

## Report

# PHYSIOLOGICAL AND PSYCHOLOGICAL EFFECTS OF A MIND/BODY THERAPY ON CLAUSTROPHOBIA

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### ABSTRACT

A preliminary study was conducted to quantify the effects of a specific form of therapeutic intervention on claustrophobia using methods from an emerging field called energy psychology, which uses the acupuncture system to reduce or eliminate irrational anxiety and fears. The treatment includes a form of self-applied acupressure, focused thought, and structured breathing exercises to effect a rapid desensitization of the feared object or situation. Four claustrophobic and four normal individuals were recruited. The claustrophobic individuals were measured with the State-Trait Anxiety Inventory (STAI) and physiological measures of EEG, EMG, heart rate, respiration rate, and measures of the electro-conductance within the acupuncture meridians. The results when compared with normal individuals showed that a 30-minute treatment appeared to create reduction in EMG for the trapezius muscle; changes of EEG Theta wave activity and changes in the electrical conductance between acupuncture points along a meridian pathway. The measures pre- and post-treatment on the STAI for the experimental group were significantly lower even at a two week followup. This pilot study suggests that specific physiological and psychological changes occur for claustrophobic individuals after undergoing an energy psychology treatment. Further investigation appears warranted.

**KEYWORDS:** Acupuncture, acupressure, claustrophobia, energy psychology, fears, phobias, treatment

**T**here is an emerging field that is called Energy Psychology. This innovative approach to psychological problems often utilizes the acupuncture system to effect reduction or elimination of emotional distress. This mind/body approach to psychology theorizes an interaction between cognitive processes, the emotions, and physical responses in the body through pressure stimulation of certain acupuncture sites. We have completed a pilot study exploring psychological and physiological changes using one variation of this novel therapeutic approach.

There are several variants of Energy Psychology, which derives its name from the underlying theory that specific thoughts and emotions such as fear of closed spaces generate a unique field of energy including, but perhaps not limited to, electromagnetic energy, and that these energies interact with the body through the acupuncture system.<sup>1</sup> Cognitive theory is predicated on the observation that chronic affects such as depression and anxiety are created and sustained by negative interpretations of particular experiences.<sup>2</sup> However, there is no explanation offered by cognitive theory as to the exact mechanisms of this action. Some neuroscientists such as Joseph LeDoux have proposed that certain neurological pathways, particularly in the amygdala, are formed by traumatic events and that there is likely a feedback process between somatic and neural responses involved in emotions. More recently, PET and fMRI imaging have been used to identify that specific cortical brain activity occurs when emotions are present.<sup>3-5</sup>

Other brain imaging research reveals further subcortical structures including the basal ganglia are involved in both conscious and unconscious learning processes.<sup>6,7</sup> Exactly which of these structures are involved in the cognitive loops that are associated with chronic emotional reactions is not clear. As LeDoux acknowledges "It's hard to believe that after all these years [of research] we actually still don't have a clear and definitive understanding of the role of body states in emotions."<sup>8</sup> There is much still to be learned about what creates and maintains chronic emotional distress including fears, anger, guilt, shame, or regret when all rational and logical observation, even by the sufferer, would controvert those feelings. The work coming from the Institute of Heartmath reveals the effects of emotions on the short-term power spectrum analysis of heart rate variability.<sup>9</sup>

