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**Abstract**

Post-traumatic Stress Disorder (PTSD) is one of the Anxiety Disorders, with particularly debilitating effects due to flashbacks and hypervigilance in daily life. Treatments commonly focus upon either pharmacological or psychotherapeutic modalities, but there is often a need to merge both of these approaches so as to deal effectively with the somatic as well as the psychological symptoms of PTSD in particular clients. This case study reports the application of a combined approach, using both client-centered counselling plus biofeedback of respiratory sinus arrhythmia to train the client to control his exaggerated sympathetic nervous system responses. Results indicated that both physiological and psychological measures of PTSD in this client significantly reduced during the seven treatment sessions.

The incidence of Post-traumatic Stress Disorder (PTSD) among the adult population has been reported as between eight and nine percent in the USA (Grinage, 2003), with an increase of up to 30% in high risk groups since the events of September 11th, 2001 (Klein, Caspi, & Gil, 2003). The Australian Bureau of Statistics estimates that about 16% of the population suffers from some anxiety disorder, including PTSD (ABS, 2001). However, in spite of this incidence, PTSD has been described as the least studied of the anxiety disorders (Fryer, 2000). Although it was once viewed as a ‘post-war’ illness, and therefore relating to a relatively small segment of the population, Grinage (2003) comments that about 25 to 30% of people that are exposed to a traumatic event that may not include warfare eventually develop PTSD. There is limited research available that suggests that, for many people, the disorder may be undetected and untreated (Koenen et al., 2003), but which may effect daily functioning in subtle ways, often manifesting itself in presentation for counseling on related issues which might appear to the client as “stress”.

Thus, attention to the possibility of PTSD in even sub-clinical states, plus indications on ways of treating this anxiety disorder, are of direct relevance to everyday counselling practice. Following from that point, there is no doubt that PTSD is a debilitating anxiety disorder that can cause significant distress and consequent higher rates of usage of health services because of decreased well-being, compromised physical health, poor quality of life and psychological maladjustment (Zatnick et al., 1999). As a result of the pervasive nature of PTSD, treatment has naturally focused upon a multidimensional approach. There are two major treatment modalities—psychotherapy (Rothbaum, Ninan, Thomas, 1996) and psychopharmacology (Foa et al., 2000). Psychotherapy treatments have most recently applied variants of Cognitive and/or Behavioural therapies, and medications used include the treatment of the related anxiety and depressive symptoms with anxiolytics and antidepressants.

The present study reports on a combined psychotherapy and physiologically-oriented treatment approach that applied biofeedback of respiratory sinus arrhythmia (RSAFB) within a counselling environment to assist clients to reduce their overall levels of
PTSD symptomatology. RSAFB allows the therapist to focus upon the manifestations of PTSD which show in the client’s exaggerated sympathetic nervous system responses to anxiety, including increased heart rate and the attenuation of RSA amplitude. As noted by Sharpley (2002), the speed at which the heart beats is determined by the autonomic nervous system, under which the sympathetic nervous system (SNS) increases heart rate and the parasympathetic nervous system (PNS) restores it to resting levels. In a healthy individual, the SNS and the PNS work in tandem to raise and lower heart rate according to momentary demands. This phenomenon occurs naturally when we breathe in (the heart comes under SNS control) and breathe out (heart come sunder PNS control). Thus, normal functioning allows for a curve of heart rate from maximum to minimum during breathing, this is called Respiratory Sinus Arrhythmia or RSA. In a young, fit and healthy person, the amplitude (i.e., the number of beats between the highest and lowest heart rates) may be between 15 to 30 or more beats per minute (See figure 1).

![Normal "Healthy" RSA](image)

\textbf{Normal “Healthy” RSA}

However, in the chronically anxious person (e.g., with PTSD), there is a pattern of long-term SNS arousal which can reduce the amount of SNS/PNS variability in heart rate. In the case of such a person, the RSA amplitude is reduced to very low levels according to age and health, but which may be as little as two or three beats per minute. Figure 2 shows such an RSA curve.
Participant
The client reported on here (‘S’), was a 23 year-old male who had a ‘near-death’ experience while diving. He had needed to ascend quickly, suffered from ‘the bends’ and required decompression in a chamber. Unfortunately, he had been sent home twice before receiving the appropriate treatment, suffered severe pain and headaches for 24 hours before decompression, and became claustrophobic and anxious while in the decompression chamber for several hours. Both his eardrums had been perforated and he had been informed that his survival chances were less than 20%, and that if he survived he would suffer permanent damage to his hearing.

Assessment
At the time of treatment, he presented with poor day-to-day functioning, anxiety, sleep disturbance, hypervigilance, regular nightmares and flashbacks, and a lack of motivation and poor concentration. When administered the Clinician Administered PTSD Scale (CAPS) (Blake, et.al.,1998), which is a semi-structured interview designed to assess the essential features of PTSD as defined by the DSM-IV (American Psychiatric Association, 2000), ‘S’ met the criteria for PTSD according to the DSM-IV-TR. He was also administered the Zung Self-Rating Anxiety Scale (Zung, 1971), on which he scored and SAS index of 74, which classified him as experiencing ‘severe anxiety’, and the Zung Self-Rating Depression Scale (Zung, 1965), on which he scored and SDS index of .76, indicating moderate to severe depression. His resting heart rate was 88 bpm, and his average RSA was 4.7 bpm.
Setting, Equipment and Treatment Regime

All treatment was conducted in the PTSD and Anxiety Disorders Clinic at the School of Health Sciences, Bond University by the author. Heart rate and RSA data were collected via BIOVIEW series IV (Zencor). For pre- and post-treatment collected of RSA for statistical calculations and additional reliability, surface ECG electrodes (Blue Sensor, Ambu) were applied to ‘S’’s left and right wrists after skin preparation of cleaning with methylated spirits. Data were downloaded via the HRVIEW program to a computer and analysed to produce statistical summaries. Training sessions used a less-invasive device for collection of heart rate via pulse (BIOVIEW-IV), consisting of an earclip to the lobe of ‘S’’s left ear and his pulse data were collected and displayed on the computer screen as an ongoing trace against time which demonstrated RSA. This device was used during RSAFB training because it enables the client to move his/her hands without confounding the ECG signal that is collected when surface electrodes are applied to the client’s wrists. Thus, this equipment and sensors enable relatively non-invasive collection of the effects of the SNS and PNS upon the participant’s heart rate and RSA.

