Programme title:

Swingle Clinic

Website/for more information see:

http://www.swingleclinic.com/

What claims does the company make/what does the programme target?

The Swingle Clinic claims to be able to assist individuals with a wide range of therapeutic needs to “regain control,” “get back on track with life,” and “quiet the mind” (Swingle Clinic, 2015). Neurofeedback therapy is intended to improve cognitive function, attention, mood, anxiety, and behaviour. The specific neurological conditions and psychological disorders targeted include attention deficit hyperactivity disorder, autism spectrum disorder, chronic fatigue, depression, anxiety, insomnia, post-traumatic stress disorder, epilepsy, stroke, traumatic brain injury, and fibromyalgia, though the clinic also markets itself to neurologically healthy individuals for “brain optimisation.” Accordingly, the recommended number of sessions varies widely from client to client depending on their condition and corresponding needs. The Swingle Clinic suggests that younger individuals with more neuroplastic brains may have shorter treatment schedules, while older individuals or those with more severe conditions (e.g., traumatic brain injury) may require more extensive training. In any case, it is recommended to continue with the treatment for a few sessions after the targeted symptoms show consistent and reliable improvement, by which the healthier brain patterns are mean to become habitual (Swingle Clinic, 2015).

What it involves:

The practitioners at the Swingle Clinic utilise a form of biofeedback referred to as “neurofeedback” or “neurotherapy” to treat a wide variety of neurological and psychological disorders (Swingle Clinic, 2015). Treatment with neurotherapy is intended to correct inefficiencies in electrical brain activity by changing brainwave patterns through self-regulation. As an initial assessment, measurements of various electrical brainwave frequencies are made using electroencephalography (EEG) to evaluate the condition of each client and subsequently develop an appropriate therapy schedule. The number of anatomical locations prescribed for assessment depends on the condition of each client; a brain map of five different locations Is generally used for psychological disorders, while nineteen locations might form the brain map of a closed head injury, stroke, or other neurological trauma (Swingle Clinic, 2015).

During each of the ensuing therapy sessions, the client undergoes EEG scanning while performing tasks requiring modulation of brainwave activity (Swingle Clinic, 2015). This task takes different forms, depending on the needs of the client. Children have the option of playing a type of video game involving either hot air balloons or racing cheetahs, while adults have the option of playing a video game or using a more complex interface. In either case, success is achieved by modulating the brainwave activity to match a desired predetermined pattern, which is fed back to the client using audio or visual cues (e.g., if the desired brainwave activity is produced, the client is rewarded with their cheetah winning the race). The precise brainwave activity prescribed for each client is based on both normative brainwave profiles and information from clinical databases within the Swingle Clinic (Swingle Clinic, 2015).

Prices:

Initial 1-hour assessment: US$160-200 (5-point map) or US$310 (19-point map)

Follow-up treatment: US$115 for each 50-minute session

Reassessment session (after every 4th or 5th treatment session): US$150-190

Evidence for efficacy:

The experimental evidence regarding the use of neurotherapy/neurofeedback is mixed; while a few studies have identified positive effects of the treatment (Éismont, Lutsyuk, & Pavlenko, 2011; Nan et al., 2012; Wang & Hsieh, 2013; Zoefel, Huster, & Herrmann, 2010), others have found no significant difference between neurotherapy and a control or placebo condition (Bink et al., 2013). Of the studies that did demonstrate positive treatment effects, many correlated these effects with changes in the relative amplitude of particular frequency bands, however, the specific frequency changes observed varied from study to study with different targeted symptoms and different experimental outcome measures with little overlap. In a relatively small pool of published, peer-reviewed studies, this makes it difficult to robustly assess the effects of neurotherapy on any given psychological or neurological condition, however, the variety of different effects does speak to the potential of neurotherapy to affect a range of electrophysiological features. The results of several of these studies are summarised below:

1. *Individual Alpha Neurofeedback Training Effect on Short Term Memory (Nan et al., 2012):* In this study, 32 students between the ages of 20 and 29 were randomly assigned to neurofeedback treatment and experimental control groups to assess the effects of neurofeedback training on a digit span test of short term memory. Though the control group did not undergo any sham training, they did engage in the same repeated digit span tests as the treatment in order to rule out the possibility of a practise effect. The neurofeedback training regimen involved 3 to 4 sessions per day for 15 days, or a total of 20 sessions. Results indicate a significant positive correlation of session number with the average of the relative amplitude in individual alpha band of all subjects, as well as alpha bands, individual lower alpha bands, individual upper alpha bands, and sigma bands. Delta bands, on the other hand, were significantly negatively correlated with session number. While alpha is generally associated with meditation and alertness, delta is primarily a sleep wave, and sigma indicates mental alertness. However, only the amplitude change of the individual upper alpha band was correlated with the increased performance on the digit span test. Both forward and backward digit spans were significantly increased in the treatment group relative to the control group at post-test, indicating improvements in short term memory performance. Contrary to expectations, there were no significant changes in resting baseline EEG for either group. This study provides evidence of both significant changes in particular brainwave amplitudes during neurofeedback training, and significant improvements in short term memory as measured by an isolated test as a result of this training.