An integral part of traditional Chinese medicine has been the belief that acupuncture can affect emotional states and stress. More recently acupuncturists in Western countries use it to treat complex psychological problems.<sup>10</sup> Preliminary research conducted at University of California, Irvine indicates that there may be a neural pathway between specific acupuncture sites and unexpected brain activity as measured by functional magnetic resonance imaging.<sup>11</sup> These researchers postulate that acupuncture points situated at or very near to nerves or nerve bundles surrounding major blood vessels serve to transmit signals to the brain via the spinal cord and brainstem. The signals may then terminate in the upper cortical areas, such as the sensory cortex or subcortical areas. They speculate that such innervation may release neuropeptides, beta-endorphins and other hormones that create therapeutic effects. Furthermore, they observe that the peripheral nerves involved in these connections overlap with many of the meridians of traditional Chinese medicine and may explain the pathways of “Chi” energy.<sup>12</sup> In recent communications, Cho has continued to find similar results and in their forthcoming article, they speculate that acupuncture may be working through a variety of modes within a broad-sense hypothalamus-pituitary-adrenal axis.<sup>13</sup> Another finding from Cho and his colleagues has been that the transmission rate of the acupuncture signal varies from that of the predicted neuronal speeds, to the more diffuse and slower response indicative of the humoral pathways.<sup>12</sup>

**I**n another perspective, Jones offered that his research found three different pathways connecting certain points on the urinary bladder meridian to the brain.<sup>14</sup> The first was the direct nerve simulation of about 200 ms from foot to brain activity. A second pathway was nearly instantaneous by comparison. His fMRI is able to detect signals as fast as .08 microseconds and detected a signal from acupuncture stimulation to corresponding cortical activity at .08 microseconds. Thirdly, Jones reports a slow response of about 25 seconds after stimulation and that some subjects described the slow movement of energy coming up through their body. Jones noted that while the first pathway was the strongest response or burst, the next strongest was the slow third pathway, and the second pathway was the weakest.

James Oschman describes several communication systems within the body beyond the conventional neural pathways and chemical systems of the endocrine system.<sup>15</sup> These systems, as well as indirect neural pathways, are believed

responsible for the observed effects from percussing specific acupressure points upon mental and emotional function.

**O**ne of those systems involves the observation of a cellular matrix and tensegrity, a lattice-like system of connective tissue that have the ability to communicate information. Another communication path that Oschman describes is the perineural control system also identified by orthopedic surgeon and researcher, Robert O. Becker.<sup>16</sup> Becker recognized a layer of connective tissue surrounding each nerve fiber capable of communicating minute electrical signals based on the transverse Hall Effect. All these pioneering studies suggest that there are multiple vectors for the signal transmission and we may not be at the end of discovery of new systems that intersect at the acupuncture locations.

While the connection between the acupuncture system and cognitive and emotional processes is only beginning to be identified, there is a growing body of anecdotal evidence that indicates significant clinical effectiveness using methods that involve acupressure and cognitive focusing.<sup>1,17,18</sup> One method of Energy Psychology is generically called thought field therapy that involves a process of manually percussing various acupuncture locations while focusing on the distressing thought or emotion (e.g. fear). Our intention with this pilot study is to explore some of the physiological as well as psychological correlates to this treatment.

Four claustrophobic individuals were administered psychological, physiological, and behavioral measures before and after a 30-minute treatment. The four claustrophobic subjects were recruited from notices posted in the community and were chosen based on their self-reports of difficulty remaining in small spaces such as an elevator. Four non-phobic volunteers, for comparison, were selected based on their self-reports of no symptoms of claustrophobia.

All subjects were administered a pre-test and two post-tests of the State-Trait Anxiety Inventory (STAI), a well established, valid, and reliable inventory that discriminates between transient and enduring traits associated with anxiety. This measure was chosen because the state anxiety measure is responsive to immediate changes in anxiety levels. Behavioral measures were taken on all subjects by asking them to enter and remain in a small metal lined enclosure

(7' x 10' x 8") resembling an elevator, with the door closed as long as they could or up to 5 minutes. First, objective physiological measures were taken then subjective measures of distress on a 0 to 10-point scale were taken upon entering and at the end of the 5-minute period in the room.

The phobic subjects then received a 30-minute treatment. Normal subjects received a 30-minute period of relaxation while listening to classical music. After the 30-minute time period both groups were taken back to the small room for a 5-minute exposure time. The State-Trait Anxiety Inventory and physiological measures were again administered.

