphere becomes more active and exerts greater influence over cognitive and affective processes. Research bearing upon the hypothesis includes work on memory, learning, imagery, divergent thinking, creativity, perception, habit modification, attitude

change, hand dominance, and brain activity. The results offer only mixed support for the DHA model, but indicate areas for theoretical extensions and further research.

Suedfeld, Peter; Coren, Stanley (1989). "Perceptual Isolation, Sensory Deprivation, and REST: Moving Introductory Psychology Texts out of the 1950s." Canadian Psychology/Psychologie Canadienne 30(1): 17-29.

Abstract—This paper examines the treatment of sensory deprivation research (now usually referred to as the Restricted Environmental Stimulation Technique, or REST) in 185 introductory psychology textbooks published between 1956 and 1986. The research area has undergone drastic changes during those three decades, moving from very dramatic early findings which were widely publicized but have to a great extent proven unreliable, to systematic investigations and replications, and most recently to well-established applications in a number of fields including behavioural health. Nevertheless, most textbooks still describe the results in terms of such largely abandoned issues as hallucinations, cognitive impairment, and high stress. The modal reference even in the mid-1980s is still to articles published in the mid-1950s. A thirty-year delay in assimilating scientific developments into texts is not only unusual but unacceptable, particularly when it results in giving successive generations of students a highly inaccurate view of a research area that has made significant progress and contributions.

Turner Jr, John W and Thomas H Fine (1983). "Effects of Relaxation Associated with Brief Restricted Environmental Stimulation Therapy (REST) on Plasma Cortisol, ACTH, and LH." Applied Psychophysiology and Biofeedback 8(1): 115-126.

Abstract—Restricted Environmental Stimulation Therapy (REST), which involves placing an individual into an environment of severely reduced stimulation for brief periods, has been subjectively reported to produce deep relaxation. The present study determines the effects of REST-assisted relaxation on plasma cortisol, ACTH, and luteinizing hormone (LH). These parameters were also measured in a group exposed to a similar relaxation paradigm, but without REST (non-REST). Each subject experienced two baseline sessions (1 and 2), four REST (or non-REST) relaxation sessions (3, 4, 5, 6), and two follow-up sessions (7 and 8). Pre- and postsession plasma hormone levels were measured in sessions 1, 2, 5, and 8. Both REST and non-REST subjects reported that the experience was relaxing. During the treatment period (session 5) pre- to postsession changes in cortisol and ACTH, but not in LH, were significantly greater for the REST group than for the non-REST group. Plasma cortisol level also decreased across sessions in the REST group, with levels in sessions 5 and 8 significantly lower than the baseline (sessions 1 and 2). Non-REST subjects showed no change in plasma cortisol across sessions. No significant change in plasma ACTH or LH occurred across sessions in the REST or non-REST groups, although ACTH showed a decreasing trend. These data demonstrate that repeated brief REST-assisted relaxation produces a relaxation state associated with specific decreases in pituitary-adrenal axis activity.

Turner Jr, John W and Thomas H Fine (1991). "Restricting Environmental Stimulation Influences Levels and Variability of Plasma Cortisol." Journal of Applied Physiology 70(5): 2010-2013.

Abstract—Restricting stimulation from the environment has been shown to alter psychological and physiological states. The present study of 27 healthy subjects examines the effects of restricted environmental stimulation technique (REST) on plasma levels of cortisol and variability in plasma cortisol levels across repeated REST sessions. The REST environment consisted of a 1.2 X 1.2 X 2.4-m ovoid chamber containing 25 cm of saturated MgSO₄ solution (sp gr 1.28) maintained at 34.5°F. The buoyant supinely floating subject experienced a minimum

of light, sound, and temperature awareness and spatial orientation. The non-REST environment was a cushioned reclining chair in a quiet dimly lit room. The 5-wk protocol consisted of four visits for blood sampling during a 2-wk baseline followed by eight REST or non-REST sessions, 40 min each, with blood samples taken on four nonsession days between sessions 5 and 8. Variability in plasma cortisol was expressed in terms of standard deviation. REST was associated with across-session decreases of 21.6% in plasma cortisol and 50.5% in plasma cortisol variability, whereas no changes in these measures occurred in non-REST. It is concluded that REST influences both static and dynamic aspects of adrenocortical function, possibly altering the feedback monitoring of plasma cortisol.

Turner Jr, John W, Thomas H Fine, Gina Ewy, Peter Sershon and Thomas Freundlich (1989). "The Presence or Absence of Light During Flotation Restricted Environmental Stimulation: Effects on Plasma Cortisol, Blood Pressure, and Mood." Biofeedback and Self-Regulation 14(4): 291-300.

