

# HEALTH AND THERAPEUTIC APPLICATIONS OF CHAMBER AND FLOTATION RESTRICTED ENVIRONMENTAL STIMULATION THERAPY (REST)

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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.

**KEY WORDS:** Restricted stimulation, flotation, isolation, REST.

## INTRODUCTION

Over fourteen years prior to the writing of this paper, a review of the health psychology implications of restricted environmental stimulation therapy (REST) concluded that "REST is beginning to shed its earlier negative aura, and to be appreciated as the versatile and useful tool that it really is" (Suedfeld and Kristeller, 1982, p. 353). Since then there has been a resurgence in publications – including the proceedings of six international conferences on REST – dealing with the effects of stimulus reduction on basic psychological and psychophysiological processes, as well as with the application of such findings in the treatment of various psychiatric, medical, and adjustment dysfunctions (e.g., Barabasz and Barabasz, 1993; Suedfeld, Turner and Fine, 1990). In this review, we shall make explicit the connections between the phenomena of REST as explicated in basic experimental research and its uses in the treatment of various psychopathological and behavioral problems.

Since the early 1950s, when Donald Hebb and his students at McGill University initiated REST research, a number of procedures have been used to reduce the level, patterning, variability and meaningfulness of ambient stimulation in a laboratory setting

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(Solomon *et al.*, 1961; Zubek, 1969). Many of these have fallen into disfavor, partly because they were so confounded that it was difficult to identify what aspect of stimulation, if any, was being restricted (Suedfeld, 1980).

Two basic methods, each of which has several versions, are currently in use. These are chamber and flotation REST. In chamber REST, the subject lies on a bed for several hours, 24 hours being one frequently used period. The room is completely dark and sound-reducing by about 80 dB (on average); movement is restricted by the experimental instructions, but not by mechanical restraints. Food, water and toilet facilities are available *ad libitum* without the subject having to leave the chamber. An open intercom permits a monitor nearby to respond to questions or requests, and to help the subject leave the chamber before the scheduled end of the session if desired. Subjects are also instructed in how to leave the room by themselves if they prefer. In most experiments of up to 24 hours' duration, fewer than 10% choose to leave early (Suedfeld, 1980).

In flotation REST, where the modal session duration is around 45 minutes, the dark and quiet room contains a flotation tank or pool. Pools are open and can be entered as one enters a room (similar to an indoor spa), whereas tanks are covered and must be entered and left through a hatch which is closed while the subject floats. The flotation medium is a skin-temperature solution of water and Epsom salts ( $Mg_2SO_4$ ), at a specific gravity that allows the subject to float supine, with the face and ventral portion of the body above the waterline. The solution is so dense that turning over requires major deliberate effort; the subject can sleep or daydream without concern for safety.

Again, an intercom allows the floater to communicate with a monitor. Showers are taken before and after floating, the first time to reduce contamination of the solution (which is usually filtered and sterilized after each use) and the second to remove residual Epsom salts from the skin and hair. As in chamber REST, the participant can leave at any time. While there are no published data on early termination from flotation sessions, our experience with over 8,000 sessions suggests that fewer than 5% of subjects choose to leave the flotation REST session before the allotted time.

A technique that combines some aspects of each of the foregoing, known as "dry flotation," has been used in exploratory studies during the past few years. This apparatus is similar to a flotation tank, except that a thin plastic membrane covers the water surface. The participant lies on the membrane rather than being immersed directly in the solution. In principle, dry flotation has the advantages of flotation REST in general as well as the advantage of chamber REST in not requiring pre- and post-session showers nor frequent filtering and sterilization of the flotation medium, not impairing auditory perception by submerging the ears, and reducing the humidity of the enclosed environment. It does involve more tactile stimulation than does "wet" flotation. In the few studies published so far comparing wet and dry flotation, the latter has been shown to induce higher arousal and less sensory reduction as measured by EEG (amplitude and alpha) and plasma cortisol (Turner and Fine, 1993; Turner, Gerard, Hyland, Nieland and Fine, 1993). Both techniques induce relaxation, positive affect, and lowered heart rate, but again wet flotation seems more effective (Forgays, Forgays, Pudvah and Wright, 1991). Wet flotation was also more effective than dry in reducing pain and improving grip strength and range of motion in a small group of rheumatoid arthritis patients (Turner, DeLeon, Gibson and Fine, 1993). As no other health-related evaluations of dry flotation have appeared in print, the remainder of this paper will concentrate on the uses of traditional, wet, flotation and chamber REST.

We shall discuss the application of these two versions of REST separately for a variety of reasons. First, although the techniques share the goal of restricting environmental

stimulation, some of the differences between flotation and chamber vary the experience and may produce different effects. For instance, the presence of a supersaturated solution in flotation REST changes several sensory factors. Tactile stimulation is significantly reduced and the subject experiences the illusion of weightlessness. There has also been speculation that the magnesium sulphate used to create the elevated specific gravity may have a therapeutic effect on hypertonic muscles (DeTurk, Sniffen, Meredith and Lehmann, 1990). While one of flotation's main demonstrated effects has been the induction of a state of relaxation (Turner and Fine, 1983), the effects of chamber REST on arousal have been less clear-cut (Borrie and Suedfeld, 1976). The nature of the solution may be one reason for this.

A second distinction between chamber and flotation REST is the modal duration of exposure. In flotation REST, the subject experiences some degree of immobilization (i.e., being unable to roll over) that can become uncomfortable after 4 to 8 hours, thereby precluding sessions of long duration. Borrie (1990-91) has hypothesized that the relatively longer period of time spent in chamber REST sessions is responsible for the resulting changes in attitudes and thinking that are especially associated with the chamber technique.

A third reason for separating our discussion of the two techniques is that the research questions regarding flotation REST were basically different from those asked about chamber REST. The majority of research on chamber REST applications grew out of the basic research that began in the 1950s and explored a variety of theoretical questions about the human need for stimulation, the nature of arousal and its relationship with external stimulation, and the cognitive effects of isolation. Researchers had shown that chamber REST affects psychological functioning (thinking, perception, memory, motivation, mood) and psychophysiological processes (for reviews see Zubek, 1969; Suedfeld, 1980). Practitioners went on to explore its utility in the treatment of major psychiatric dysfunctions such as autism, neuroses (e.g., phobias), and substance misuse (e.g., cigarette smoking and heavy alcohol intake).

