Heart Rate Variability in Verifying Treatment Efficacy of Thought Field Therapy™

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ABSTRACT
The efficacy of Thought Field Therapy (TFT) has now been supported, not only by the client's self report but also by an independent, objective physiological measure known as Heart Rate Variability (HRV). HRV is gaining increasing popularity for use in both clinical and research settings as a measure of treatment success. Being stable and placebo-fee, it has the potential to meet this need. Twenty eight cases are presented from the clinical practices of the authors and one other TFT trained psychotherapist where HRV was used pre and post TFT treatment. The cases included TFT treatments which addressed a wide variety of problems including phobias, anxiety, trauma, depression, fatigue, learning difficulties, compulsions, obsessions, food craving, anger, and physical pain. A lowering of Subjective Units of Distresses (SUD) as reported by subjects was related to an improvement in HRV SDNN measurement in all cases.

THOUGHT FIELD THERAPY (TFT)

- TFT is a treatment for psychological problems, developed by psychologist Roger Callahan in which meridian points on the body are stimulated, usually by having the client tap with their finger tips, in specifically determined sequences while the client focuses attention on the problem being addressed (Callahan, 1985; Callahan & Callahan, 2000; Callahan & Trubo, in press).

- TFT tapping patterns are either individually determined treatments through a method known as causal diagnoses, or formulas known as algorithms. Algorithms were developed from causal diagnoses and are effective for a high percentage of people.

- Most treatments take only minutes to administer and results are reported immediately by subjects using a Subjective Units of Distress (SUD) scale.

- TFT has been used by over 5,000 mental health professionals from around the world to help people with problems such as phobias, anxiety, trauma, obsessions, compulsions, depression, addictive urges and a variety of other problems.

- Advantages of the TFT treatment approach:
    - High degree of success
    - Speed of the treatment
    - Immediate feedback as to its effectiveness
    - Disclosure is very limited
    - Retelling of traumatic stories are not required
    - No negative side effects. If the treatment does not work then nothing happens

HEART RATE VARIABILITY

The Basics

HRV is defined as the variation in the length of the intervals, measured in milliseconds (ms) between heart beats (Malik & Camm, 1995).

Two people can have the same heart rate (pulse), but have very different variability (e.g., two people, both with an average pulse of 65 beats per minute could very different HRV. For instance, one could have variability only between 63-67 beats whereas the second person could have much higher variability between 58-72 beats. The first person would be considered to have very low HRV.

The heart beat is controlled by the autonomic nervous system and the rate of the heart beat changes moment to moment as the sympathetic and parasympathetic systems switch dominance.

Frequency Domain Analysis of HRV indicates balance between the sympathetic and parasympathetic systems of the autonomic nervous system (ANS). High Frequency Power (HF) mainly indicates parasympathetic and Low

Frequency Power indicates a combination of sympathetic and parasympathetic. LF/HF Ratio indicates the balance. A ratio of >1 indicates LF dominance; the higher the number, the greater the LF dominance. Total Power is the total of all frequencies.

Time Domain Analysis deals with the actual variation in beat-to-beat intervals of the heart.

- **SDNN** is the Standard Deviation of all Normal-to-Normal intervals during the entire test period.
    - In a 24-hour test, a cut-off point of <50 ms (milliseconds) was determined to be "highly depressed HRV" and an SDNN of <100 ms to be "moderately depressed HRV" and these cut-off points are considered "likely to be broadly applicable." (Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology, 1996) p. 1055.

- **RMSSD** is the Root Mean Square of Successive Differences and measures mainly parasympathetic changes.

HEART RATE VARIABILITY
The Literature

Over 2000 studies have been published from 1988 to 1998 according to a recent Medline data base search using the words "Heart Rate Variability" (Huikuri, Makikallieo, et al., 1999). For a complete discussion of the history of development and applications of HRV see ....cite. Roger and Monica in press)

HRV has been demonstrated to be stable (Kleiger, et al., 1991; Bigger, Fleiss, Rolnitzky & Steinman, 1992; Stein, Rich, Rottman & Kleiger, 1995.) While some smaller circadian variations have been noted, it does not change without reason.

