Subliminal exposure to positive auditory stimuli significantly improves emotional well-being in patients with anxiety and/or depression

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Abstract

This case series study investigated the effect of subliminal, sub-threshold verbal affirmation messages in 53 patients with anxiety and/or depression. Anxious (n = 22), depressed (n = 2), and both anxious and depressed (n = 29) subjects were exposed to subliminal, sub-threshold verbal suggestion therapy, both with and without music overlay. Following a medical history assessment, patients self-reported emotional and psychological state in an 87-item questionnaire before and after treatment period. Patients were unaware of subliminal text underlying music in each treatment session. Seven sessions of the 30-minute treatment protocol were found to be significantly effective in reducing self-reported symptoms of anxiety and depression in patients both in the short term (immediately following the seventh session) and long term (in follow-up sessions). Results of the technique, labeled Quantum Neuro Recoding (QNR), were found to be effective with and without music overlay. These results provide evidence for the potential efficacy of treating patients with anxiety alone and anxiety and depression with repeated subliminal auditory stimuli.

Introduction

Although the fortunate majority of the population rate their mental health as good, a large portion say they that their mental and emotional well-being has not been good at least part of the time. According to the World Health Organization, one in four people in the world will be affected by mental disorders at some point in their lives, with around 450 million cases in 2001. Mental disorders, including anxiety and depression are among the leading causes of disability worldwide (World Health Organization, 2001). Many patients seek psychiatric help and counselling in an effort to alleviate symptoms. In this study, we analyzed the effect of subliminal, sub-threshold verbal affirmation messages in a case series of 53 patients with anxiety and/or depression who sought treatment at the Brain Wellness Spa in Perth, Australia.

Despite skepticism from the public, clinicians and biomedical researchers, research studies continue to provide evidence for the significant short- and long-term impact that various types

of subliminal messages can have on physiological and behavioral processes (van Gaal et al. 2012; Hassin 2013), including changes in cardiovascular state (Capa 2011), mood (Monahan et al. 2000), motivation (Aarts et al. 2008), and even political leanings (Hassin et al. 2007; Weinberger and Westen 2008). Effects are not limited to healthy subjects. Studies have shown that subliminal stimuli have an impact on the cognition of patients who suffer from a variety of psychiatric conditions as well as control subjects (e.g. Murphy and Zajonc 1993; Hartikainen et al. 2000; Banse et al. 2001; Fazio and Olson 2003; Gray 2001).

Behavioral changes observed correlate with physiological activation of the brain. Functional Magnetic Resonance Imaging (fMRI) studies confirm the significant impact of both visual and auditory subliminal stimuli on the brain, frequently via observed activation of the amygdala and fusiform gyrus, for example, in the case of presentation of subliminal face images (Phillips et al. 2004; Grotegerd et al. 2013). The mechanism of action of such subliminal stimuli and the body's reaction, has been proposed to be direct neural relay of auditory information to the amygdalae followed by the visual cortex (LeDoux 1996), producing an unconscious response to stimuli (Damasio 2010). A study by Grotegerd et al. (2013) used fMRI to analyze the effect of exposing subliminal images of sad, happy and neutral faces in patients with bipolar and unipolar depression, as well as in healthy controls. The study found a significant difference in levels of amygdala excitation between patients with depression and normal patients, as well as between patients with different types of depression.

The exact mechanisms and areas of activation by subliminal stimuli no doubt vary according to the stimuli used and experimental variables. A systematic meta-analysis of fMRI studies (Brooks et al. 2012) showed that 9 out of 12 studies of subliminal stimuli of faces resulted in the activation of the amygdala, with many studies also reporting activation of the bilateral anterior cingulate, bilateral insular cortex, hippocampus and primary visual cortex. The meta-analysis also included three studies in healthy subjects (Bijsterbosch et al. 2011; Diekhof et al. 2009; Kouider et al. 2010) using subliminal auditory stimuli. These were found to activate the left

lateral cerebellum, left superior temporal gyrus and left insular cortex - regions associated with speech production and comprehension (Brooks et al. 2012).

Early research on subliminal manipulation found that the behavioral effects of masked primes decay within a few seconds (Ferrand 1996; Greenwald et al. 1996). However, observed effects lasted longer when the stimuli were presented multiple times (Levy et al. 2014; Farooqui and Manly 2015). For subliminal stimuli to have a therapeutic effect, the duration of the desired response in a patient must be sufficient to change behavior, for example, by impacting decision-making. This means that after a few exposures, information from unconscious stimuli must be integrated into abstract representations and stored in long-term memory for later retrieval – the type of process associated with conscious learning (Tononi 2004; Shanks 2010; Newell and Shanks 2014).