Unlike the use of chamber REST, the invention of the flotation tank (Lilly, 1977) received considerable positive recognition from the public as a recreational device. Researchers employing this technique took their lead from the numerous anecdotal claims of extraordinary benefits produced by flotation as they explored its use with stress-related disorders, pain reduction, and insomnia. When possible, our review of the therapeutic uses of REST first identifies relevant basic research and then shows how the results of such research have served as the starting point and the explanation of clinical applications of the technique.

One last procedural comment should be made. All of the experiments and clinical treatments described in this article met requirements for ethical clearance as defined by the appropriate institutions and granting agencies. All participants were either volunteers or, in the case of children or patients who were not able to understand the recruiting and orientation material, had their participation approved by parents, guardians, or the equivalent. In all of our hospital studies, the patients (or, in the case of autistic children, their parents) were given full information about the study and assured that their agreement or refusal to participate (and whether they finished the entire scheduled session) would in no way affect their medical treatment. Their anonymity was guaranteed, and they were explicitly told that the REST session could be terminated any time they wished. They were monitored by both hospital and research staff throughout the session, and were afforded debriefing and full opportunity for followup counseling and discussion.

Although a few patients requested early termination of the procedure, no episodes of serious emotional upset as a consequence of REST were reported.

## CHAMBER REST

Chamber REST data make up most of the material in the early scientific literature and reviews of REST. As can be seen in the reference sections of major review books (Suedfeld, 1980; Zubek, 1969), much of the research has been published in well-known scientific journals and monographs and there have been programmatic series of experiments exploring specific areas of REST effects (e.g., Suedfeld, 1990). Most of the applications summarized here have been tested in studies designed after the consideration of data gathered in experiments dealing with basic psychological processes.

### *Relief from Stimulus Overload*

By definition, REST drastically reduces the flow of ambient information and stimulation. It appears logical to use it as a treatment for patients whose problems stem from a temporary inability to cope with or process normal stimulus levels. Two such applications appear in the literature.

One is the use of chamber REST with patients suffering from drug-induced mania. A review of the area (Adams, 1980) has shown that a period of solitude in a darkened, quiet environment is the treatment of choice for individuals in the acute phase of LSD and PCP intoxication, when the symptoms make them almost uncontrollable in more stimulating settings. The inference is that the intense internal stimulation triggered by the action of the drug, added to ongoing external stimulus flow, overwhelms the individual's capacity for coping and self-control. When one of these two stimulus sources is removed by putting the person in a low-stimulus environment, he or she is more able to deal with the residue. This treatment is easier, less costly, less dangerous, and more precisely controllable, than pharmacological counteragents.

In the same way, pediatricians have adopted stimulus reduction as the standard housing condition for neonatal intensive care units (NICUs), which care for premature infants as well as those who are born addicted to heroin, cocaine or alcohol. Such babies are hypersensitive to sensory stimulation; reducing inputs reduces the level of crying, muscle dysfunctions and other physical symptoms. As awareness of this problem has spread, so have attempts to avoid it. In many NICU's, care is taken to control ambient stimulation, with special emphasis on lowered levels of light and sound. Interestingly, the number of specialists working in the unit is positively correlated with the number of policies in place to control stimulation (Frank, Maurer and Shepherd, 1991).

Another example is the use of seclusion, often categorized as "time out from positive reinforcement," as a method of extinguishing disruptive, violent, or agitated behavior. Patients are either totally or partially isolated from the ongoing activities of their group, therapist, parent, etc. The standard explanation for the efficacy of this technique is that time out brings about the cessation of the behavior because the patient wants to resume the interaction (e.g., Sachs, 1974). An alternate rationale is that temporarily uncontrollable patients just need time to calm down, presumably because their outburst is inherently time-limited (Soloff, 1983). REST theorists argue that this explanation is incorrect for this kind of patient. Time out constitutes a negative reinforcer (that is, the removal of an

aversive stimulus): solitude and low stimulation relieve the patient from stressful stimulus overloads (Suedfeld, 1980). The fact that patients not infrequently choose to isolate themselves (e.g., Joshi, Capozzoli and Coyle, 1988) supports the latter view, although – as in REST experiments – the aura with which the procedure is imbued may cause it to take on a frightening and unpleasant aspect (see, e.g., Myers, 1990).

These environmentally-based treatments are not called REST by the physicians and nurses who use them. Most practitioners do not realize, or at least do not acknowledge, that their technique fits into the category, and should be understood as an example, of REST. Nonetheless, some of these applications bring together the traditional psychiatric use of bed rest and seclusion or time out, all of which involve the limitation of visual, auditory, and kinesthetic stimuli, with the more profound stimulus reduction techniques of REST. They do so without addressing the underlying theoretical issues and without drawing the explicit parallels between the procedure and the REST literature (Suedfeld, 1980).

The conditions described above characterize time-limited episodes in people's lives. However, patients who are chronically handicapped in dealing with environmental stimulation also benefit from REST. Relatively little research has been done with some populations for whom the periodic use of REST may provide a significant benefit (e.g., those who are highly distractible). A number of early case reports have discussed the beneficial effects of stimulus reduction on autistic children (Maier, 1970; Schechter, Shurley and Toussieng, 1970; Schechter, Shurley, Sexauer and Toussieng, 1969; Schechter, Shurley, Toussieng and Maier, 1969). In the first controlled study of this phenomenon (Suedfeld and Schwartz, 1983), autistic patients were put into a mild form of REST (solitude, very dim light, silence) for 48 hours and compared with a control group whose members were kept in a normal pediatric ward with an attendant for the same period. The REST group, but not the controls, showed improvements on a number of measures and behavioral rating scales. Contrary to the fears of some parents and nursing staff, the children evidenced essentially no stress during the period of stimulus restriction.

A more precisely controlled project (Harrison and Barabasz, 1991), with a blind data-collection design and patients matched for IQ, confirmed the beneficial outcomes of reduced stimulation for autistic patients. Positive effects focused on social interaction measures with older children and on the Autism Behavior Checklist among children who were less severely autistic. There were no changes on vocal behavior, discrimination learning, and a number of other performance measures; and, as in the Suedfeld and Schwartz study, there were no observable signs of stress.