After treatment all phobic subjects reported greater comfort in the small room to varying degrees, most noteworthy were the physiological and psychological measures at post-treatment.

Phobic subjects demonstrated a significant difference from normal control (non-phobic) subjects on the State-Trait Anxiety Inventory before treatment. After treatment and re-exposure the phobic subjects showed a significant ( $p < 0.001$ ) reduction in state anxiety as measured by  $t$ -test. Trait anxiety predictably showed no difference at any measurement.

**A**t a two-week follow-up, the STAI was re-administered and state anxiety levels remained significantly lower for the phobics (Table I). Two of these subjects, for whom elevator avoidance was the only significant phobia, reported a remission of their claustrophobic symptoms related to elevators in their daily life. The other two subjects, while still unable to ride in an elevator, reported feeling less distressed by their symptoms and limitations.

Physiological measures were taken using the I-410 biofeedback unit by J & J using the PDS software that included heart rate, 2-channel EMG, EEG Alpha, Beta, Theta, and Delta activity.

A significant increase was recorded on Theta wave activity between phobic and non-phobic subjects when comparing the pre-treatment values. No measurable difference is noted between the groups on Theta activity post-treatment (Table II). Measurements were taken of Alpha, Beta and Delta wave activity, however, no significant changes were observed.

**Table I**  
**State Anxiety (SAI) T-scores**

	Pre Treatment	Post Treatment	Pre vs. Post
Control Group, <i>n</i> = 4			
Mean	35.25	35.50	1.57
Std. Dv.	1.71	1.00	
Claustrophobia Group, <i>n</i> = 4			
Mean	60.00	41.00	** -3.12
Std. Dv.	14.63	7.78	
Diff Cont vs. Exp	**** -3.23	- 1.40	

Two-tailed *t*-tests: \*\* *p* < .05, \*\*\*\* *p* < .01

**Table II**  
**EEG THETA – Single Channel (Non-dominant side)**

	Pre Treatment	Post Treatment	Pre vs. Post
Control Group, <i>n</i> = 4			
Mean	2.59	2.65	1.07
Std. Dv.	0.51	0.54	
Claustrophobia Group, <i>n</i> = 4			
Mean	4.00	3.62	-1.32
Std. Dv.	0.38	0.92	
Diff Cont vs. Exp	# -4.44	-1.83	

Two-tailed *t*-tests: # *p* < .001

The following measures were recorded: EEG single channel on non-dominant side of the frontal cortex; EMG of the frontalis (above the eye, EMG1); and the trapezius (shoulder, EMG2) both on the non-dominant side, respiration rate and heart rate.

**Table III**  
**EMG – TRAPEZIUS MUSCLE (Non-dominant side)**  
**Values in micro-volts**

	Pre Treatment	Post Treatment	Pre vs. Post
Control Group, <i>n</i> = 4			
Mean	2.60	2.25	-2.34
Std. Dv.	2.24	1.94	
Claustrophobia Group, <i>n</i> = 4			
Mean	7.93	4.87	-1.47
Std. Dv.	3.46	1.10	
Diff Cont vs. Exp	*** -2.59	** -2.35	
One-tailed <i>t</i> -tests: ** <i>p</i> < .05, *** <i>p</i> < .025			

Additional physiological measurements of transdermal electrical conductance properties of skin at Jing-Well points on the toes and fingertips were taken using the Apparatus for Meridian Identification (AMI) developed by Hiroshi Motoyama. The AMI is based on the Single Square Voltage Pulse Method (SSVP) also developed by Motoyama.<sup>19,20</sup> A complete description of the principle of operation of the AMI can be found in Motoyama and Onetto.<sup>21,22</sup>

The *t*-test results of the physiological measures showed non-significant differences between the phobic and non-phobic subjects for pre and post-treatment when looking at the EMG 2 (trapezius muscle). These were one-tail *t*-tests as it was predicted there would be less muscle tension for the control group compared to the phobic group (Table III).