Few studies have focused on the long term effects of subliminal suggestion, and the ones that did typically noted longer term effects when familiar stimuli (e.g. single words) were used (Naccache et al. 2005; Ocampo 2015). Ruch et al. (2016) suggest that subliminal messages may work via delayed decision-making, particularly where messages contain several pieces of novel information that must be relationally bound in long-term memory. In their study of the duration of impact of subliminal information, Ruch et al. found that visual and verbal subliminal information affected conscious decision-making equally after 15 mins and after 25 mins, providing evidence for the longevity of the effect. The authors hypothesized that subliminal messages consisting of multiple items that require relational processing undergo long-term storage in the hippocampus, which has been found to play a key role in memory-retrieval of subliminally presented information (Duss et al. 2014; Züst et al. 2015).

The study presented below is the culmination of ten years of experience using repeated subliminal therapy sessions to alleviate symptoms of mental illness in patients. Why focus on the subconscious? As Dijksterhuis et al. (2006) noted, it is not always beneficial to use conscious (versus unconscious) deliberation when making a choice, so it is conversely possible that subconsciousness-based therapies may be more effective. Dijksterhuis's deliberation-without-

attention hypothesis postulates that decisions made in the absence of attentive deliberation are better, in part because a larger amount of information can be processed subconsciously (Dijksterhuis 2004).

In particular, unconscious perception may play an important role in the normal human fight or flight response, as well as in its pathological counterparts, phobias and anxiety disorders. In their study "Unconscious anxiety": Phobic responses to masked stimuli, Öhman and Soares (1994) found that human fear responses were triggered by preattentive perceptual analysis of phobic stimuli. Several studies suggest that individuals diagnosed with anxiety have an unconscious attentional bias to processing negative information presented subliminally, likely mediated by unconscious cognitive processes (e.g. Mogg et al. 1993; Mayera and Merckelbacha 1999; Lin et al 2007). A possible mechanism of action is that the information presented subliminally involves an essential first step of "quick and dirty" processing, in conjunction with a subsequent slower processing impacting conscious decision-making (Mayera and Merckelbacha 1999; Hassin 2013; Mudrik et al. 2014).

Evidence to support the use of subliminal affirmative messages to alleviate mental illness is found in the classic study using the words, "Mommy and I are one", by Silverman and Weinberger (1985). This study indicated the subconscious need for a patient to be one with their childhood's "good mother". Orbach et al. 1994 found similar effectiveness of an identification subliminal message, "Mommy and I are alike", in reducing anxiety in subjects with high and medium levels of self-identity. Subjects with low levels of self-identity showed reduced anxiety with the message "Mommy and I are one" alone. Control messages had no impact. To our knowledge, there have been no studies analyzing the effect of subliminal affirmative scripts of multiple sentences lasting more than 20 minutes. Therefore, the aim of this case series is to evaluate whether these scripts, delivered in eight 30-minute sessions, could potentially reduce emotional distress, and improve symptoms of anxiety and depression in subjects diagnosed with anxiety, depression, and co-morbid anxiety and depression.

Method

Participants

A total of 53 adult subjects (17 men, 36 women, mean age = 34) diagnosed with anxiety (n = 22), depression (n = 2), and both anxiety and depression (n = 29) were included in the study. The subjects were a random sample of patients who presented themselves for treatment at the Brain Wellness Spa, Perth, between January 1 and June 20, 2017. Informed consent was obtained from all individual participants included in the study. The cohort of patients included in this study had a variety of occupations and backgrounds, including students, teachers, business owners and managers, nurses, doctors and veterinarians, mechanics, builders, engineers, journalists, as well as unemployed patients. A detailed medical history assessment was conducted for each patient at the clinic.

Primary Outcomes

The primary indicator of patient symptoms was a self-administered 87-point questionnaire on their emotional and psychological state, completed both before and after treatment. Subjects were asked to rate the following before the first session and after their seventh session (before the eighth and final session):

- *22 indicator feelings*: stress, anxiety, depression, feeling flat, moods, tension, worry, confusion, loss of clarity, fatigue, fear, grief, insomnia, anger, aggression, jealousy, negative thoughts, sadness, emotional reactivity, hate, negative attitudes and negative thinking. Patients were asked to choose the level of each indicator from a scale of 1 to 10, 1 being mild symptoms, and 10 being severe symptoms.
- *10 indicator feelings*: loneliness, feeling isolated, unhappiness, desperation, being unable to cope with life, hopelessness, being unloved, being unwanted, giving up on life and never being able to have a better life. Patients were asked to choose Yes or No to these questions, with "Yes" indicating unhealthy perceptions.