The lower the HRV is, the less likely it is to change (Van Hoogenhuyze, et al., 1991). Van Hoogenhuyze et al. did two successive 24 hour HRV tests on two groups of subjects: a group of subjects with congestive heart failure and a group of normal subjects. Pearson product-moment test-retest correlation coefficients of the four different HRV measures studied to be high in both groups (.89, .87, .93 and .95 for the healthy group and .97, .87, .97 and .97 for the unhealthy group).

HRV has no placebo effect. HRV has been shown, when tested on both normal healthy subjects, and unhealthy subjects, not to be responsive to the placebo effect (Kleiger, et al., 1991; Vybrial, et al., 1993; De Ferrari, Mantick & Vanoli, 1993; Casadei, Conway, Forfar & Sleight, 1996; Venkatesh, et al, 1996).

Low HRV has been shown in numerous longitudinal studies to be related to a higher mortality rate in both healthy and unhealthy subjects and thus can be shown to be a strong predictor of all-cause mortality (Magid, Martin & Kehoe, 1985; Kleiger, Miller & Bigger, 1987; Dougherty & Burr, 1992; Bigger, Fleiss, Rolnitzky & Steinman, 1992; Singer & Ori, 1995; Task Force of the European Society of Cardiology and North American Society of Electrophysiology, 1996; Tsuji, et al., 1996; Dekker, et al., 2000).

In recent studies, HRV that is too high has also been shown to be related to mortality (deBruyne, et al., 1999; Dekker, et al., 2000).

HEART RATE VARIABILITY
The Literature on HRV and Psychological Problems

HRV and PTSD – Cohen, et al., 1998 showed that subjects with PTSD were shown to have lower HRV consistently, whereas the control group without PTSD had lowered HRV only when exposed to a trauma-related reminder.

Anxiety/Phobias and HRV – The following studies showed a relationship between phobias or anxiety and low HRV (Middleton, 1990; Kawachi, Sparrow, Vokonas & Weiss, 1995; Freidman & Thayer, 1998a; Freidman & Thayer, 1998b; Watkins, Grossman, Krishnan & Blumenthal, 1999)

Depression and HRV – A relationship between HRV and depression has also been demonstrated (Carney, et al., 1995; Krittayaphong, et al, 1997; Carney, et al., 2000) although it should be noted that some studies showed the absence of such a relationship (Watkins, et al., 1999; Yeragani, et al., 1991).

Thought Field Therapy and HRV – Using cases collected by TFT trained therapist it was demonstrated that very large changes in HRV measurements can be made in subjects with a range of problems (Callahan, in press). It also has been demonstrated that TFT makes changes towards optimal health with changes in HRV measurements going towards autonomic system balance, not just in one direction (Pignotti, in press)

Dishman, et al., 2000 showed a statistically significant relationship between subjects' self?rated anxiety and emotional stress and low HRV. This relationship existed independent of age, gender, trait anxiety, cardiorespiratory fitness, heart rate, blood pressure and respiration rate.

STUDIES WITH STATISTICALLY SIGNIFICANT RESULTS IN RAISING HRV

Study	**Type of Intervention**	**HRV Measure Used**	**% of change of HRV**
Pignotti &Bray, 2000	Thought Field Therapy with 28 varied conditions	SDNN	118%
Pignotti & Stienberg, In press	Thought Field Therapy with 39 varied conditions	SDNN	96%
Callahan, in press	Thought Field Therapy with 20 varried conditions	SDNN	127%
La Rovere, et al 1994	Scopolamine in 21 pts with moderate to severe CHF	SD LFP HFP	45%
Vybrial, et al 1990	Scopolamine in 22 healthy adults	SD LFP HFP MD (ms)*	29%
De Ferrari et al 1993	Scopolamine in 20 acute MI pts	SD MSSD	25% 38%
Vybrial et al 1993	Scopolamine – placebo controlled study of 61 male pts after acute MI	SD: Placebo Treatment	 NS 27%
		MNSD:** Placebo Treatment	 NS 26%
		SDMN: Placebo Treatment	 NS 29%
Casadei, et al, 1996	Scopolamine – a double blind placebo study - 16 pts with stable chronic heart failure and 8 healthy volunteers Baseline numbers not given. Authors note that there was no significant difference between baseline and placebo	SDNN for CHF: Placebo Treatment	
		SDNN for healthy: Placebo Treatment	 NS 20%
		SDANN for CHF: Placebo Treatment	 NS 10%
		SDANN – healthy: Placebo Treatment	 NS 15%