At the other end of the life span, it has been suggested that patients suffering from Alzheimer's syndrome and related problems may benefit from stimulus reduction. Interestingly, as in the case of autism, enriched stimulation has also been prescribed by some researchers; but in a recent study, which used both environmental design and behavioral guidelines for staff and visitors to lower stimulation levels in a residential unit, disoriented patients (aged 81–94 years) showed statistically significant improvements in the ability to perform the activities of daily life, lowered levels of agitation, weight gain, and a trend toward improved mental and emotional characteristics. Family members also reported increased satisfaction with the condition of their relative (Cleary, Calmon, Price and Shullaw, 1988). Like the environment used with autistic children, this situation did not qualify as profound REST; however, there were substantial reductions in ambient light, noise, and movement.

*Stimulus Hunger*

One well-known consequence of chamber REST has been called stimulus hunger or stimulus-action hunger (Jones, 1969; Lilly, 1956). Simply, this is the finding that normal subjects lying quietly in a dark, silent room for 24 hours or more respond positively to information or stimulation that breaks the sameness of the environment. Relevant data include the use of a button press to obtain exposure to visual or auditory inputs, requests to hear even rather boring materials, and compliance with reinforcement schedules requiring counter attitudinal behavior in order to obtain information. Participants in prolonged chamber REST value stimulus sequences that are high in unpredictability (Jones, 1969) and cognitive challenge (Landon and Suedfeld, 1969).

This phenomenon has been used as the rationale for treating phobic subjects in the REST setting (Suedfeld and Buchanan, 1974; Suedfeld and Hare, 1977). In the latter study, snake phobic volunteers were put in the chamber for 5 hours. At the end of this time, they gained access to a button which, when pushed, delivered a brief exposure of one of a series of slides showing snakes of differing realism. Confirming the stimulus-hunger hypothesis, REST subjects significantly decreased self-reported and behavioral fear of snakes compared to non-REST control groups. For the latter, as in the general literature using systematic desensitization procedures, hierarchical presentation of slides (from most abstract to most realistic, or to put it another way, from the least to the most fear-arousing) was more effective than random presentation. In REST – as predicted by the stimulus-hunger hypothesis and Jones's findings – it was the randomly ordered slide presentation that most powerfully decreased fear of snakes. The modal approach to a live, 2-meter boa constrictor changed from no closer than 6 meters prior to treatment to manual touching of the glass and wire screen surfaces of the terrarium enclosing the animal after REST. No such change occurred in groups receiving slide exposure without REST, even if they had the same number of exposures as the REST subjects.

Another potential exploitation of stimulus hunger would build upon the fact that it is accompanied by increased sensitivity to whatever information is available, whether from external or internal sources. The latter would include both physiological and psychological signals. One experiment has shown that single motor unit control is enhanced when electromyograph (EMG) biofeedback is administered in REST rather than a normal sensory environment (Lloyd and Shurley, 1976). It would be logical to hypothesize that the therapeutic efficacy of electronic biofeedback techniques would be enhanced if the procedure were administered in full REST, not just, as is now frequently the case, in somewhat stimulus-reduced circumstances. To our knowledge, while REST and biofeedback have been featured in multitreatment stress management trials, they have not been combined in any controlled clinical studies.

A twist on the stimulus-hunger paradigm is that people in REST may get more easily satiated with repetitive stimuli, because even after they become boring there is nothing else on which to focus one's attention. This may lead to "overboredom" in the same sense that repetition of items after criterion has been reached can lead to "overlearning." This phenomenon may be useful in some applications. Suedfeld and Clarke (1981) conducted a pilot study and two controlled experiments, one using university students who responded to recruiting material which did not refer to food or weight and the other using self-selected obese participants. Members of the first group were allowed to take their choice of food into a 24-hour chamber REST session; the obese subjects took only their favorite "problem" food. During one- and three-month followup periods, both groups decreased

their liking and use of the foods they had taken in the chamber. Although these results supported the "overboredom" theory – i.e., that repeated exposure to the same stimuli in REST would become aversive – their clinical value was not established because there were no changes in hip or waist circumference in either experimental group, and one of a comparison REST group supplied with a bland diet drink during the session showed statistically significant weight loss.

Similar findings for acquired aversion to previously liked foods were reported by Dyer (1993), who went on to indicate that REST subjects ingested significantly fewer calories during a two-week period 3 months after the session than did controls, and consumed less of the favourite problem food (still significant at the 6-month followup). Again, the lack of other stimuli in REST presumably exacerbated the monotonousness of the restricted food supply, reducing the participant's subsequent liking for the dish.

Dyer's REST groups also showed reduced body fat percentage (skinfold) during the entire followup period. Although non-REST control subjects did not show these changes, those who received weight-loss messages *and* were fed their favourite problem food during the 24-hour control period reduced their consumption of that food between two weeks before and two weeks immediately after the session. To the extent that particular foods pose a problem for patients attempting to lose weight, this "overboredom" procedure may be a useful adjunct to other weight management programs (see also Borrie, 1978).

### *Improvement of Memory*

A number of chamber REST studies have indicated that memory (usually measured by recall) improves from before to after the session (e.g., Grissom, 1966). These findings have been obtained with both verbal and nonverbal materials, and 24 hours of stimulus reduction has been identified in parametric research as the optimal time period to generate the phenomenon (Suedfeld, 1969).

It is widely known that psychiatric patients being treated with electroconvulsive therapy (ECT) very frequently complain of memory loss as a result of the treatment. It is also the case that such complaints are difficult to substantiate through objective tests of memory. The conclusion must be that either we are not testing the kind of memory that is adversely affected by ECT, or that the self-evaluations of memory loss are actually incorrect. Regardless of the facts, such complaints furnish some of the most flammable fuel in the campaign against ECT.

In a modified REST project, depressed patients receiving ECT were assigned to one of two recovery conditions. After they emerged from anesthesia in the usual recovery room, they were either returned to their usual hospital bed or were assigned for up to 3 hours to a small, isolated, stimulus-reduced room similar to that used in the treatment of autistic children described previously. Neither group showed significant decrements on objective tests of memory; however, the REST group gave significantly lower ratings of subjective memory loss (Suedfeld, Ramirez, Remick and Fleming, 1989). The stimulus reduced recovery setting gave patients a less traumatic impression of the ECT procedure.

### *Cognitive and Behavioral Flexibility*

A major part of health-related research using chamber REST is based upon findings that the environment reduces the rigidity of patterns of thought and behavior in experimental subjects. These data have been generated using measures of reactions to counter attitudinal information, attitudinal self-consistency, and problem solving. REST has been

shown to have such flexibility-inducing effects even without the presentation of new information: in the classic Lewinian analysis of attitude change, it appears to be a general attitude unfreezer (Tetlock and Suedfeld, 1976).

