

Sensory Deprivation

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Sensory deprivation has recently been integrated into the clinical setting after several decades of groundbreaking research. This emerging field has been successfully implemented as a means of treatment for various ailments ranging from drug addiction to neurological disorders. The fact that our senses have been targeted in therapies exemplifies their critical role in several domains of our psychological development. It is becoming clear that our senses are paramount in our brain's ability to regulate internal states; mental health entails balance on myriad levels. Is there any area of our brain that contributes to our mental health more than others? Some scientists would argue that the primary *motor* cortex plays a critical role in our ability to empathize and subsequently bond with other human beings; social relations are a critical higher-order process within the complex constitution of our mental health. Yet it is our senses that have come to be manipulated as an effective mode of therapy to treat psychological issues; why has the primary *somatosensory* cortex been targeted over the primary motor cortex? A multitude of sensory deprivation techniques have emerged over the years with much success, but no technique has gained more ground than a technique that goes by the name REST or Restricted Environmental Stimulation Therapy; this mode of therapy has been shown to have positive emotional, cognitive, and neuropsychological effects in several studies. Although the localization of particular brain areas which are implicated in mental health remains daunting, research of our senses has proven fruitful. Through the implementation of sensory deprivation therapies we have come to appreciate the power of increased volition of one's body and its effect on both perceived and realized health.

Sensory deprivation research –starting in the 1950s- cultivated several areas in the fields of physiology and psychology suitably bettering our understanding of particular areas of the brain and their roles in the constitution of mental health. In the relatively brief amount of time that this area has been studied, much has been learned in what constitutes effective mental therapy. Surprisingly, the impetus for the research in sensory deprivation was not an investigation of its potential therapeutic value but more of how it could come to be used as a tactical device in war. In Peter Suedfeld's *Restricted Environmental Stimulation: Research and Clinical Applications* he states the origins of sensory deprivation research. “The immediate stimulus for the research [of sensory deprivation] was an interest in Russian and Chinese ‘brainwashing’” (Suedfeld 5). Interest in the field aggrandized shortly after WWII and peaked in the 1980s. Sensory

deprivation's clear significance in mental processes is what made for its eclectic application in various experiments, ranging from cognitive tests to memory tasks. It wasn't long before researchers amassed their data, and ideas of therapeutic applications were proposed. A symposium was held in Harvard in the late 1960s in which dozens of medical doctors, health professionals, and researchers talked in depth about the dynamics of the field (Heron 6). Many a research came to similar conclusions. Woodburn Heron and D. O. Hebb in *Sensory Deprivation: A Symposium Held at Harvard Medical School* stated that, "As a result of [sensory] isolation, the activity of receptors is reduced and...the sensory system might become 'sensitized'" (Heron 7). Here *sensitized* means a lower threshold for given stimulus to cause a given response; our senses could be said to be heightened when stimulation is reduced. What was important about their findings was that a concept of "stimulus-hunger" was emerging. Further, researchers were beginning to link particular areas of the brain –such as our primary somatosensory cortex- to mental health. These immature stages of research paved the way for future studies in other areas of our brains and consequently bettered our understanding of our senses' role in our psychological development.

When one discerns how sensory deprivation comes to be used as a form of therapy, one must investigate the role our senses play in the comprehensive makeup of our mental development: factors such as perception and subjectivity need to be taken into account. From a physical/physiological point of view, to *sense* is to be able to receive and process stimuli (perceive) with our sense organs and central nervous system respectively (Holle 63). The latter process is by far the more complex of the two and is what makes for the adaptability of our central nervous system. Britta Holle in *Motor Development in Children Normal and Retarded* states that, "To perceive is therefore a widely embracing process which requires a corresponding development of the central nervous system" (Holle 63). Our brains develop dynamically; our biological machinery must correspondingly change with the sensory stimuli in order to make it manageable within the person/organism's psychological framework. Perception is the outcome of our brain's analysis of a given set of stimuli. The subjective nature of perception needs to be deduced in order to fully fathom the totality of mental health, for mental health is a subjectively experience entity. Bender, the scientist who Barbara Chutroo bases her argument on, says that our gestalt/our complete subjective experience is the product of our senses' role in our environment. "The senses guide our interplay within the gestalt" (Chutroo 410). Our somatosensory system –the bastion of our sensory stimuli- can be

