

WATER IMMERSION AND FLOTATION: FROM STRESS EXPERIMENT TO STRESS TREATMENT*

PETER SUEDFELD, ELIZABETH J. BALLARD AND MARGAUX MURPHY
University of British Columbia

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.

Introduction

Sensory deprivation research, one of the first systematic laboratory explorations of environmental psychology, began in the late 1950s as an attempt to elucidate the effects of monotonous or reduced environmental stimulation on a range of psychophysiological, motoric, perceptual, cognitive, emotional, attitudinal, and other measures (Zubek, 1969). The two major methodological variants of what is now commonly called the restricted environmental stimulation technique (REST) involved confinement to a bed within a room that provided either monotonous stimulation (white noise, diffuse light) or reduced stimulation (darkness and silence), and immersion in a tank of water, with air provided through a breathing tube and with vision and audition being occluded through various procedures (Solomon *et al.*, 1961; Zubek, 1969). Recent research, with increased safeguards against expectancy and other artifacts, has shown that REST is neither generally aversive nor generally damaging to psychological functioning (Suedfeld, 1980). In fact, within the past few years the dark, silent chamber procedure has been used to bring about health-promoting habit change and more effective stress management in such areas as smoking cessation, weight loss, and the treatment of hypertension (Suedfeld and Kristeller, 1982).

In contrast, water immersion REST for a long time retained its image as the most stressful of the procedures. Reviews (e.g. Zuckerman, 1969) indicated that immersed subjects soon experienced altered states of consciousness, hallucinations, interference with thinking and concentration, sexual and aggressive fantasies, and severe 'stimulus-action hunger' (Lilly, 1956). Because of the negative image of the technique and because of the elaborate equipment required, the total number of experiments remained well under 20. Not only is this number insufficient to provide replications and parametric studies, but experimentation with water immersion never escaped

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such procedural shortcomings as the use of small groups of self-selected and non-representative subjects, a lack of control treatments, and the presence of experimental artifacts. Table 1(a) clearly shows several of these flaws.

Actually, the data indicate that the general impression of universally severe negative reactions is misleading. This impression was primarily based on self-reports; objective measures frequently found no deterioration in performance or even any great aversion to the situation (Table 2). But primacy and contrast effects enhanced the impact of the anecdotal material: it figured prominently in the earliest reports, and attracted attention because of its dramatic quality. Thus, secondary sources and popular media emphasized the supposedly damaging and bizarre consequences of the experience (see Suedfeld, 1980).

Although the originators of the water REST technique made a point of recognizing its positive effects and of warning others against the possible biases induced by negative set (Lilly, 1956; Shurley, 1960, 1966), the widely disseminated anecdotal reports probably led to self-fulfilling prophecies of aversive reactions among some experimenters and research participants. Two other factors probably magnified the stress experienced by subjects in this procedure. One was the use of indefinite durations, abandoned by chamber REST researchers quite early in the history of the field. When a subject is told to stay in the tank as long as possible, the lack of structure increases anxiety and the procedure almost by definition guarantees that participants will emerge when they are feeling extremely uncomfortable, bored, or frightened (cf. Cambareri, 1959; Francis, 1964). The second factor was that in total immersion such problems as 'fear of losing one's air supply [and] sensitization to the mask or the sound of one's breathing' (Zuckerman, 1969, p. 49), and dependence on the apparatus and the monitor, all of which are unrelated to stimulus restriction *per se*, served as artifactual augmentors of stress. Shurley (1966) showed that only 20% of subjects remained in such submersion for 6 h, and none for as long as 8 h. In contrast, floating with the face out of the water led to 71% of the subjects remaining in the tank for 6 h and 57% for 8–12 h. This study, in fact, was a precursor of the flotation tank REST method which shall be discussed next.

The past five years have seen a reversal of the negative image of water REST, the rise of a new psychology-based commercial industry, and a spurt of research. One impetus was a book (Lilly, 1977) which described an innovative flotation procedure. The popular movie 'Altered States' (Melnick, 1980) then disseminated a highly dramatized version of this procedure to the public. In the new technique, a substantial amount of Epsom salts is added to the water, increasing its density. The face and portions of the ventral surface of the body are above the water when the subject is floating, with the result that breathing is normal. Sessions usually last for 1–2 h, and the laboratory atmosphere is replaced by soft lights, pleasant pictures, carpeted floors, etc. These developments occurred, perhaps fortuitously, at a time when relatively unusual approaches to the exploration of one's own psyche, including mood-altering drugs, meditation, yoga, biofeedback, etc. suddenly became not only acceptable but extremely popular. A major bestseller describing the proliferation of such techniques in North America (Smith, 1975) included a chapter on sensory restriction, emphasizing the work of Lilly.