Specific applications of this phenomenon have concentrated on the field of habit modification, primarily smoking cessation. The connecting argument is that REST may work by unfreezing the rigid structure of thoughts, emotions, motivations, and behaviors supporting the habit. A fundamental reorientation of this structure then becomes possible, with a newly emergent pattern consistent with the patient's desire to change or abandon the habit. This change is further strengthened and consolidated by another intervention technique or by social and societal factors (the Lewinian concept of re-freezing) (Suedfeld, 1980).

There have now been close to 20 REST-related smoking interventions publicly reported. The basic paradigm is a 12–24 hour chamber REST session, in complete darkness and silence except that some conditions present periodic messages while the patient is in the chamber. These messages vary in content, but are normally quite brief and are administered by audio tape. Actually, their presence or absence seems to make little difference to the outcome although they may contribute to the face validity of the intervention.

What does make a consistent difference is the combination of REST with another proven smoking cessation procedure, whether this be self-management training, hypnosis, support networks, or counseling. In such combinations, the success rates of the joint technique groups approximately equal the sum of those of either method alone, and are far better than those of placebo, subtractive expectancy placebo, or waiting list controls (Suedfeld, 1990). Again arguing against a placebo or expectancy explanation of the effect, this potentiation does not occur when the other technique is of dubious effectiveness (e.g., aversive conditioning).

REST can dramatically enhance long-term maintenance of post-treatment gains. Unlike most habit modification techniques, whose good results start to erode soon after the end of treatment and largely disappear within a year, REST is associated with low relapse rates. A recent review (Suedfeld, 1990) indicates that of smokers who are abstinent at the end of a multimodal treatment combining REST with an effective traditional intervention, about 1/2 to 3/4 remain so through at least one-year followups. Barabasz, Baer, Sheehan and Barabasz (1986) have reported 47% abstinence at 19-month followup when hypnotherapy and counseling with an experienced clinician were combined with 1–3 very brief chamber REST sessions. The paper does not give "continuous maintenance" data (i.e., the percentage of clients who became abstinent at end of treatment and were still abstinent at the followup); however, the rate reported above compares very favorably with a range of 4–36% abstinence for other conditions using hypnosis and 6% for an untreated control group, all in the same study. The Barabasz *et al.* paper is also one of the few that found a 1–2 hour chamber REST session to be effective in habit modification (in contrast, for example, with the smoking results of Suedfeld and Baker-Brown, 1987, and the alcohol use results of Barabasz, Barabasz and Dyer, 1993).

This REST-instilled maintenance of change has been reported in successful long-term weight reduction among severely obese individuals after 24 hours of REST (Borrie and Suedfeld, 1980) and reduction of alcohol intake among prodromal alcoholics after just 2-1/2 hours (Cooper, Adams and Scott, 1988). Both of these effects were still observed at 6-month followup. Barabasz *et al.* (1993), working with university students who were self-reported moderate-heavy or heavy drinkers, conducted a parametric study varying REST duration in combination with an informational message. They found an important

duration effect: in contrast to the findings of Cooper *et al.*, there were no significant lasting reductions in alcohol intake for the 3- and 6-hour REST groups, but the 12-hour group showed a marginally significant reduction and the 24-hour group a highly significant one even six months after the session. This finding is compatible with Suedfeld and Baker-Brown's (1987) demonstration that 24 hours of REST elicited more reduction in smoking on 3- and 12-month followups than a 12-hour session, across a variety of message presentation designs.

Borrie (1990–91) offers a differentiated explanation of why REST is a useful tool in the treatment of addictive behaviors. In his view, the components of its effectiveness are the induction of general relaxation, the experience of serenity and relief by nonchemical means, the internal refocusing on personal problems, the removal of precipitating environmental cues and possible responses, a feeling of increased control over the behavior, and enhanced learning. Borrie hypothesizes that these consequences of REST have an impact on all aspects of the individual's addictive lifestyle, "from the extinction and/or replacement of the addictive behaviour through adjustment of physical and emotional reactions to the promotion of a new sense of self and spirituality" (p. 998). From a different theoretical perspective (Prochaska, DiClemente and Norcross, 1992), REST may help to move people more rapidly from the precontemplation to the preparation stage (from wishing and intending to change to taking some action). Its positive effect on the maintenance stage can help the individual to shortcut the spiral recycling that Prochaska *et al.* consider typical of the habit change process.

Another set of applications has been based on the well-established finding that both chamber and flotation REST increase suggestibility generally (Suedfeld, 1969) and hypnotizability specifically (Barabasz, 1982; Pena, 1963; Ritchie, 1976; Sanders and Reyher, 1969; Wickramasekera, 1969). In fact, A.F. Barabasz (1990) has proposed that flotation leads to spontaneous hypnotic states in highly hypnotizable subjects. This effect has been exploited in a number of clinical studies by the Barabasz and their colleagues. M. Barabasz (1987) reported that a series of counseling and hypnosis sessions, plus 2 to 2-1/2 hours of chamber REST, were successful in treating compulsive hair-pulling (trichotillomania) for two of three patients. A controlled study combining hypnosis with 6 hours of chamber REST found reductions in chronic pain as well as significant increases in hypnotizability after REST, and established that these effects were not due to demand characteristics (Barabasz and Barabasz, 1989).

## FLOTATION REST

### *General Relaxation*

Psychophysiological measures have shown changes indicating relaxation from before to after flotation sessions, and/or across repeated flotation sessions, on a wide range of stress-related measures. There are increases in EEG theta and alpha waves, the former being most marked in wet flotation and the latter in chamber and dry flotation (e.g., Fine, Mills and Turner, 1993). Plasma and urinary cortisol, ACTH, aldosterone, renin activity, ephinephrine, heart rate, and blood pressure, all directly associated with stress, consistently decrease; hormones not related to stress, such as luteinizing hormone and testosterone, show no change (reviewed in Turner and Fine, 1993). Self-reports, using either standard psychometric scales or open-ended questions, indicate deep relaxation for

the vast majority of subjects (e.g., Schulz and Kaspar, 1994; Suedfeld, Turner and Fine, 1990; Forgays *et al.*, 1991). However, many of the therapeutic phenomena and effects ascribed to flotation (e.g., relief from pain, insomnia and muscle hypertonicity) have not been tested with sufficient rigor for definitive conclusions to be drawn. While some findings may remain unconvincing to skeptics until more rigorous research has been performed and reported in the literature, we shall present some observations that are intriguing and promising.