looked at as a mediator between reality and our interpretation of it; it receives the full analysis of stimuli from every stimuli-receiving-region of our brains and beautifully amalgamates them into one cohesive state. When our brains lose their ability to properly receive, sort, and reproduce the surplus of stimuli in our environment then this mental cohesion is dissolved and mental disease realizes. By depriving our brains of environmental stimulation, our perception changes accordingly. The downstream effects of this modulation on our subjective experience of mental health can now be better understood within the context of our senses.

Perception of satisfaction is influenced by large-scale sociocultural and socioeconomic factors which shape higher-order drives as well as our overall sense of well being; sensory deprivation may reduce activity in an area of our brain implicated with these such things. Henry P.H. Chow in “Predicting Academic Success and Psychological Wellness in a Sample of Canadian Undergraduate Students” purports that, “There is empirical research suggesting that it is often the individual’s perceived satisfaction, rather than the absolute number of instrumental and emotional supports available, that affect psychological outcomes” (Chow 484). Dr. Chow would argue that it is the retention of quality, not quantity, of higher-order-drives which make us feel a sense of wellbeing. Such factors as goal-oriented motivation, pursuit of knowledge, and positive body perception are imperative to a proverbial *sound* mental constitution in creatures as complex as ourselves. However these processes are fabricated progressively throughout one’s life. Barbara Chutroo in “The Drive to be Whole: A Developmental Model Inspired by Paul Schilder and Laurretta Bender in Support of Holistic Treatment Strategies” states that, “Sensory input enables the progressive assemblage of the body/personality” (Chutroo410). In this quote Chutroo expresses her belief in a scientist named Dr. Schilder, who believes life and personality are one single entity. Being that our personality lies in the same area as higher order thoughts/drives (our prefrontal cortex), it makes intuitive sense that the two interact and grow in tandem throughout one’s life. One should note that this piecewise assembly of the mind is a delicate process; when one or more of these complex domains is decremented in some way, our entire mental stability may go askew. Chutroo and Chow’s research, amongst others, suggests that the makeup of our mental health is determined by a complex set of factors, many of which are embedded in higher order cognitive processes which must be properly cultivated throughout one’s lifetime. Sensory deprivation therapies may make for a more robust mind by potentially putting higher-order thought processes on hold; this in turn

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gives the mind respite.

With the plethora of complex processes and domains that reside in our minds, emotion and social aspects appear to pervade all of them; such entities' positions within our minds must be understood in order to fully grasp the complexity of mental health. Keith D. Markman, William M. P. Klein, and Julie A. Suhr in *Handbook of Imagination and Mental Stimulation* state, "Recent progress in cognitive neuroscience suggests a critical role for motor representations in social interaction" (Markman, Klein, and Suhr 3). What relationship does our primary motor cortex have with complex entities such as emotional and social aspects, and what is their relationship with our senses; can these areas be localized? Without our senses we are unable to process even the most basic of information; a solid perceptual foundation is necessary for such grandiose factors such as emotion and even more complex –social relations - to properly contribute to our psychological development. Also in their book, Markman, Klein, and Suhr state, "Theories of embodied cognition impart the notion that the current motor state pervades all of our cognitive states and emotions" (Markman, Klein, and Suhr 3). The very basis of our society's interpersonal interactions is embedded in emotional experiences. Our emotions would not be properly generated and maintained if it weren't for this highly specialized area of our brains called the primary motor cortex. A subconscious mechanism within this area recognizes body language from others and internalizes it and then replicates it; if you haven't noticed when people talk, they mimic each others' body language and posture inadvertently. But which area of our brain contributes more to these large-scale-factors such as social interactions, our primary somatosensory cortex or our primary motor cortex? It is obvious that both areas are critical for proper functioning on all scales; it would be in our best interest to view them as a system (i.e. the sensory motor system) within a system (our brain/mind). By viewing the two in tandem we can better understand how they contribute to our psychological health and subsequently can be manipulated in order to produce a therapeutic effect.