Kochiadakis, et al 1996	Scopolamine – 15 pts with three vessel CAD but no prior MI	SD	47%
Venkatesh, et al, 1996	Scopolamine – double blind crossover placebo controlled in 12 pts with CHF	SDNN (real Tx) SDNN (placebo)	22% NS
		Mean MN (real Tx) Mean MN (placebo)	
Stein, et al, 1996	Exercise training for 12 months in normal older adults	SDNN SDANN	13% 11%
Cowan, et al, 1990	Biofeedback training for 6 weeks	Mean HRV	
Flapan, et al, 1997	Digoxin in 10 pts with stable chronic cardiac failure	SDNN – 20% chg Total 24 hour counts (total power?)	20%
Carney, Freeland, Stein, et al 2000	Treating depression with cognitive therapy in 30 patients mildly or mod/severely depressed patients with CHD compared with 22 non-depressed patients also with CHD Daytime rMSSD came up to levels comparable to nondepressed group	24-Hour HRV: mildly or mod/severely depressed group. SDNN & SDNNIDX Changes in rMSSD for the mod/severely depressed group for daytime period only. Night and 24 hour rMSSD Changes in mildly depressed group	NS 28% NS NS
Khaykin et al, 1998	Antidepressants – fluoxtine and doxepin after 6 wks of tx – 14 pts with depression	Doxepin responders (N=7) SDNN (Not Sig) SDANN (p<.05)	 NS 28%
	Note: when responders and nonresponders were analyzed together, nothing was significant	Doxepin nonresponders (n=2) SDNN (p<.05 worse) SDANN (not sig)	 22% NS
		Fluoxtine responders (n=3) SDNN SDANN	 NS NS
		Fluoxtine nonresponders (n=2) SDNN SDANN	 NS NS

LF = Low Frequency Power (mainly influenced by sympathetic)
HF = High Frequency Power (mainly influenced by parasympathetic)
rMSSD is mainly influenced by changes in parasympathetic
SDNN is influenced by changes in both sympathetic and parasympathetic
An **LF/HF Ratio** > 1 indicates sympathetic dominance; the higher above 1, the greater the sympathetic dominance
*MD (ms) was described as “mean absolute difference between consecutive RR intervals.”
**MNSD was defined as the mean of the 5 minute SDs (like SDANN)
***SDMN was defined as SD of 5 min mean normal to normal interval (like SDNN)
LFP = Low Frequency Power
HFP = High Frequency Power

DATA COLLECTION
The twenty eight cases presented here were selected from the private practices of the one of the authors located in New York City, NY (Pignotti) and a Psychologist trained in TFT in Los Gatos, CA (Steinberg). Details of the cases

presented in this paper were disguised to protect client confidentiality. Our sample was not random; we selected cases we believed were representative of results regularly obtained with TFT.

MEASURES

Five-minute HRV tests were done with the HeartScanner (Biocom Technologies 1998-1999). As an instrument used to measure HRV, the HeartScanner conforms to standards set forth by the North American Society of Pacing and Electrophysiology (1996).

The specific HRV measure used was SDNN (Standard Deviation of Normal to Normal) which measures the standard deviation of all normal to normal intervals between heart beats during the test period. The Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology (1996) gave norms for the 24 hour test as follows: an SDNN of less than 50 is considered to be "highly depressed" and an SDNN of less than 100 is considered to be "moderately depressed". The task force further noted that these cut-off points are "likely to be broadly applicable" (p. 1055).

Although there are no currently established norms for the 5-minute HRV test, we chose to look at relative changes in SDNN. It should be taken into consideration, however, that SDNN scores on the 5-minute test would tend to be lower than those of a 24-hour test on the same person (Biocom Technologies, 1998-1999). Additionally, one should keep in mind that an HRV test showing very high SDNN, especially in older and middle-aged people could be pathological (DeBruyne et al., 1999; Dekker, et al., 2000).

Time domain analysis of SDNN was done on each subject. The mean SDNN pre and post were compared to determine the percentage of change. On four of the cases, Power Spectral Analysis of High Frequency Power (HF), Low Frequency Power (LF), HF/LF Ratio and Total Power was done, along with additional Time Domain Analysis of rMSSD (Root Mean Square of Successive Differences) which reflects change in the parasympathetic system.