### *Stress Reduction*

On a functional level, REST appears to reduce distractors, eliminate behavioral trigger cues, disrupt habit patterns, and remove external demands. Viewed in terms of Selye's definition of stress as the nonspecific response of the body to any demand made upon it, REST greatly reduces immediate stressors. Both psychological and psychophysiological signs of relaxation after flotation REST have been well established by controlled studies (e.g., Suedfeld, Ballard and Murphy, 1983; Turner and Fine, 1983). Parametric studies are badly needed. For example, it is not clear whether more than one flotation session is necessary to elicit the neuroendocrine changes that are assumed to reflect the state of relaxation. A Swiss study (Schulz and Kaspar, 1994), while reporting that five subjects rated themselves as more sedate, relaxed, and euphoric after than before a single flotation session, found no significant REST-related changes in a long list of hormones, the one exception being urinary vanillylmandelic acid (VMA, the main metabolite of catecholamine). Although the authors point out that such factors as the small sample size and short sampling time may have increased the risk of a Type II error, the findings at the very least raise doubts and indicate the need for further research in this aspect of flotation effects.

However, as the sampling of literature below indicates, the general phenomenon is beyond doubt. In one project (Turner, Fine, McGrady and Higgins, 1987) aimed at reducing blood pressure, 18 hypertensives and 13 normotensives were treated with either sessions of EMG biofeedback-assisted relaxation training or 30 minutes of flotation REST twice a week for 10 weeks. A 6-week baseline on each subject served as a control for changes in absolute levels and variation of blood pressure, cortisol, aldosterone and plasma renin. For the hypertensive subjects, flotation REST and biofeedback produced significant and equivalent reductions in blood pressure. Decreases were also observed in the average levels of each hormone in all groups except normotensives treated with biofeedback. As compared to a control condition, flotation significantly reduces level and variability of plasma cortisol (Turner and Fine, 1991) and the secretion of IgA, the major immunoglobulin in saliva (Turner, DeWerth, Fine and Faulmann, 1992).

The use of flotation REST has been compared to relaxation training in treating the stress-related disorder, primary psychophysiological insomnia. Sleep onset latency of 36 patients referred by a sleep disorder clinic was measured by subjective report and by an objective sleep assessment device. During the 2 weeks following a 2-week baseline measurement, subjects received four sessions of flotation REST, autogenic training, or a combination of the two over a 2-week period. Three months after the end of treatment those who had floated (either with or without the adjunctive relaxation tape) showed statistically and clinically significant decreases in sleep latency by either subjective report or objective measure. No such improvement had been found on 1-week and 1-month followups (Ballard, 1993).

At St. Elizabeth Hospital in Wisconsin (Koula, Kemp, Keane and Belden, 1987; Jacobs, Kemp, Keane and Belden, 1985), flotation REST and biofeedback were combined in a treatment program designed to alleviate stress-related disorders including generalized anxiety, tension and migraine headache, and chronic pain. At seven-month followup, the treatment yielded significant reductions in symptom frequency and intensity, as well as significant self-assessed reductions in life pressures and alcohol consumption. Participants also reported increased ability to relax, a claim supported by improvements in the patients' ability to lower their EMG using biofeedback. In a multi-case report, Borrie (1993a) described post-flotation stress reduction, clinically significant reductions in symptoms, and reduced medication use in patients suffering from lupus ( $n=4$ ), Lyme disease ( $n=2$ ), scleroderma ( $n=3$ ), and Reiter's syndrome (which comprises urethritis, arthritis, and conjunctivitis) ( $n=1$ ). These patients also described feeling calmer and less likely to react to stressful events during a period of several days following each flotation session.

Another multi-case study (Barabasz, 1993) has shown the effectiveness of REST as a fear- and arousal-reducing procedure. Four fliers, varying in specialty (a crop-duster, flying heavily-loaded single-engine aircraft very near the ground; two airline pilots flying large jet transports for a major airline; and a Royal New Zealand Air Force trainee pilot in the instrument flying phase of training), had become either completely or seriously unable to carry out their tasks. Referred for treatment, all failed to respond to systematic relaxation training. Systematic desensitization and hypnotherapy were equally ineffective. All four were relieved of their anxiety, and exhibited flying performance at or above their previous level of skill, after a course of treatments involving REST: six flotation sessions for the crop-duster, four for one of the airline pilots; 1 hour of flotation and a 6-hour chamber session for the other airline pilot, and one 6-hour chamber session for the trainee.

In an intriguing combination of treatments, Walker, Freeman and Christensen (1994) treated a man with a debilitating obsessive-compulsive disorder. They used repeated sessions of flotation, during which the patient was exposed to recordings of his own obsessive thoughts without being able to act on them. These researchers suggest that the combination of exposure during a deeply relaxed state and response prevention led to the successful reduction of obsessive-compulsive symptoms and of arousal to fear-arousing stimuli.

### *Pain Relief*

As noted above, stress symptoms responding to REST include chronic pain and both tension and migraine headache. Similar pain reduction data were reported in research on groups of patients suffering chronic pain of differing aetiology (Fine and Turner, 1985), rheumatoid arthritis sufferers (Mereday, Lehmann and Borrie, 1990; Turner, DeLeon, Gibson and Fine, 1993), a group of chronic pain patients attending a pain management clinic that included sessions of flotation REST (Borrie, 1993b), a group of chronic tension headache patients (Wallbaum, Rzewnicki, Steele and Suedfeld, 1991), and women suffering from severe premenstrual syndrome (Goldstein and Jessen, 1990; Jessen, 1993). In these studies, the effect of flotation upon pain reduction appears to be direct and perhaps physiologically mediated, as contrasted to the alleviation of pain via deepened hypnotic states brought about by chamber REST (Barabasz and Barabasz, 1989).

The duration of pain relief following a flotation session depends on several factors: the aetiology of the pain, the ability of the patient to achieve deep relaxation during the session, the number of sessions the patient has had, whether the patient has learned to

avoid pain-exacerbating activities, and whether the patient has learned to prolong the state of relaxation past the period in the tank. Borrie (1993b) postulates that the more muscular tension is involved in the patient's baseline pain reaction, the more pain relief will be produced by flotation REST. In cases of intractable pain, e.g., from reflex sympathetic dystrophy, patients frequently report no decrease in pain level but do report a decrease in pain bothersomeness following flotation.