The result has been a rapidly growing use of flotation tanks, which are sold for \$2000–5000. In most major cities, flotation time is available for \$15–25 h. During the past two years, articles have appeared in many newspapers and magazines

TABLE 1
Water REST experiments: design and procedure

| Reference | Sample | N | Projected duration | Control/comparison environment |
|------------------|---|---------------|--------------------------|--------------------------------|
| <i>Immersion</i> | | | | |
| (a) | Male USAF pilots | 10 | 10 h | None |
| (i) | Barnard <i>et al.</i> , 1962 | 20 | Indefinite | None |
| (ii) | Cambareti, 1959 | 10 | Indefinite | Quiet room (own controls) |
| (iii) | Forgays and McClure, 1974 | 24 | Indefinite or 3 h | None |
| (iv) | Unpaid volunteers | 8 | 2 hr | Normal room |
| (v) | University students | 24 | 6 h | Chamber REST (own controls) |
| (vi) | Goldberg, 1961 | 2 | Repeated, each up to 3 h | None |
| (vii) | Levin, 1974 | Not reported | Indefinite | None |
| (viii) | Lilly, 1956 | | | |
| | Lilly and Shurley, 1961 | | | |
| (ix) | Marum, 1968 | 12 | Not reported | None |
| (x) | McClure and Forgays, 1975 | 24 | 24 h | None |
| (xi) | Schaefer, 1964 | 19 | Repeated, indefinite | None |
| (xii) | Shurley, 1962b | 11 | As long as possible | None |
| (xiii) | Shurley, 1966 | 17 | As long as possible | Flotation |
| <i>Flotation</i> | | | | |
| (b) | Hospital outpatients | 40-45 | M = 3 sessions at 30 min | None |
| (xiv) | Belden and Jacobs (Reference note 1) | 20 | Indefinite | None |
| (xv) | Bliss and Clark, 1962 | 3 | 20 at 1 h | None |
| (xvi) | Fine and Turner, 1982 | 39 | Up to 12 at up to 3 h | None |
| (xvii) | Hunt, 1980 | 14 | 10 at 45 min | Bedroom |
| (xviii) | Jacobs <i>et al.</i> (Reference note 2) | | | |
| (xix) | Kammerman, 1977 | 20 | 30 min, then 2 at 90 min | None |
| (xx) | Lilly, 1977 | 77 (reported) | Variable | None |
| (xxi) | Pishkin and Shurley, 1969 | 108 | 30, 60 or 120 min | Lab. room or tank area |
| (xxii) | Serafetimides <i>et al.</i> , 1973 | 16 | 4 h | Bed rest (own controls) |
| (xxiii) | Shurley, 1966* | 27 | 60 min | Expecting to float |
| (xxiv) | Stern (Reference note 3) | 40 | 9 at 70 min | Quiet, dim room |
| (xxv) | Taylor (Reference note 4) | 35 | Up to 40 min | None |
| (xxvi) | Turner (Reference note 5) | 6 | 4 at 40 min | Quiet, dim room |
| (xxvii) | Turner and Fine (Reference note 6) | 16 | Indefinite | None |
| (xxviii) | Walters <i>et al.</i> , 1962 | 20 | 3 h | None |
| (xxix) | Walters <i>et al.</i> , 1964 | | | |
| | Medical students | | | |
| | Medical Centre staff and acquaintances | | | |

* See Table 1(a), no. xiii.