There is building evidence that the maintenance of mental health is implicated with one's ability to monitor one's behavior efficiently. Is the manipulation of our senses, subsequently modulating the activity of our sensory motor cortices, the vehicle for an increase in volitional control of one's thoughts and hence producing a therapeutic effect? David Sallah and Michael Clark in *Research and Development in Mental Health* may infer that to understand the complex processes one needs to look at the human as an organic constituency, "An understanding of human beings is best achieved by being

thoroughly grounded in the natural sciences because men and women are essentially matter [which] has become conscious of itself” (Sallah and Clark 78). The natural sciences have provided us with much of what we know in the fields of neurology and pharmacology, but in actuality the applications are too broad to be considered efficacious. In order to ascertain an effective mode of therapy one must look not just at the organic level but the meta-physical/psychological level. Scientists like Dr. Suedfeld would argue that the therapeutic aspects of sensory deprivation might have something to do with an increase in control over one’s mind and subsequently one’s body. “We may hypothesize that the effects of REST (Restricted Environment Stimulation Therapy) on the brainstem changes the relationship between stimuli and responses so that the individual now more closely monitors his behavior, thus increasing his volitional control over it” (Suedfeld 403). What’s important here is that there is a link between an organic basis -our brain tissue- and a subjective state it experiences - perception. When one’s stimulus load is reduced this seems to allow for less energy to aggregate at our sensory cortex and thus allowing for more energy to be allocated toward brain areas implicated in self-monitoring (localized in our prefrontal cortex [PFC]). This cohesive state of self-monitoring appears to make a crucial contribution to our sense of coherence; to some degree our minds necessitate volition in order for us to subjective feel healthy.

The field of Neuropharmacology has attempted to answer what if any particular chemical composition makes up a healthy mind. There is mounting evidence that the hormonal changes associated with certain sensory deprivation techniques such as REST can be substantial; decreases in certain hormones effect particular neural networks and can induce a stress-reduced-environment. Dr. Suedfeld’s later work with Dr. Turner and Dr. Fine pinpointed particular physiological changes that occurred during their sensory deprivation therapy and purported evidence of how hormonal changes could essentially be therapeutic. “We hypothesized that by combining the reportedly profound relaxation experienced in REST with the high sensitivity of hormonal feedback regulation, we would maximize the opportunity to observe the physiological effects of REST” (Suedfeld, Turner, and Fine 72). Suedfeld and colleagues found that endogenous (made within our bodies) opioids (opium based drugs) are produced during this therapy, producing relaxation and mild euphoria. In addition two stress hormones affiliated with our hypothalamus-pituitary-adrenal axis/the HPA axis (critical brainstem areas connected to glands on top of our kidneys), ACTH and cortisol, were significantly decreased after administration of the REST therapy. Dr. Carlson and colleagues found similar hormonal

responses when meditation-like-therapy was induced to patient under stress (Carlson et al 448). They found that, “[Mindfulness-based stress reduction] program enrollment was associated with enhanced quality of life and decreased stress symptoms,...and resulted in possibly beneficial changes in (HPA) functioning” (Carlson et al 448). This data suggests that the decrease in production of particular hormones from our HPA-axis produces stress reduction – a desired effect of many a therapy. Further, in this stress-reduction-therapy it is theorized that there may be a sort of reformatting of the connections of this brainstem area (the HPA axis) with a higher order control center, (such as our prefrontal cortex/PFC) i.e. a strengthening of the connection between the two may indicate that there is an increase in volition of one’s hormonal circuitry. The hormone-based-physiology relating to stress-free psychological states marries biological matter with subjective outcomes; if such states that can be voluntarily controlled this would serve our health tremendously.