Rheumatoid arthritis, a painful disorder where stress can play a role in flare-ups, is also the target of a promising line of work now in the early stages. Three pilot studies have looked at the use of flotation REST to reduce the pain of such episodes. An Australian report (Thomas, 1983) described flotation-produced lessening of pain in three sufferers with rheumatoid arthritis, but no success with six patients diagnosed with osteoarthritis. In a study of ten patients diagnosed with rheumatoid arthritis (Mereday *et al.*, 1990), the six patients who kept their scheduled appointments all showed significant reduction of pain, with resultant increased ability to move about as assessed by a pre- and post-float questionnaire. The third study (Turner, DeLeon, Gibson and Fine, 1993) found marked reduction in perceived pain, increased range of motion, and greater grip strength in four rheumatoid arthritis patients who floated twice a week for either 2 or 5 weeks. Those who floated for 5 weeks reported carryover effects of 24 to 48 hours. As mentioned previously, much weaker effects were found with dry flotation than with wet; the authors suggest that different levels of ambient humidity, stimulation level, and expectation may explain this outcome.

### *Muscle Hypertonicity*

The final application of flotation that we shall mention is the treatment of muscle hypertonicity and spasticity. A pilot study conducted at the State University of New York at Stony Brook (Sniffen, DeTurk, Mereday and Lehmann, 1990) looked at the effect of a single 15–20 minute flotation session on ten cerebral palsy patients, aged 3–12 years. All ten exhibited a post-float decrease of at least one step on the Ashworth scale, indicating a reduction in muscle tone during passive leg raising. Five had an increased range of motion of 10 degrees or more. Even more striking than these results were the parents' reports of changes over the following few days, indicating improvements in posture and balance, self-care, and speech. These changes followed no more than 20 minutes of flotation.

The same muscle tone reduction has been observed after flotation in patients with Parkinson's disease, cerebral palsy, and stroke history (Borrie, Dana, Perry and Friedman, 1993; DeTurk *et al.*, 1990). Since the buoyancy and warmth of the solution are not enough to explain the prolonged change in tone and function, Sniffen *et al.* (1990) proposed that the magnesium in the flotation solution is a transcutaneously absorbed muscle relaxant. This hypothesis becomes an interesting new piece to the puzzle facing REST researchers and a new direction for the practitioners using flotation REST; comparing "wet" and "dry" flotation procedures in this context would be one way of testing the theory.

### "SIDE EFFECTS"

One of the most intriguing aspects of REST as a therapeutic intervention is that the desired outcome – i.e., reduction or elimination of the problem with which the patient

presents – is frequently not the only beneficial outcome. This observation has been particularly salient in studies of habit modification.

Suedfeld and Best (1977) described such “side-effects” in a group of patients undergoing REST as part of a smoking cessation program. Several of the participants reported that their time in the chamber was used to think more deeply than usual about other life problems, and that solutions found as a result of this experience were applied successfully afterward. The list of benefits included an increase in health-related behaviors (initiating an exercise program, reducing the intake of coffee and fattening foods) and solving interpersonal problems, with family members (constant arguments, withdrawal, perceived rejection) and at work (insufficient recognition, failure to assert oneself).

Similar outcomes have been found by other researchers. Roy (1991) described a case of unexplained muscular tension, hypertension, neck pain, and generalized anxiety. After some sessions of psychotherapy, with little improvement, the patient was referred and underwent a 24-hour chamber REST session. Not only did he achieve normal blood pressure and a relief of the somatic symptoms to the extent that medication became unnecessary, he also reported a significant change in his outlook on life. Previously a rather unhappy and frustrated newcomer to Canada, he felt much better about his new country and about his relationship with his family. Other patients seen by this psychiatrist attributed to REST such outcomes as being able to sleep without medication, adaptive reactions to the accidental death of a spouse, increased assertiveness, improved weight control, and an improvement in interpersonal relationships (Suedfeld, Roy and Landon, 1982).

Such comments are spontaneously offered in most clinical research programs, and may emerge in the course of clinical interviews or therapy sessions. Nevertheless, this aspect of REST effects usually surprises both the patient and the researcher or therapist. It is therefore unlikely to be the consequence of expectancy. The scope and frequency of such occurrences are so striking that it appears questionable to call a change in the focal behavior (e.g., smoking) the “effect” of treatment and these unexpected but sweeping changes in other behaviors a “side-effect.” Rather, enhanced problem-solving in a wide range of health and life areas may be the effect, and success in solving the pre-identified “problem” just one component.

A special case of “side-effects” is mood enhancement. Although an improvement in mood state may be one of the motives for people to engage in self- or commercially-administered REST experiences, it has not been the major dependent variable in controlled research. Nevertheless, several researchers have noted spontaneous reports and/or incorporated self-ratings of mood in their measures. Leaving aside early studies in which anxiety was aroused by the pre-session procedures, the literature shows a consistent pattern of increases in positive affects (relaxation, sedation, euphoria, calmness, vigor, energy, pleasant memories) and decreases in negative ones (fatigue, anxiety, tension, depression, hostility, anger, and confusion, unpleasant memories). This pattern is found in chamber REST as well as in both “dry” and “wet” flotation; however, it seems most marked in the last of these (see, e.g., references under “General Relaxation,” above, and, *inter alia*, O’Leary and Heilbronner, 1985; Schulz and Kaspar, 1994; Rank and Suedfeld, 1978). Such positive changes are statistically significant not only within subjects (i.e., pre- to post-REST), but also as compared to untreated control groups, and even in comparison to an induced progressive muscle relaxation procedure (Barabasz *et al.*, 1993). Interestingly, neither cumulation nor habituation appears to occur even over a period as long as six months of weekly floating (Pudvah and Rzewnicki, 1990).

The pattern has been interpreted as showing a reduction in components of Type A personality, potentially another health-related application (Forgays and Forgays, 1994). The possible role of endogenous opioids may be indicated by a finding that an injection of naloxone (which blocks the production of opioids) eliminates the positive mood effects of flotation (Turner and Fine, 1990). Enhanced mood may play a role in the impact of REST on behavior change: i.e., it may contribute to a feeling of coping efficacy, self-esteem, and optimism, which in turn may facilitate desired habit modification. This hypothesis has not been tested. Interestingly, autobiographical memories experienced during flotation are also characterized by more positive emotional tone than those that arise in more standard environments (Suedfeld and Eich, 1996).