TABLE 2
Water REST experiments: results*

| | Objective measures | Structured self report | Anecdotal |
|--|---|---|---|
| Stress/arousal (Psychological and psychophysiological) | Increase iii, vi, xxii; decrease i, xvi, xxiv, xxvi, xxvii High then decreasing xxii; no sex differences vi, x; Introspective/copying skills associated with better adaptation v; suggestible Ss lower ii; geometry training leads to lower stress xi | Increased happiness, decreased negative feelings xiv, xxvi; relaxation xiv, xviii, xxiv | High i; low iv; curvilinear vii; bodily discomfort i; stimulus-action hunger i, vii, xii, xv, xx |
| REST tolerance | Control > experimental iii, xiii; knowing duration and time cues increases tolerance iv; no sex differences iv; no differences for experienced divers iv | | |
| Cognition | No significant effects on various tests i, v. Improved learning, especially difficult material xxv; interaction with problem complexity on concept identification xxi No perceptual distortions xi | Males have more stimulus-bound thought xxviii, xxix | Decreased concentration i. |
| Imagery and perception | | Minority of Ss, or no hallucinations vi, xi; suggestible Ss have more imagery ii | All or many Ss i, xii, xv; altered orientation xviii |
| Time estimation | Overestimate iii; no effect ix, x; curvilinear i; underestimate xii, xxi; no sex differences iii, vi, x | | |
| Other | Increases in ego strength, other positive MMPI changes xix | | |

* Numerals identify references in Table 1.

(Reference note 2). Radio and television stations have also reported on the phenomenon. These treatments are positive in tone, with many first-person reports of journalists who had gone through the tank experience.

Systematic work on flotation is still low in quantity and plagued by methodological shortcomings [Table 1(b)]. The most famous report (Lilly, 1977) reproduces parts of 77 statements from participants in a consciousness and awareness workshop of which the tank was a crucial part. At least a third of these people were clearly familiar with various forms of self-exploration (meditation, yoga, Tai Chi, etc.). Given the problems of expectancy, a non-representative sample, lack of statistically testable data, and double selectivity (first by the floater in choosing what to report, and then by the author in choosing what parts of which reports to reproduce), the credibility of this material depends on how willing the reader is to suspend the usual criteria of rigor. Other literature indicates that both psychological and physiological measures show lower arousal and stress after flotation, with reports of self-insight, cognitive mastery, and serenity (Table 2).

Given the proliferation of tank facilities and the participation of thousands of essentially unscreened clients, it seems advisable to evaluate the popular use of water REST systematically. Recent REST work has drawn participants from selected populations, with the explicit rationale of developing basic research data or treatments for such problems as smoking, high blood pressure, or stress-related symptoms. The expectancies communicated by prestigious institutions and staff, the high educational level of most subjects, and the scientific procedures used, make results from the research setting ungeneralizable to the possible experiences of paying customers. The point of the current study was to begin assessing flotation effects under the circumstances that at this time characterize the majority of sessions, where the participants do not belong to a homogeneous category and the experience is not part of a goal-oriented treatment or research program.

Method

Subjects

Subjects for this study were recruited through Inner Worques, a commercial tank facility in Vancouver, B.C., Canada. Over a period of approximately two months, customers were asked to provide demographic information and data concerning previous as well as the current tank experience, and to fill out a number of scales. As compensation, \$10 of the \$25 fee was remitted.

Although some customers were not approached because the employee on duty at the time forgot to do so, none who was approached refused to participate. The final sample consisted of 12 female and 15 male customers, aged from 21 to 56 years of age; 15 were experiencing their first flotation in a tank while the others had had between one and four previous floats.

Procedure

The usual procedure in this facility consists of an orientation to the tank environment. The customer then takes a shampoo and shower and enters one of three tanks located in a dimly lit quiet room. Each tank is approximately 4 ft × 8 ft, with a 10 inch deep solution of Epsom salts in 93–94°F water. Entry and exit times are staggered

so that participants do not see each other immediately before or after a session. The cover of the tank opens easily from both the inside and the outside. With the cover closed, the inside of the tank is completely dark.

The participant uses plastic plugs to keep the ears free of the solution. Most people float either with their arms at their sides or with their hands linked behind the head; in either case, the solution is buoyant enough that the face is completely out of the water at all times. After 55 min, music is played to inform the customer that time is almost up. A staff member knocks on the tank to indicate the end of the session. The customer then leaves the tank, takes another shower and shampoo, and gets dressed.

With the participants of our study, all of whom completed the planned 1 h session without trouble, the administration of measures before and after the tank session was an additional procedure.

Measures

Of our five tests, two measured potentially relevant individual characteristics and the other three were concerned with the effects of the tank experience.

(1) Arousal Seeking Tendency (Mehrabian and Russell, 1974a). This measure of what might be called trait arousal seeking was administered before the float, and the responses were compared with those of the standardization group.