All treatment was based upon the application of visual feedback via computer screen of ‘S’’s heart rate and his RSA curve. This procedure has been previously validated in several studies (e.g., Cowan, Kogan, Burr, Hendershot & Buchanan, 1990; Reyes, del Paso, Godoy & Vila, 1992; Sharpley, 1994), and was applied here in the following regime:

Session 1. Intake session (history, assessment, baseline HR and RSA).
Session 2. Respiration-based RSAFB via computer screen of ‘S’’s heart rate.  
(This consisted of showing ‘S’ the computer screen on which his heart rate was being plotted and demonstrating how he could increase the amplitude of his RSA via deep breathing).

Session 3. Visualisation
(‘S’ was asked to visualize a calm environment in which he felt secure, and to then see for himself how this influenced his RSA amplitude).

Session 4. Progressive muscle relaxation
(‘S’ was instructed in PMR and required to view how this effected his RSA amplitude).

Sessions 5 & 6. Systematic desensitization
(‘S’ produced a stress hierarchy and then applied the techniques taught during sessions 2 to 4 with visual RSAFB via the computer screen. By this procedure, ‘S’ was able to apply these techniques as he determined them to be effective and/or relevant to his control of his RSA amplitude when he was imagining revisiting the stressful events associated with his diving accident and the consequent trauma that led to his PTSD).

Session 7. Re-assessment of anxiety, depression, PTSD, HR and RSA.
This treatment regime was applied within a non-confrontational counselling environment, with application of the selected procedures listed above as “possible ways you can help train yourself to control the way you react to stress”. The use of a multifaceted treatment approach based upon visual RSAFB and within client-centered
counselling which focused upon the establishment of the Therapeutic Alliance is the basic treatment regime used in the PTSD and Anxiety Disorders Clinic. While RSAFB was the principal focus of the treatment offered to ‘S’, and therefore is the topic of this paper, the counselling environment in which it was applied should be emphasized. As has been suggested by many authors, unless clients are engaged via the establishment of the Therapeutic Alliance, particularly the bonding aspect of it, prognosis for therapy outcomes is relatively poor.

**Results and Discussion**

After seven sessions of RSAFB and allied treatment protocols based upon RSAFB presented within a counselling environment, ‘S’ showed clinically significant reductions in both his SAS scores from a Baseline Index of 74 (severe anxiety) and SDS scores (Baseline Index = .76, moderate to severe depression) to a post-treatment SAS Index of 34 (low anxiety) and SDS Index of .60 (not depressed). His CAPS score after treatment failed to indicate the presence of PTSD according to DSM-IV-TR criteria. In terms of his presenting problems and self-report, ‘S’ commented that, after treatment, he felt more in control of his life, was better able to control anxiety symptoms when faced with PTSD-inducing stimuli, his depressive symptoms were dramatically reduced, and that he had experienced a major reduction in flashbacks, nightmares and avoidance behaviours previously present. His resting heart rate was 64 bpm, and his average RSA amplitude was 17.6 bpm. Figure 3 shows his RSA curves.

**Figure 3**

**Pre- and Post-Treatment RSA**

These data indicate that the multi-faceted treatment regime based upon RSAFB was successful in seven sessions in reducing the PTSD symptoms of this client who had suffered significant trauma and life-threatening events. While no claim is made here that RSAFB alone constituted the entire therapeutic regime or accounted for the clinically significant changes noted over the seven weeks of treatment, all of the
interventions were supplementary to RSAFB, and all relied upon it to provide ‘S’ with evidence of the effectiveness of the various components. It is doubtful if any single therapy aspect can be reliably singled out as that most responsible for treatment effectiveness and more recent evaluations of such commonly-cited ‘evidence-based’ treatments as CBT have clearly shown that it is the actual therapist-client engagement that is the principal causal factor in effective outcomes (e.g., King, 1998). However, notwithstanding that, Sharpley, Guidara and Lancaster (1996) presented data from a client who received visual feedback of heart rate and who commented that “Biofeedback was very helpful because I could actually see the results. It made it easier to learn the relaxation”. (p. 58). If seeing is believing, then the application of RSAFB here may have allowed ‘S’ to focus upon a direct and fundamental psychophysiological manifestation of his heightened anxiety state and then reduce it via learnt control of his RSA amplitude.

Finally, although many counselling environments do not include such ‘technical’ equipment and approaches as that described here, the marriage of the ‘scientific’ and the ‘human’ via RSAFB and client-focused counselling within a therapy approach that sees the development of the client-counsellor engagement and Therapeutic Alliance as primary, can be of benefit to clients. PTSD is difficult to treat, and counselors in the field may find that combinations of the technical with the human could help the produce more effective outcomes for this difficult and often resistant problem.

Footnote.

1 This person gave written permission for his treatment data to be reported in this way.
References