On the other hand, negative affect may arise out of specific mental activities during REST. Some participants who engage in serious self-searching may discover aspects of their behavior or personality that they find distressing; for example, subjects in smoking cessation studies have recognized self-destructive patterns in their past lives that led to some anguished reappraisals. This particular reaction may be therapeutically productive (Suedfeld, 1980).

## DIFFICULTIES IN THE APPLICATION OF REST

Difficulties in applying REST can be divided into those pertaining to the use of REST in general, and those specific to certain kinds of patients or to the chamber or flotation technique. In the former category are those based on a general aversion to using the technique, and others based on more practical details.

### *REST Aversion*

Most participants find REST to be in the tolerable to pleasant range: fewer than 10% quit even a 24-hour chamber session (Suedfeld, 1980), and in one of the few systematic assessments of a flotation session (Forgays and Belinson, 1986), 90% of the subjects said that it had gone very well and 83% reported pleasant aspects. The major complaints were not psychological: they referred to the salt solution, which stings if it gets into the eyes, or the quality of the air in the environment.

Notwithstanding the evidence, misconceptions, erroneous expectations, and fears that patients bring to treatment are serious difficulties. Fears of specific elements of REST (e.g., darkness, being enclosed, water, silence) can be discovered while a volunteer is being briefed prior to a session, and procedures can often be adjusted to accommodate these fears (e.g., by leaving the lights on when the participant first enters the environment and lowering them gradually as he or she indicates feeling comfortable about it). Unrealistic fears, such as that REST is dangerous or precipitates hallucinations or psychosis, are based on inaccurate information and must be handled with careful reassurance and factual clarification.

Deplorably, these misconceptions are often instilled in patients by misinformed health care providers who base their knowledge on older textbooks (see Suedfeld and Coren, 1989, for a review of textbook presentations of REST research over the years), representations in earlier popular media (Chayefsky, 1978), or polemical distortions (Shallice, 1972). When possible, efforts are made to remedy such erroneous ideas. In several studies using hospital populations, a thorough explanation given to physicians, nurses,

ward attendants, and other staff members concerning the rationale, procedure, and previous findings related to REST made it possible to proceed with the research in a supportive and understanding climate.

A number of REST researchers, and even reviewers who themselves have not used the technique, have expressed puzzlement as to why REST treatments have not been more widely adopted in spite of their demonstrated effectiveness, low cost, and absence of side effects. One answer has been that potential users are put off by the absence of one comprehensive theory that would explain the range of beneficial outcomes (Suedfeld, 1980). However, this rationale is less persuasive with the emergence of some general theories of REST effects (e.g., Budzynski, 1990; see also Raab and Gruzelier, 1994; Suedfeld *et al.*, 1994), to say nothing of the fact that other treatments – such as ECT – whose efficacy has been confirmed by solid empirical evidence are widely accepted and used, even though their theoretical foundations may be equally nebulous.

In the first years of the research, one could have argued that it was unclear as to whether REST as a treatment was confounded with expectancy (placebo) and other artifacts, or whether the procedures omitted crucial controls. It is now clear from a number of well-controlled studies that these criticisms are not well-founded. Although some of the data are still from case or pilot studies, especially in flotation REST, a significant body of clinical REST investigations showing positive results is well within the norms of scientific rigor and is being published in refereed journals.

It may be that REST shares the problem of many new treatment procedures, in that claims for its effectiveness seem too good to be true. It is well known that any novel approach tends to obtain good initial results, which encourage publication and publicity, but which may not be replicable. Proponents may then generalize beyond the data to unjustifiable claims (Gellert, 1994). Neither of these criticisms seems strongly appropriate to REST. The technique has a history of almost 50 years both in experimental and in clinical research, with no major shift in the clinical results; and, with very few exceptions, its scientists (as opposed to popularizers) have not “globalized” the intervention to areas where it has no empirical support. It is true, however, that even the scientific journal literature in the area sometimes draws perhaps excessively optimistic conclusions from pilot or case studies.

Whatever the cause, it is possible that the problem is diminishing. Recent psychology textbooks have begun to present a more up-to-date and accurate description of REST techniques and effects, with a majority of those texts that refer to REST at all mentioning its use in therapeutic contexts. The American Psychological Association has recently informed its insurance carrier that REST is considered a normal and acceptable intervention method, which will henceforth be included without additional cost in malpractice insurance for psychological health providers. Perhaps the real difficulty was in changing the assumptions of professionals who had imprinted on melodramatic stories about REST, and it will disappear as new generations of scientists and practitioners emerge (cf. Kuhn, 1970).

#### *Problems Related to the Procedure*

Often seen as a general obstacle to the utilization of REST is the amount of time that treatment takes: at least 90 minutes for flotation (including time for showering and changing clothes), and up to 24 hours for chamber REST. In both techniques, this requires not only the patient's time, but also the involvement of a monitor to oversee the entire

session. It has been demonstrated that additional time is also needed for debriefing after either kind of REST session (Suedfeld, 1980). In addition to any structured interview, patients need open-ended time to talk about their experience before leaving the setting. When chamber REST is used, accommodation must also be made for the nutritional and toileting needs of both the patient and the monitor overseeing the session. For extended chamber sessions, the bed and mattress must be carefully selected for comfort.

Difficulties specific to flotation REST concern the use of a supersaturated solution that must be maintained within a specific range of pH, specific gravity, and temperature. The enclosure or room containing the pool must be maintained at a specific humidity and temperature. Sterilization of the solution is a concern requiring constant attention as well as reassurance to the patients. In addition to bromine or chlorine, filtration systems are often equipped with ozone injectors and ultraviolet light purifiers. The saline solution also presents a problem to areas surrounding the pool. Wherever the solution drips, it dries and leaves caked salt, which can become corrosive to all but the most impervious of surfaces. The type of pool enclosure is an important consideration for a clinical population. R.A. Borrie has found that an open pool is more inviting to some participants than enclosed capsule-type tanks, and evokes fewer claims of claustrophobia.

#### *Problems Related to the Patient*

Contraindications based on patient characteristics are few and, for the most part, not very significant. This is because the environmental manipulation can be terminated immediately if a participant either expresses a desire to leave or gives any sign of stress. Negative emotional or physical signs almost without exception disappear within minutes of leaving either the chamber or the pool.