2. *Neurofeedback Training Improves Attention and Working Memory Performance (Wang & Hsieh, 2013):* In this study, 32 participants were randomly assigned to experimental treatment and control groups; while the experimental participants underwent 12 sessions of neurofeedback training over 4 weeks, the control group received sham training that was not linked to the participant's own EEG recordings. Results indicated that older adults in the experimental treatment group experienced significant improvements in orienting scores, working memory function, and executive attention, while the younger experimental group improved only on the executive attention component. No group exhibited significant effects of training on the alerting component. The EEG topography of resting theta amplitude, which has been associated with attention and working memory, was found to be significantly increased in both younger and older neurofeedback groups after training, but not in the sham groups. These findings demonstrate that uptraining of frontal midline theta activity is possible with neurofeedback training, and that this might improve attention, working memory, and executive function in normal aging adults and to a lesser extent in younger individuals.

3. *Neurofeedback Training of the Upper Alpha Frequency Band in EEG Improves Cognitive Performance (Zoefel, Huster, & Herrmann, 2011):* In this study, 14 participants underwent 5 sessions of neurofeedback training on 5 consecutive days, with a mental rotation test administered on the first and last day. A control group of 10 participants was utilised to rule out a practice effect on this test. Results indicated a significantly higher

amplitude of the targeted upper alpha band in the last session, relative to the first session, as well as a significant improvement on the rotation test scores for experimental participants but not control participants. Given the small sample size of the experimental group, individual results were also considered; of the 14 experimental participants, 11 showed significant improvement with training and 3 did not. Emphasis was also placed on the independent nature of the upper alpha band changes, which demonstrated that neurofeedback training can be used to target a very specific frequency range without significantly altering other bands above or below.

It is worth noting that though an earlier review of the efficacy of neurofeedback training concluded that the existing body of research did not provide adequate support for the therapy (see: Lohr et al., 2001), all three of the studies described above were published ten or more years after that particular review.

Evidence against efficacy:

As with many such therapies, the majority of published studies fail to provide adequate experimental measures for scientific validation, with a lack of control groups, non-random allocation of treatment groups, small sample sizes or case study design, and the use of outcome measures that have questionable psychometric validity (see: Lohr et al., 2001; Nelson & Etsy, 2012; Nelson & Etsy, 2015; Pachalska et al., 2011; Pachalska et al., 2012; Warner, Barabasz, & Barabasz, 2000). Among the more scientifically robust randomised control studies, a recent one by Bink et al. (2013) found no significant effects of neurofeedback training relative to a treatment-as-usual control condition. The results of this study are described in greater detail below:

1. *Neurocognitive Effects of Neurofeedback in Adolescents with ADHD: A Randomized Control Trial (Bink et al., 2013)*: In this study, 45 adolescent males with a diagnosis of ADHD underwent 37 sessions of neurofeedback training over the course of 15 weeks in addition to treatment as usual (both behavioural interventions and medications, as prescribed by the main therapist of the participating psychiatric centre), while the 26 participants in the control group only continued with the individually-prescribed ADHD treatments. The aim of the neurofeedback training was to reduce attention problems; results indicated significant improvements in outcomes of attention and motor speed with no improvements of higher executive functions, however, these results did not differ for the neurofeedback group and the control group and may be attributed to a practice effect. These findings indicate no additional treatment value of neurofeedback training for attention, motor speed, or executive function.

The results described by Bink et al. (2013) are consistent with those of three other double-blind randomised control studies, all of which cited no additional improvement on cognitive measures over sham neurofeedback (Arnold et al., 2013; Logemann et al., 2010; Vollebregt et al., 2013). These results are contradictory with those mentioned above, raising concerns with regards to the efficacy of neurofeedback as a therapeutic tool for individuals with neurological disorders or psychological conditions.

Conclusions:

There is significant evidence demonstrating that a neurofeedback treatment can alter isolated frequency bands (such as upper alpha and resting theta), and this has been shown to affect performance on particular cognitive measures previously associated with those frequency bands (such as short term memory, attention, and mental rotation). However, there is also significant contradictory evidence suggesting that neurofeedback is ineffective, particularly as concerns amelioration of clinical symptoms. Given all of this evidence, it is possible that neurofeedback training itself can be effectively applied to alter specifically targeted brain activity, but that the clinical applications of this are yet to be fully developed and realised due to an incomplete understanding of the neurological and electrophysiological characteristics of psychological disorders and their associated symptoms. Thus, while neurofeedback therapy could be a useful tool and has potential as a treatment for both neurotypical and clinically symptomatic individuals, there is not yet sufficient evidence to support its use in a clinical setting.

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