Abstract—This study examined the effect of light on relaxation associated with flotation restricted environmental stimulation therapy (REST), as measured by plasma cortisol, mean arterial pressure, and psychometric parameters. Twenty-one subjects were paired by baseline cortisol levels into two groups: one experiencing flotation REST in the presence of light (REST-L) and one experiencing flotation REST in the absence of light (REST-D). Subjects were 15 male and 6 female students aged 22-28 in normal health who had not experienced REST. Repeated flotation REST (8 sessions) either with light or without light was associated with a decrease in plasma cortisol and a decrease in mean arterial pressure, with no differences in effectiveness between groups. The psychometric assessment of mood, using the POMS scale, before and after sessions 1 and 8 revealed mood state improvement in both REST-L and REST-D groups. These data suggest that the presence of light did not compromise the flotation REST experience, as evidenced by the lack of difference between REST-L and REST-D groups.

*van Dierendonck, Dirk; te Nijenhuis, Jan (2005). "Flotation Restricted Environmental Stimulation Therapy (REST) as a Stress-Management Tool: A Meta-Analysis." Psychology and Health 20(3): 405-412.

Abstract—In this study we investigated the value of flotation Restricted Environmental Stimulation Therapy (REST) as a stress-management tool. We focused on the physiological effects of REST, its influence on well-being, and on performance. Twenty-seven studies published in 25 articles or book chapters were included in a meta-analysis. The total number of participants was 449, with a mean age of 29 years (ranging between 20 and 45). Sixty-four percent was male and 36% was female. The results showed that REST has positive effects on physiology (e.g., lower levels of cortisol, lower blood pressure), well-being, and performance. The pre-post mean effect size and the overall randomized control group effect size were relatively strong. This suggests that despite some limitations of the original studies, flotation REST can be a useful stress management tool in addition to or instead of other stress management tools.

Vartanian, Oshin and Peter Suedfeld (2011). "The Effect of the Flotation Version of Restricted Environmental Stimulation Technique (REST) on Jazz Improvisation." Music and Medicine 3(4): 234-238.

Abstract—The flotation version of restricted environmental stimulation technique (REST) has been shown to improve perceptual-motor skills in sports and creativity in the sciences. We examined whether these effects would extend to jazz improvisation—an activity involving perceptual-motor coordination and creativity. College students enrolled in an intermediate-level

jazz improvisation class (N = 8) floated for one hour per week for 4 consecutive weeks. The comparison group (N = 5) consisted of student volunteers enrolled in the same class who did not engage in flotation. The dependent variables were (a) blind ratings of improvised pieces collected before and after treatment, (b) instructors' ratings of perceived change in improvisational ability, and (c) final class grades. Both blind and perceived change measures demonstrated higher scores on technical ability in the flotation group. The flotation group also had higher final class grades. The results suggest that flotation REST can improve perceptual-motor skills in jazz improvisation.

Wagaman, Jeffrey D, Arreed F Barabasz and Marianne Barabasz (1991). "Flotation REST and Imagery in the Improvement of Collegiate Basketball Performance." Perceptual and Motor Skills 72(1): 119-122.

Abstract—22 expert collegiate basketball players were exposed to either imagery training only or restricted environmental stimulation (REST) with Imagery training. The REST group showed significantly better performance on both objective game performance and coaches' blind ratings.

Wallbaum, Alistair BC, Randy Rzewnicki, Howard Steele and Peter Suedfeld (1991). "Progressive Muscle Relaxation and Restricted Environmental Stimulation Therapy for Chronic Tension Headache: A Pilot Study." International Journal of Psychosomatics 38: 33-39.

Abstract—Thirty-one patients suffering from chronic tension headache participated in one of four procedures, each of which comprised two one-and-one half hour sessions per week for 4 weeks. The conditions were: Chamber/Control (both weekly sessions lying on a bed in a dimly-lit room), and three active treatment procedures: Chamber/Tank, one session as above, the other floating in a dark, silent REST tank; Chamber/Relaxation, one as above, one doing progressive muscle relaxation exercises; and Tank/Relaxation, one session floating and one doing progressive muscle relaxation. By 6 months after the end of treatment, complete data had been obtained from 20 subjects. There was a significant overall decrease in headache reports; the active treatment groups collapsed improved significantly more than the control group. At the 6-month follow-up, the treatment groups showed continuing improvement (57% over end of treatment for the Tank-Relaxation group and a mean of 25% for the other two), whereas the control group had deteriorated by 34% since end of treatment. Clinical improvements were comparable to those of more time- and effort-consuming relaxation therapies, and confirm the usefulness of REST as a long-lasting and versatile treatment in behavioral health.

*Indicates Review or Meta-Analysis