Exceptions to the above pattern are rare. When one is found, it is usually in a patient suffering from subclinical depression; apparently, such individuals use REST to ruminate on their already self-critical, sad, and otherwise negative thoughts. The opportunity to do so in an environment that aids introspection and reduces distractions occasionally leads to an increase in uncomfortable thoughts about the self or unpleasant memories. When the patient leaves the REST situation, it may take a few hours or (very rarely) a few days before equanimity is fully restored (see also Suedfeld, 1980).

Some conditions should disqualify a potential patient. Among these are infectious diseases. Although there is no record of any infection being passed through the flotation medium, nor through properly laundered bedding in chamber REST, most facilities prefer to play it safe.

Another disqualifier is the arrival of the patient under the influence of alcohol or other psychoactive chemicals, as the interaction between REST and these agents is not well understood. An exception may be made here when REST is used specifically to counteract a drug-induced manic state, in which case appropriate precautions must be taken. Patients with open skin lesions, hemorrhoids, severe rashes, or vaginal irritation should be turned away from flotation because the Epsom salts solution can cause them severe pain.

Surprisingly, subjects with claustrophobia sometimes do volunteer for REST. In some instances, they are unaware of their problem (in which case they will most likely decline to enter the environment when the session is scheduled to begin, or leave very quickly), while in others their condition is not severe. In the latter situation, we have sometimes allowed them to proceed, at first perhaps with a dim light on and the door or hatch slightly open. Some claustrophobic participants become comfortable in the environment and

agree to full REST conditions. One reason for this adaptation is that, according to them, the absolute darkness and the consequent inability to see the walls and ceiling lead them to forget how small the enclosed space is.

Patients who suffer from relaxation-induced anxiety (Heide and Borkovec, 1984) need special attention if they are to benefit from REST. Persons with this paradoxical condition will experience heightened anxiety from the induction of relaxation by any means. For REST, in particular flotation, to be useful with these people, other issues, e.g., loss of control, must first be addressed in counseling.

Some people may have difficulty in finding a comfortable and painless posture for floating in the supersaturated solution. Adjustments can be made by suggesting changes, e.g., in the position of the hands, or by providing buoyancy devices such as inflated cushions under various parts of the body. The patient can then experiment until he or she finds an optimal configuration. In this way, comfort can be achieved for almost all patients.

## CONCLUSION

Although a number of previous reviewers have argued that the evidence favors REST as a treatment modality that deserves further exploration and application, only one has used a statistical rather than a conceptual approach to assessing its results. Because of the wide variety of applications, techniques, and measures, and the number of case reports, the picture of current knowledge is somewhat uneven and complex. However, Kendall (1994) has presented the first meta-analysis of the findings. The analysis included 19 studies, which used wet flotation and/or chamber REST, alone or in combination with other techniques, to induce relaxation and/or to treat smoking, obesity, alcohol intake, or chronic pain. The statistic of interest,  $d$ , is a measure of the size of the treatment effect, with  $d=0.5$  being considered a moderate effect and  $d=0.8$  a large effect.

Kendall found that overall, 19 chamber REST studies had  $d=0.53$  and 6 flotation studies showed  $d=0.33$ . Comparing REST (either type) only conditions with those using REST plus another treatment modality and those using the other method only, Kendall reported  $d$ 's of 0.45, 0.51, and 0.25, respectively. Thus, REST alone and REST in combination were almost equally effective, and about twice as effective as the other treatment alone.  $d$ 's for smoking, chronic pain, relaxation, and obesity (the last of these were REST combinations) were, respectively, 0.51, 0.61, 0.41, and 0.82, all at least of moderate size. At least some of these effect sizes would have been larger had the review omitted studies that used extremely long treatment sessions, did not adequately prepare the participants for the session, or used homogeneous rather than reduced stimulation (on the last point, see also Suedfeld, 1980).

Kendall also analyzed the data to estimate the "file drawer" problem – i.e., the hypothetical number of unpublished or overlooked studies with negative results that would have to exist in order for the overall effect size to become insignificant. Because almost half of the studies included in the meta-analysis were conducted by Peter Suedfeld and his research team, Kendall used this subgroup of studies for the assessment, and calculated that there would have had to be an improbably high number of such null-result studies (41 using REST alone, or 36 using a treatment combination including REST) to invalidate the outcome of the original meta-analysis.

The interplay of basic research, clinical research, and health application demonstrated in the chamber REST literature is a very useful as well as persuasive model. Clinical

applications are based on reasonable theoretical grounds and solid experimental data; and, in turn, the understanding of how basic psychological processes are affected by stimulus reduction is advanced by seeing the implications of these effects in long-term, personally relevant, changes in behavior.

Flotation REST has the potential of contributing significantly to a range of other health interventions, mostly those based on deep relaxation as a treatment component. Its relaxing and mood-enhancing effects are more profound than those of most known techniques, and can be attained easily, cheaply, precisely, and in almost all patients. Although the number of controlled studies is increasing, many of the health-related applications still remain in the realm of case studies or pilot research. Such studies have reported other successful applications – to movement disorders, hypertension, insomnia, chronic pain, and gastrointestinal symptoms. These results seem quite promising, but further validation using sizable samples, standardized subject selection, random assignment to treatments, and appropriate control conditions, is clearly needed. Such research should also elucidate the preferability of flotation or chamber REST for particular patient populations and interventions.

There must also be a more adequate evaluation of optimal combinations of either chamber or flotation REST with other behavioral health techniques such as biofeedback, relaxation training, meditation, and hypnosis. Within the broad categories identified in this paper, there are many as-yet unexplored treatment contexts where such combinations are likely to have synergistic effects.

In sum, further basic and clinical research is required to confirm many of the observed benefits of chamber and flotation REST as effective treatments in psychotherapy and behavioral medicine, and also to provide a fuller understanding of REST's potentially broad clinical uses. Other applications that lie beyond the scope of this paper, such as the use of the technique to increase creativity and to enhance performance, should be further investigated as well.<sup>1</sup> An intervention method that many clinicians have not yet encountered, REST is a novel (and cost-effective) approach that merits consideration in the treatment of a variety of problems.

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<sup>1</sup> A number of studies have used flotation REST to enhance various kinds of performance. A review of this literature is not appropriate here; in summary, improvement as a consequence of flotation REST has been shown in the performance of novice, recreational, and expert competitors in a variety of sports ranging from dart-throwing to varsity basketball, as well as that of musical instrumentalists (see, e.g., Barabasz and Barabasz, 1996).

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