- *12 questions on long-term state*, for example: "Do you constantly worry about money?" and "Do you experience mental exhaustion from going about your daily life?" Patients were asked to choose Yes or No to these questions, with "Yes" indicatingpatient inability to psychologically and emotionally cope with their life.
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- *29 statements of emotional well-being*: Patients were asked to rank themselves on each question on a scale of 1 to 5, with 1 being low, and 5 being high. For example 1 – "I feel as though I worry constantly" to 5 – "I leave the worrying to others".
- *11 session review questions:* For example, "Do you have mind chatter?" Patients were asked to choose Yes or No to these questions

Procedure

Assessment

All patients were treated as part of the routine service at the Brain Wellness Spa in Perth. Patients completed the questionnaires in the Primary Outcomes session to monitor levels of anxious rumination and emotional state. They also completed questionnaires on their personal history, medical history, prescription and other drug use immediately before the first treatment session. Patients completed the same Primary Outcomes questionnaires immediately after completion of seven sessions of treatment, and before the eighth and final session. Follow-up meetings were also conducted.

Treatment

In this study, we used the subliminal presentation of sub-threshold verbal suggestion stimuli, that is, stimuli attended to by the brain, but without conscious perception. Each patient received a series of eight individual treatment sessions over a period of several weeks. Treatment followed the same protocol for patients with different diagnoses, including anxiety, depression and co-morbid anxiety and depression, with adherence to treatment protocol ensured by

Each session, labeled Quantum Neuro Recoding (QNR), included subthreshold auditory information lasting 30 minutes in length, with and without music overlay using noise cancelling headphones. Patients were sitting or lying down, with some falling asleep during the process.

The text used for the subliminal therapy sessions is proprietary, and developed over a period of ten years. The text was designed to help patients in eight stages. In session 1, patient feelings of suffering and being overwhelmed were addressed. In session 2, negative beliefs and values were targeted. Session 3 involved addressing childhood insecurities, trauma and fears. In session 4, patients were assisted in developing healthy perceptions. Session 5 targeted default patterns of behavior from conception, and session 6 worked on genetic mental illness and money stress. Session 7 aimed to modify emotional patterns, and the next step, in session 8, was to lock in new behaviors.

Analysis

Descriptive data are reported here as mean, variance, number, and percentage. Comparisons of data were calculated using t-tests, as appropriate. P values less than 0.05 were considered to be significant. All analyses were carried out with SPSS software (Armonk, IBM Corp, NY, USA).

Results

We hypothesized that patients would report significantly different levels of symptom severity with different diagnoses both before and after therapy. We also hypothesized that patients who suffered from (a) anxiety and (b) anxiety and depression would respond significantly to subliminally presented affirmative auditory information, and show lower levels of stress, anxiety and depression indicators after 7 sessions of treatment, than before, as recorded in questionnaires. The null hypothesis would be that there is no difference between scores between patient diagnosis populations, and no difference between scores before and after treatment. In other words, 2 null hypotheses were (a) there was no difference between

patients with different diagnoses and (b) no effect of the subliminal treatment protocol on either population.

Two-sample T-tests of mean severity of 22 self-reported indicator feelings in patients with anxiety versus patients with anxiety and depression, before and after seven treatment sessions (on a scale of 1 to 10, 1 being mild symptoms, and 10 being severe symptoms), confirmed significant differences in means between patients with anxiety alone, and patients with anxiety and depression (Table 1): ($P \leq 0.05$). Patients with anxiety and depression had significantly higher scores (indicating lower levels of emotional well-being) than patients diagnosed with anxiety alone, both before and after treatment.

Paired sample T-tests of mean severity of 22 self-reported indicator feelings before versus after seven treatment sessions in patients with anxiety and those with anxiety and depression (on a scale of 1 to 10, 1 being mild symptoms, and 10 being severe symptoms) confirmed our hypothesis of significant improvement in mental health indicators in all 3 populations of patients (Table 2, Figure 1): ($P \leq 0.05$). Significant improvement was observed in patients with anxiety, who scored a mean of 4.70 ±0.62 (95% CI) and 1.29 ±0.20 (95% CI) before and after treatment respectively. Patients with anxiety and depression scored a mean of 6.22 ±0.66 (95% CI) and 1.92 ±0.24 (95% CI) before and after treatment respectively. Patients with depression alone scored a mean of 6.23 ±1.05 (95% CI) and 2.41 ±0.42 (95% CI) before and after treatment respectively. The total cohort of subjects improved their symptoms significantly: before treatment they scored a mean of 5.59 ±0.60 (95% CI) and 1.72 ±0.21 (95% CI) after treatment. All results were significant ($P \leq 0.05$).