In order to apply a therapy (such as sensory deprivation) one must understand health and disease/illness in respect to the norm. What is *normal* mental functioning and is this synonymous with *health* remain challenging questions. Normal can be looked at from a variety of angles yet some may say the only legitimate way to define such a concept would be mathematically. But even in numbers there is a degree of misrepresentation; statistics can only be held accountable for correlations – and a correlation should never be considered a *causation*. In their book *Evolutionary Medicine and Health: New Perspectives* Wenda Trevathan, E.O. Smith, and James McKenna question how health officials arbitrarily define health and disease, “What constitutes the normal range of human variation and knowledge of what factors maintain normal conditions” (Trevathan, Smith, and McKenna 6). From their point of view, Trevathan, Smith and McKenna would claim that “normal ranges” of human health should be looked at from two ends of the spectrum: the proximate (immediate) causes and ultimate (evolutionary and or macro-scale factors) causes. Through these two lenses we can appreciate that people experience different baselines of stimulation and consequently experience health differently. Brown and Barrett in *Understanding and Applying Medical Anthropology* would reaffirm this latter point. “Any conceptualization of health must therefore depend on an understanding of how so-called normal states of well-being are constructed within particular social, cultural, and environmental contexts” (Brown and Barrett 5). Sociocultural factors are a significant part of one’s environment and certainly contribute to one’s mental constitution immensely by socially constructing the norm. It is therefore wise when considering the

implementation of a therapy that one takes into account factors that are above the individual-level. Mental illness can be a result of a 10,000 year maladaptive mechanism or from a social structure that arbitrarily stigmatizes a certain behavior and consequently affects and individuals' health negatively. For a therapy to be effective it needs to address the myriad contexts in which the mind is inextricably embedded. Human beings are the products of thousands of year of change, it is important that therapies be as holistic as possible in their attempt to alleviate mental illnesses.

Although much has been learned as to what a healthy range is for our minds a holistic definition of mental health remains far from grasp. The concept of mental health is a difficult one to define for it incessantly changes. It, like most complex notions, has a meaning that changes with time. A symposium was held by the U.S. Department of Health, Education, and Welfare and Public Health Services in the late 1960s in which the complexity of the concept was addressed both theoretically as well as empirically. Elmar A. Gardner writes in *The Definition and Measurement of Mental Health*, "The absence of mental disease is not a sufficient criterion of mental health" (Gardner 6). Mental health is a subjectively experienced condition in which ones mind experiences cohesion/can focus/adapt/be able to execute a set amount of tasks relative to the general population i.e. relative to the norm/the statistical average of the population. A degree of happiness is also integral to mental health; emotional stability is implicitly linked to this operational definition. Many a definition exists with little avail and so it may be more fruitful to see mental health in the form of a model. Sussie Eshun and Regan A.R. Gurung in *Culture and Mental Health: Sociocultural Influences, Theory, and Practice* categorize all models within a binary system, "Mental Health Models are dominated by two major approaches, namely, the western evidence-based medical approach and the traditional indigenous healing approach" (Eshun and Gurung 151). What's important in this statement is that it takes into account the context and belief systems/entities that heavily contribute to ones' constitution of mental health. There is a big difference between being *healed* and being *cured*. The latter may not be dependent on a physiological mechanism yet the experience of the former has the capacity to produces an effect far greater than any physical/western-biomedical remedy; psychosomatic (how our mind affects our body) effects are eerily powerful. Sensory deprivation is such an effective therapy but only for those who believe that it has the capacity to be efficacious. Therapies must integrate ones belief systems if they are to properly heal a person: holistic approaches are the only proper means of viewing a concept as enigmatic as mental health.