In addition to HRV testing, we also measured our results by the subject's self-report, using the Subjective Units of Distress Scale or SUD (Wolpe, 1969). After being asked to think about the problem, subjects were asked to rate the degree of emotional distress they felt right at that moment on a scale of 1 to 10 where the number 10 indicates the highest degree of distress possible and 1 indicates complete absence of such distress.

PROCEDURE

The TFT treatment protocol used on all cases presented is the same as that used by Callahan (in press) and consists of the following:

Step 1: The subject was asked to think about the presenting problem and rate the emotional distress, if applicable, on a scale of 1-10 (the SUD). It is not necessary for the person to talk about the problem, as long as attention is focused on it during the treatment although the problem can briefly be identified, if the subject desires. The 5-minute pre-HRV test is administered with the client sitting in a chair, in the upright position.

Step 2: The therapist determines which TFT treatment to use and in the appropriate order (through TFT's causal diagnosis procedure) or selects an appropriate TFT algorithm. The TFT procedure is carried out while the client is instructed to focus on the problem being addressed.

Step 3: When it is determined which treatment points to use, the subject is then instructed to stimulate these points by tapping them 5-7 times on each point in the specific, set sequence.

Step 4: After the treatment, the subject is again asked for a SUD. The treatment is considered complete when the SUD is down to a 1 (the client self-report of no trace of emotional or physical distress) or when all appropriate TFT procedures have been used to reduce the SUD as low as possible. At this time, a post-HRV test is done, also with the subject sitting upright as in the pre test.

Clients were advised that our use of HRV does not constitute medical treatment or diagnosis. Those who had medical problems were under the care of a physician and were advised to consult the physician for diagnosis or advice on any medical issue

RESULTS

The SDNN was increased from **a mean of 55.8 pre-treatment to a mean of 107.6 post-treatment**. The mean percentage increase was 117.6%.

In all cases where a SUD was reported pre and post treatment the distress was reduced. The Mean pre-treatment sUD was 7.2 was reduced to 1.2 post-treatment. In all but two cases the level of reported distress was completely eliminated.

To address further questions about how TFT treatment impacts the autonomic nervous system, a more complete time and frequency domain analyses were done. These measurements are shown in the last table, for pre and post TFT treatment for 4 cases. It demonstrates the improvement in the autonomic system balance, as evidenced by an improved LF/HFRatio. Cases that had sympathetic dominance moved towards balance of the sympathetic and parasympathetic systems. rMSSD, which measures change in the parasympathetic system was also shown to be improved.

SUMMARY OF 28 CASES TREATED WITH TFT WHERE SDNN INCREASED

Case	Type of Problem	PreTx	Post Tx	% Chg	Pre Tx	Post Tx
1	Anger re work situation	42.9	157.6	267.4	8	1
2	Procrastination/anxiety	47.0	96.3	104.9	7	1
3	fear of anger/judgment	29.3	95.7	226.6	7	1
4	Depression	138.0	150.0	8.7	7	1
5	Shame	57.1	68.5	20.0	10	1
6	loss of relationship	31.1	75.0	141.2	7	1
7	Extreme fatigue	73.5	135.7	84.6	9	1
8	Depression, anger	79.0	105.4	33.4	8	1
9	Phobia	35.1	148.3	322.5	6	1
10	Phobia/hypochondria	59.2	105.4	78.0	8	1
11	fear of doctor, needles	57.9	67.4	16.4	6	4
12	Anxiety	53.8	152.9	184.2	10	1
13	Depression	29.2	81.7	179.8	6	1
14	school behavior problems	67.6	102.9	52.2	8	1
15	eating disorder	19.9	20.6	3.5	8	1
16	Specific phobia	53.9	137.8	137.1	6	1
17	food cravings	59.2	111.3	88.0	5	1
18	loss of husband	61.9	116.4	88.0	6	1
19	Phobia	67.2	171.9	155.8	8	1
20	back pain, malaise	18.5	124.7	574.1	8	1
21	Trauma	47.4	95.6	101.7	10	1
22	Obsession	50.1	59.7	19.4	5	1
23	School problems	71.5	150.1	109.9	6	1
24	work upsets	82.0	138.2	68.5	7	1
25	Trauma	50.0	112.0	124.0		No SUD
26	Anger	73.2	103.9	41.9	5	1
27	joint pain	47.4	63.4	33.8	7	1
28	Compulsion	60.2	65.5	8.8	6	3
	Mean	55.8	107.6	117.6*	7.2	1.2