(2) The Body Consciousness Scale (Miller *et al.*, 1981) consists of three subscales: private body consciousness (a tendency to focus on internal sensations), public body consciousness (a tendency to be concerned with physical appearance), and body competence (feeling positive about one's physical abilities). The measure was administered after the session.

(3) The Subjective Stress Scale (Berkun *et al.*, 1962) was administered before and after floating. This measure presents adjectives and adjectival phrases, of which the respondent chooses the one that best describes his or her emotions at a specified time. In our case, these choices were made for just before floating, during the float, and after emerging from the tank (the latter two being completed after the session).

(4) The Russell Mood Scale (Person) (Mehrabian and Russell, 1974b), administered after the float, provides 30 adjectives related to level of energy and subjective arousal. These are rated on a 1 (not at all) to 5 (very much) scale, the respondent ascribing a rating to each of the adjectives.

(5) The Russell Mood Scale (Place) (Russell and Pratt, 1980) has four subscales, with the respondent rating a particular environment on each of these four. The anchor points of the subscales are: arousing-sleepy, exciting-gloomy, pleasant-unpleasant, and distressing-relaxing. The instructions were to rate the tank environment on these bipolar dimensions.

Results

The results will be presented in the same order as the description of the tests, above.

(1) On Arousal Seeking Tendency, floaters scored higher than the standardization mean, 54 vs. 39, $\chi^2(1) = 9.85$, $P < 0.005$. Differences as a function of gender and flotation experience were not significant.

(2) Floaters were higher than the standardization group on private body consciousness ($M = 17$ vs. 12, $\chi^2(1) = 26$, $P < 0.005$) and body competence ($M = 14$ vs. 10,

$x^2(1) = 20$, $P < 0.005$), and approximately the same on public body consciousness ($M = 16$). Intergroup differences within our sample were not significant.

(3) There was a significant reduction in Subjective Stress: before $M = 33$, during $M = 22$, after $M = 14$. These mean ratings were closest to the scale items, 'Doesn't Bother Me', 'Steady', and 'Fine', respectively. The level of stress after the float was significantly lower than before, $t(24) = 3.08$, $P < 0.005$. There were no significant subgroup differences within our sample.

(4) The most common feelings after the session were being 'calm', 'still', 'at rest', 'alert', and 'acquiescent'. 'Elated', 'full of pep', 'energetic', and 'active' were in the middle range. The least commonly reported items were 'stirred-up', 'sluggish', 'harried', 'jittery', and 'clutched-up'. Subgroup differences were not significant.

(5) Mean ratings of the tank were closer than the standardization mean to 'sleepy' (0.95 vs. 5.0, $x^2(1) = 3$, $P < 0.10$), 'excited' (13 vs. 5.8, $x^2(1) = 6.26$, $P < 0.025$), 'pleasant' (20.6 vs. 9.9, NS), and 'relaxed' (with reverse scoring, -24.1 vs. -4.5 , $x^2(1) = 6.26$, $P < 0.005$). Again, the subscales did not differentiate male from female nor experienced from novice floaters.

Discussion

Our data clearly show that an hour of flotation was a generally relaxing and pleasant experience for these customers of a commercial tank facility. This finding reinforces earlier reports that the experience is non-stressful and enjoyable, extending such reports from the previously used samples of facilities (clinical, educational and research institutions and established centers of transpersonal psychology) to a standard urban business operation.

One interesting aspect of our findings is the distinction between arousal and excitement on the Russell Mood Scale. It appears that tank participants were more excited, but less aroused, than the standardization group. Whether this is because of the implications of the other end of the two bipolar dimensions (sleepy versus gloomy, respectively), or whether some other fine distinction is involved, the point seems to be worth pursuing.

The data also show what may be personality differences between floaters and the general population. Participants are more aware of internal sensations, more positive toward their own body, and more oriented toward seeking arousal-increasing experiences. All of these characteristics seem intuitively compatible with engaging in the flotation experience.