Looking at the pre-treatment heart rate between groups produced an unexpected observation of a significantly lower resting heart rate for phobic subjects. This lower heart rate difference remained at post-treatment. Measurements of breaths-per-minute and blood pulsed volume flow showed no significant changes.

The AMI results indicated a significant increase in BP (Before Polarization) mean values for the phobic subjects after treatment. This effect was not observed for non-phobics. The BP value represents the peak value of the 3-

**Table IV**  
**Apparatus for Meridian Identification (AMI)**  
**Before Polarization (BP) Values in microamperes ( $\mu$ A)**  
**Peak current of 3V square pulse for 1/1000<sup>th</sup> second.**

	Pre Treatment	Post Treatment	Pre vs. Post
Control Group <i>n</i> = 4			
Mean	1,786	1,794	.131
Std. Dv.	247	142	
Claustrophobia Group <i>n</i> = 4			
Mean	1,673	1,747	** 2.71
Std. Dv.	85	57	
Diff Cont vs. Exp	# 0.86	0.62	
One-tailed <i>t</i> -tests: ** <i>p</i> < .05, # <i>p</i> < .001			

volt current in microamperes before ionic polarization within the skin. The higher BP mean values from the AMI device after treatment for phobic subjects are consistent with a relaxation effect. According to Motoyama,<sup>21</sup> BP is a parameter of organ function and it was predicted that BP mean values would increase when the subjects relax, therefore, a one-tail *t*-test was applied on this measurement (Table IV). Other measurements with the AMI were taken but showed no meaningful changes.

## DISCUSSION

The measure of state anxiety indicated a clear decrease for the phobic subjects, which was sustained on two-week follow-up measurement. This suggests that the changes in anxiety were somewhat enduring. Subjective reports of improvement on the target problem of elevator claustrophobia were encouraging considering only a 30-minute treatment was allowed for all phobic subjects. In interviewing these subjects it was noted that the two least responsive subjects had the most complex history of anxiety that included both long duration and multiple phobias. In a follow-up study it would be advisable to either screen

subjects for such complexities or use an ANCOVA design to examine for the effects of such complexity on outcome.

Observations of higher mean value Theta wave activity in phobic subjects over non-phobics suggests a more fundamental difference in the brain function between phobic and non-phobic subjects. It would be consistent with the findings of neuroscientists that specific neural pathways have formed for phobic subjects and that these effects are likely to produce changes in a range of EEG measurements. A more comprehensive and sophisticated EEG measurement in a follow-up study would be worthwhile to more precisely identify frequency and peak evoked potentials as well as regions of the brain where activity occurs.

The observation that phobic subjects appear to carry tension in their shoulders (trapezius muscles) is no surprise. The 30 minutes of relaxation while listening to classical music that the non-phobic subjects experienced produced no EMG change in their trapezius muscles, which indicates that little tension in that area existed at the beginning of the experiment for these individuals. However, there appeared to be treatment effects on this muscle group for the phobic subjects that approached normal levels. Yet, there was still a post-treatment difference between groups with the phobic subjects still retaining more tension than the non-phobic subjects. A longer or more comprehensive treatment might have resulted in greater muscle relaxation for the phobic subjects.

**T**he significantly lower heart rate of phobic subjects is another surprising finding as one would expect fearful individuals to have a higher heart rate. One explanation is that phobic individuals have adapted to generally higher levels of stress and have developed a more efficient heart in a manner similar to endurance athletes. However, this finding may be a spurious result that would not be observed in a large group sampling.