*Mean percent change in SDNN was calculated adding each individual percent change in and dividing the sum by the number of cases

DISCUSSION

The data show improvements after TFT treatment, both by the clients subjective self_report (the SUD) and the objective, placebo_free measurements of HRV. Furthermore, the HRV improvements after TFT treatments greatly exceeded expectations for outcomes based on other HRV studies. Table 1 lists studies found in the literature with statistically significant increases in SDNN or related measures. Caution must be used in making direct comparisons because some of these studies used data collected over 24 hours and analysis techniques vary.

FURTHER STUDY

We recommend that further research be done, directly comparing the outcomes of TFT with other psychotherapy treatments, using HRV. It would also be useful to do a study using both HRV and a recognized psychological pencil and paper instrument to further explore the relationship between the client's self report and HRV.

TIME AND FREQUENCY DOMAIN ANALYSIS
FOR CHANGES IN AUTONOMIC BALANCE
4 Cases Pre and Post TFT

Female age 60, Phobia		
	Pre Tx	**Post Tx**
SDNN	35.1	148.3
rMSSD	17.2	94.8
LF Power	181.6	2408.2
HF Power	63.8	2999.9
LF/HF Ratio	2.8	0.8
Total Power	468.3	6352.6
Male age 47, Depression		
	Pre Tx	**Post Tx**
SDNN	29.2	81.7
rMSSD	7.9	23.5
LF Power	185.4	52.3
HF Power	21.9	11.2
LF/HF Ratio	8.5	4.7
Total Power	355.2	207.6
Male age 28, Loss of Relationship		
	Pre Tx	**Post Tx**
SDNN	31.1	75.0
rMSSD	23.6	53.3
LF Power	186.6	778.4
HF Power	106.7	607.3
LF/HF Ratio	1.7	1.3
Total Power	416.1	1708.5
Female age 44, Family upsets		
	Pre Tx	**Post Tx**
SDNN	54.0	124.8
rMSSD	13.7	58.2
LF Power	1181.2	609.1
HF Power	25.8	590.5

LF/HF Ratio	45.7	1.0
Total Power	1527.4	4616.0

LF = Low Frequency Power (mainly influenced by sympathetic)
HF = High Frequency Power (mainly influenced by parasympathetic)
rMSSD is mainly influenced by changes in parasympathetic
SDNN is influenced by changes in both sympathetic and parasympathetic
An LF/HF Ratio > 1 indicates sympathetic dominance; the higher above 1, the greater the sympathetic dominance

Invitation to experiment for yourself. Pick up a copy of the trauma algorithm protocol and see what happens in the two minutes it takes to do the procedure.

SIMPLE TRAUMA PROTOCOL

Step 1. **Rate the Upset** as you think of the traumatic event on a One to Ten Scale (1= no upset, 10=worst)

Step 2. **Tap: beginning of eyebrow, under eye, under arm, and under collarbone** (See Chart below for location of points).

Do the 9 Gamut series While continuously tapping the gamut spot:

1. Close eyes
2. Open eyes
3. With your eyes look down and left
4. With your eyes look down and right
5. Whirl your eyes in a complete circle in one direction
6. Whirl your eyes in a complete circle in the other direction
7. Hum a couple bars of any tune
8. Count to five
9. Hum again.

Repeat tapping: beginning of eyebrow, under eye, under arm, and under collarbone.

Step 3. **Rate the upset**:
If upset is *two or less* on the ten point scale – **go to step 4**.
If upset is *not changed – or has changed but has not dropped to two points* on the ten point scale – **Tap side of hand and repeat steps 2 and 3**.
Stop if the upset is not dropping after repeating this step.

Step 4. Do the floor to ceiling eye roll. While continuously tapping the gamut spot and holding your head level, rotate your eyes on a vertical line from the floor to the ceiling over 6-7 seconds.

# # #

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