A previous paper (Suedfeld and Kristeller, 1982) identified the initiation of long-term change in health-related lifestyle patterns and the improvement of stress management as the major potential applications of REST to health psychology. If rigorous research indicates that flotation REST is effective in these contexts, the relatively short time periods used and the emotionally positive concomitants of the experience may make it a viable alternative to the chamber environment. The emphasis of health psychologists is on self-management and self-regulation strategies (Weiss, 1982); the use of commercial tank facilities to attain relaxation, calmness and pleasure (as found in this study) and by extension, perhaps the reduction of stress from stimulus overload and other causes (Suedfeld and Kristeller, 1982; Reference notes 2 and 6), certainly fits well into this ethos.

The appropriate place of commercial tank manufacturers and facilities must be

considered. The over-selling of tanks is an undesirable development. One obvious problem is that tanks may be publicized as a panacea, only to be excessively devalued when it turns out that their efficacy is restricted. Another is that for reasons of time pressure, financial need, ignorance or carelessness, appropriate safeguards and procedures (full orientation, the availability of a monitor, the carrying out of disinfection and other sanitation procedures) may be neglected, with possible psychological or physical harm to participants. A recent conference (Reference note 7), which brought together researchers, therapists, tank manufacturers and commercial operators, took the first steps towards developing criteria of ethics and safety.

Reference Notes

1. Belden, A. and Jacobs, G. (1983). *REST in a Hospital-based Stress Management Program*. Paper presented at the First International Conference on REST and Self-Regulation, Denver, March 1983.
2. Jacobs, G. D., Heilbronner, R. L. and Stanley, J. M. (1981). *The Effects of Restricted Environmental Stimulation Technique (REST) on Relaxation*. Unpublished manuscript, St Elizabeth Hospital-Lawrence University, Appleton, WI, 1981.
3. Stern, G. (1980). *Physiological and Mood Effects of Salt Water Flotation*. Denver, CO: Float To Relax.
4. Taylor, T. (1983). *Learning Studies for Higher Cognitive Levels in a Short-term Sensory Isolation Environment*. Paper presented at the First International Conference on REST and Self-Regulation, Denver, March 1983.
5. Turner, J. W. Jr (1981). Personal Communication.
6. Turner, J. W. Jr and Fine, T. H. (1982). *Use of the Restricted Environmental Stimulation Technique (REST) for Induction of Relaxation: Effects on Plasma Cortisol, ACTH, L.H.* Paper presented at the meeting of the Society of Behavioral Medicine, Chicago, March 1982.
7. Fine, T. H., Stanley, J. M. and Johnson, K. (Chmn) (1983). First International Conference on REST and Self-Regulation. Denver, CO: 17-19 March 1983.

References

- Barnard, C. W., Wolff, H. D. and Graveline, D. E. (1962). Sensory deprivation under null gravity conditions. *American Journal of Psychiatry*, **118**, 921-5.
- Berkun, M. M., Bialek, H. M., Kern, R. P. and Yagi, K. (1962). Experimental studies of psychological stress in man. *Psychological Monographs* **76**, No. 15 (Whole No. 534).
- Cambareri, J. D. (1959). *The effects of sensory isolation on suggestible and non-suggestible psychology graduate students*. Doctoral dissertation, University of Utah. *Dissertation Abstracts*, **19**, 1813.
- Fine, T. H. and Turner, J. W. Jr (1982). The effects of brief restricted environmental stimulation therapy in the treatment of essential hypertension. *Behaviour Research and Therapy*, **20**, 567-70.
- Forgays, D. G. and McClure, G. N. (1974). A direct comparison of the effects of the quiet room and water immersion isolation techniques. *Psychophysiology*, **11**, 346-9.
- Francis, R. D. (1964). The effect of prior instructions and time knowledge on the toleration of sensory isolation. *Journal of Nervous and Mental Disease*, **139**, 182-5.
- Goldberg, I. (1961). The effects of sensory deprivation on intellectual efficiency as a function of personality. *Dissertation Abstracts*, **21**, 2797.
- Goldberger, L. and Holt, R. R. (1961). Experimental interference with reality contact: Individual differences. In P. Solomon *et al.* (eds), *Sensory Deprivation*. Cambridge, MA: Harvard.
- Hunt, R. A. III. (1980). Naming an unknown world: The transformation of perceived meaning by voluntary subjects after repeated use of the 'isolation tank' flotation environment. Unpublished Ed.D. dissertation, Boston University.
- Kammerman, M. (1977). Water suspension isolation and the induction of ego diffusion. In M. Kammerman (ed.), *Sensory Isolation and Personality Change*. Springfield, IL: Thomas.