The inferences and the discussion in this report must be considered in recognition that a small number of subjects were involved and the low statistical power that was generated from this study. Our observations from this pilot study do suggest that there is reason to pursue further exploration of these treatment methods and provide direction for further investigation. Follow-up studies would make a change in the constituency of control subjects. Specifically, a larger study could randomly assign phobic subjects to one of two groups, one

to receive a real treatment and the other to receive a sham treatment. Another design change we would recommend includes the use of some additional psychological measures such as the Symptom Checklist 90-R, the Eysenck Personality Inventory, or the Claustrophobia Questionnaire to supplement the State-Trait Anxiety Inventory. An additional recommendation is to include a follow-up at 2 months where the SCL-90-R, Eysenck, or other measure might better clarify the endurance of clinical improvements. A follow-up study on these results is planned.

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## **Appendix A**

### **Treatment Protocol Description**

1. Experimental Subjects were first asked to spend 2 minutes seated in an energy balancing breathing exercise called Balanced Breathing. The posture for this exercise involves crossing the left ankle over the right and with the arms overlapped right over left and fingers interlocked. The interlocked hands are then rotated down and up again until they are resting crossed and interlocked on the chest. Breathing is instructed to begin with an inhaled breath through the nose with the tongue lightly pressed to the roof of the mouth. The breath is to be exhaled out through the mouth with the tongue lowered to the floor of the mouth. Breathing continues in this manner for 2 minutes during which time the subject is instructed to focus on an image symbolizing balance such as a scale, an acrobat on a balance beam, the horizon, or on the word “balanced.”
  
2. Subjects were next instructed to repeat a series of Intention Statements three times each while activating (rubbing or tapping) specific acupressure points. The statements and corresponding acupoints were as follows:
  - While rubbing the Neuro-lymphatic Reflex nerve bundle on left side: “I completely accept myself with all my problems, limitations, and challenges and my strengths.”
  - While tapping Governing Vessel 26 under the nose: “I completely accept myself EVEN IF I never get over this problem.”
  - While tapping Central Vessel 24 under the lower lip: “I completely accept myself EVEN IF I don’t deserve to get over this problem.”
  - While tapping the Small Intestine 3 (SI3) at the side of the hand: “I completely accept myself EVEN IF I want to keep this problem.”
  - While tapping (SI3): “I completely accept myself EVEN IF it isn’t safe for me to get over this problem.”
  - While tapping (SI3): “I completely accept myself EVEN IF it isn’t safe for others for me to get over this problem.”
  - While tapping (SI3): “I completely accept myself EVEN IF it isn’t possible for me to get over this problem.”
  - While tapping (SI3): “I completely accept myself EVEN IF I won’t allow myself to get over this problem.”
  - While tapping (SI3): “I completely accept myself EVEN IF I won’t do what’s necessary for me to get over this problem.”
  - While tapping (SI3): “I completely accept myself EVEN IF it isn’t good for me to get over this problem, but it is.”

- While tapping (SI3): “I completely accept myself EVEN IF it isn’t good for others for me to get over this problem, but it is.”
3. The Subjects were asked to focus on their claustrophobic distress related to the stimulus of the small room and rate their distress from 0 the least to 10 the highest as a way of focusing.
    - a. Subjects were then asked to tap 7-10 times on the following sequence of acupoints:
    - b. UB1/2, St1/2, K27, L1, He9, Si3, TH3 (while tapping Triple Heater 3 the subjects conducted a series of activities intended to activate various regions of the brain – Count to 5; hum a few bars of music; count to 5 again; glance down right; glance down left, rotate eyes 360 degrees in one direction; rotate eyes 360 degrees in the opposite direction.)
    - c. Subjects were then asked to again tap the same sites as before.
    - d. Subjects were then instructed to tap TH3 while lifting their gaze slowly (5-8 seconds) from floor to ceiling.

Subjects were instructed to keep their focus on the claustrophobic feelings at 3 junctures, beginning, just prior to the counting and eye movements, and again prior to the second round of tapping the 7 sites (We consider UB1/2 and St1/2 as individual sites as both points 1 and 2 are so close together as to be considered one location for tapping purposes.

This concluded the treatment protocol and the entire process was accomplished in 30 minutes or less including time needed to provide direction and site location for tapping.

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