Mental illness is becoming a global epidemic with incidence and prevalence increasing every year; a means of an effective affordable therapy is desperately needed. Christopher J. Smith and John A. Giggs in *Location and Stigma: Contemporary Perspectives on Mental Health and Mental Health Care* claim, “In terms of prevalence mental illness has constituted the most important source of economic loss and social stress in developed countries for several decades now” (Smith and Giggs vii). Mental disorders are becoming increasingly more prevalent and consequently are becoming increasingly more stressful on society both financially and emotionally. The fact that the prevalence of mental illness is higher in developing countries implies that factors not present in developed countries are what are potentially exacerbating the problem; this may be as simple as a lack basic nutrition or as complex as social stress/cultural violence. Nonetheless hundreds of millions of people go on with their lives without the slightest bit of alleviation of their mental ailments. Through the research of Peter, J.W. Suedfeld, Turner Jr., and T.H. Fine published in *Restricted Environmental Stimulation: Theoretical and Empirical Developments in Flotation REST* this group of individuals purport that, “It appears that there is a real need for effective, reliable, and cheap psychological method to cope with psycho-social stressors” (Suedfeld, Turner, and Fine 43). Approximately one quarter of all adults in the United States suffer from one or more mental disorders (National Institute of Mental Health 1). Effective affordable therapies are in high demand not only in the United States but globally. Sensory deprivation techniques, such as flotation REST, may be the answer to many peoples’ prayers being that it mimics other self-administered/self regulated stress reduction therapies, like hypnosis, and are as financially affordable as they are effective. In addition the salts (magnesium based/”Epson”) used in flotation REST therapy increase buoyancy of the person’s body while concurrently providing a hygienic environment (Heron 6). Although mental health should not have a price tag, these affordable Restricted Environment therapies treat a large array of disorders: drug addiction, severe depression, and sleep disorders in addition to countless more and more to come/be discovered. Flotation REST has also shown to be beneficial to those even in good mental standing by increasing focus and consequently maximizing retention rates. The utility of this therapy is truly invaluable.

The versatility of this relatively new therapy is unmatched; sensory deprivation therapy has been used to treat sleep disorders, neurological disorders, psychological disorders, and many others. Anette Kjellgran and colleagues purport, “The results indicated that the most severe perceived pain intensity was significantly reduced, [in

addition] Flotation-REST treatment also elevated the participants' optimism and reduced the degree of anxiety or depression" (Kjellgran et al 2011). Their research also claimed that patients who underwent flotation fell asleep more easily at nighttime (Kjellgran et al 2011). If pain management and sleep can be improved this would greatly benefit those countries who suffer from high rates of chronic illness and experience a high prevalence of sleep disorders. Many Americans experience sleep problems; WebMD in "The Toll of Sleep Loss in America: Sleep Loss is Taking a Toll on Our Physical and Emotional Health, and on Our Nation's Highways" reports that one in five Americans get less than 6 hours sleep a night (where the recommended amount is 7-8 hours) (WebMD 1). Sleep affects several domains of our life and without it can greatly exacerbate stress levels. The positive sleep effects from Flotation REST could be because of its' manipulation of our consciousness: "Flotation-REST must be regarded as a consciousness-altering method with promising potential for clinical and therapeutic use" (Norlander, Kjellgren, and Archer 161). Our consciousness is a meshwork of several contingent processes which in all likely pervade every area of our brain; it makes intuitive sense that a therapy as holistic as REST effects this entity. The particular subjective experience of the therapy varies from individual to individual. Between the hormonal and subjective effects of Flotation REST, the effectiveness of this therapy seems beyond promising.

A method as simple as covering the eyes, plugging the ears, and floating in water has proven to be an innovative, affordable, effective means of reducing stress levels, warrant focus, and subsequently, nourishing the body and mind. How is it that such a simple method can have such a profound effect on our senses and consequently our entire perception of our mental health? It appears that through sensory deprivation, one's higher-order-processes come to be more in a voluntary control and consequently some beneficiary downstream-effects (which most likely involves changes in hormones and brain plasticity/change) are instantiated. The psychological development of humans is a delicate and progressive process in which our senses must be able to receive and reformat an inordinate amount of stimulation; the exact biological machinery which one depends on throughout ones' life is somehow reformatted through REST/sensory deprivation therapies. In a society such as America, stress is high, sleep is minimal, and disease is prevalent; a therapy as efficacious as sensory deprivation deserves to be allocated to as many people as possible as soon as possible. Although in its' infant stages as a therapy, sensory deprivation has vast propensity for improvement in its applications.

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