- Levin, J. (1974). Arousal and hallucinatory activity under two isolation conditions. *Perceptual and Motor Skills*, **39**, 443-50.
- Lilly, J. C. (1956). Mental effects of reduction of ordinary levels of physical stimuli on intact, healthy persons. *Psychiatric Research Reports*, **5**, 1-9.
- Lilly, J. C. (1977). *The Deep Self*. New York: Simon & Schuster.
- McClure, G. and Forgy, D. G. (1975). Human sex differences in extreme isolation. *Perceptual and Motor Skills*, **40**, 387-91.
- Mehrabian, A. and Russell, J. A. (1974a). *An Approach to Environmental Psychology*. Cambridge, MA: MIT.
- Mehrabian, A. and Russell, J. A. (1974b). The basic emotional impact of environments. *Perceptual and Motor Skills*, **38**, 283-301 (Monogr. Supp. 1-V38).
- Melnick, D. (Exec. Prod.) (1980). *Altered States*. Hollywood: Warner (Film).
- Miller, L. C., Murphy, R. and Buss, A. H. (1981). Consciousness of body: private and public. *Journal of Personality and Social Psychology*, **41**, 397-406.
- Pishkin, V. and Shurley, J. T. (1969). Hydro-hypodynamic sensory isolation effects on concept identification. *Journal of Experimental Psychology*, **82**, 198-204.
- Russell, J. A. and Pratt, G. (1980). A description of the affective quality attributed to environments. *Journal of Personality and Social Psychology*, **38**, 311-22.
- Schaefer, K. E. (1964). Counteracting effects of training in geometrical construction on stress produced by maximal sensory isolation in water immersion. *Aerospace Medicine*, **35**, 279 (Abstr.).
- Serafetinides, E. A., Shurley, J. T., Brooks, R. and Gideon, W. P. (1973). Sensory versus perceptual isolation: a comparison of their electrophysiological effects. *Aerospace Medicine*, **44**, 539-41.
- Shurley, J. T. (1960). Profound experimental sensory isolation. *American Journal of Psychiatry*, **117**, 539-45.
- Shurley, J. T. (1962a). Problems and methods in experimental sensory input alteration and variance. In T. T. Tourlentes (ed.), *Research Approaches to Psychiatric Problems*. New York: Grune and Stratton.
- Shurley, J. T. (1962b). Mental imagery in profound experimental sensory isolation. In J. L. West (ed.), *Hallucinations*. New York: Grune & Stratton.
- Shurley, J. T. (1963). The hydro-hypodynamic environment. *Proceedings of the Third World Congress of Psychiatry, Vol. 3*. Toronto: University of Toronto.
- Shurley, J. T. (1966). Stress and adaptation as related to sensory/perceptual isolation research. *Military Medicine*, **131**, 254-8.
- Shurley, J. T. (1968). Reduced sensory input states: sensory and perceptual deprivation and isolation. In M. McCally (ed.), *Hypodynamics and Hypogravics: The Physiology of Inactivity and Weightlessness*. New York: Academic Press.
- Smith, A. (1975). *Powers of Mind*. New York: Random House.
- Solomon, P. et al. (eds), *Sensory Deprivation*. Cambridge, MA: Harvard.
- Suedfeld, P. (1980). *Restricted Environmental Stimulation: Research and Clinical Applications*. New York: Wiley.
- Suedfeld, P. and Kristeller, J. L. (1982). Stimulus reduction as a technique in health psychology. *Health Psychology*, **1**, 337-57.
- Walters, C., Parsons, O. A. and Shurley, J. T. (1964). Male-female differences in underwater sensory isolation. *British Journal of Psychiatry*, **110**, 290-5.
- Walters, C., Shurley, J. T. and Parsons, O. A. (1962). Differences in male and female responses to underwater sensory deprivation: An exploratory study. *Journal of Nervous and Mental Disease*, **135**, 302-10.
- Weiss, S. M. (1982). Health psychology: The time is now. *Health Psychology*, **1**, 81-91.
- Zubek, J. P. (ed) (1969). *Sensory Deprivation: Fifteen Years of Research*. New York: Appleton-Century-Crofts.
- Zuckerman, M. (1969). Variables affecting deprivation results. In J.P. Zubek (ed.), *Sensory Deprivation: Fifteen Years of Research*. New York: Appleton-Century-Crofts.

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