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Table 1. Two-sample T-tests of mean severity of 22 self-reported indicator feelings in patients with anxiety versus patients with anxiety and depression, before and after seven treatment sessions (on a scale of 1 to 10, 1 being mild symptoms, and 10 being severe symptoms)

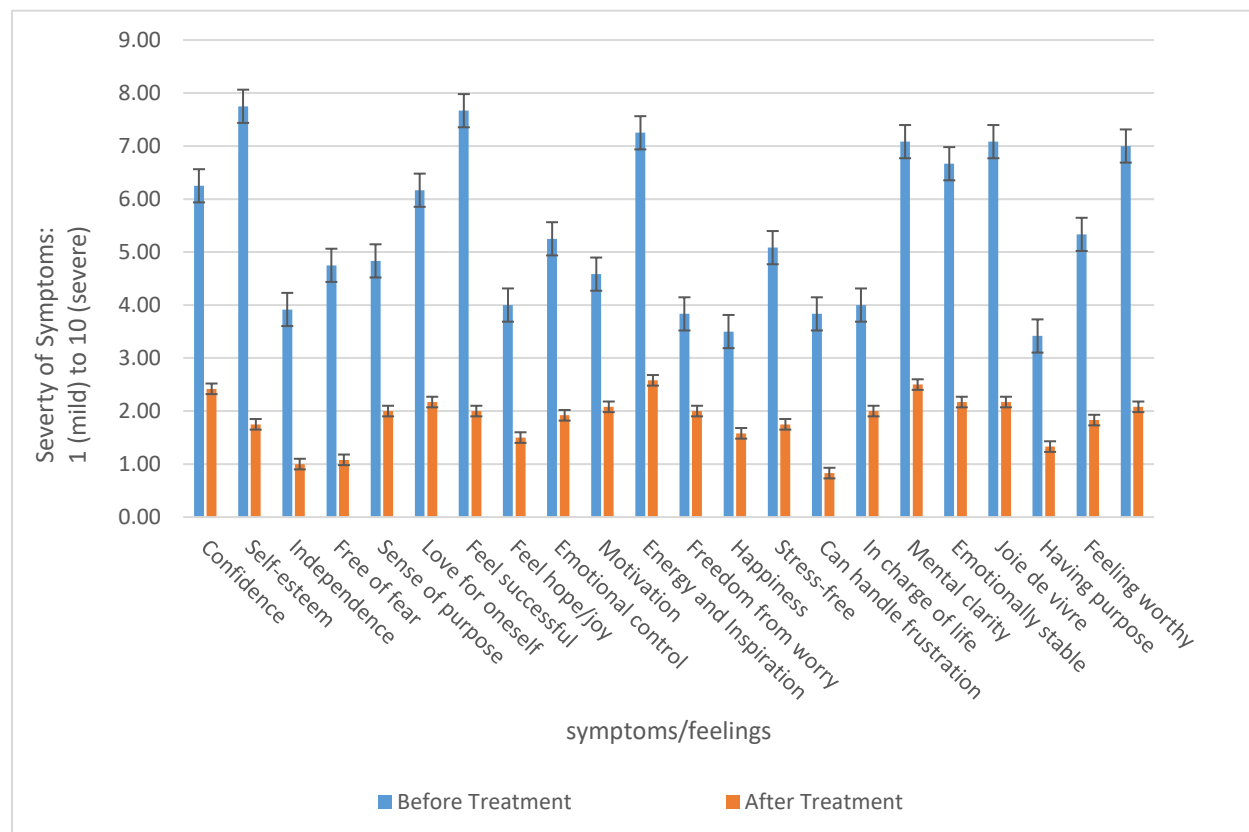| Treatment stage	Before Treatment		After Treatment	
Patient diagnosis	Anxiety	Anxiety and Depression	Anxiety	Anxiety and Depression
Mean	4.70	6.22	1.39	1.92
SD	1.40	1.48	0.46	0.55
95% CI	0.62	0.66	0.20	0.24
t Stat	-3.49		-3.54	
P(T<=t) two-tail	0.00114		0.001023	
t Critical two-tail	2.02		2.02	

Table 2. Paired sample T-tests of mean severity of 22 self-reported indicator feelings before versus after seven treatment sessions in patients with anxiety and those with anxiety and depression (on a scale of 1 to 10, 1 being mild symptoms, and 10 being severe symptoms)

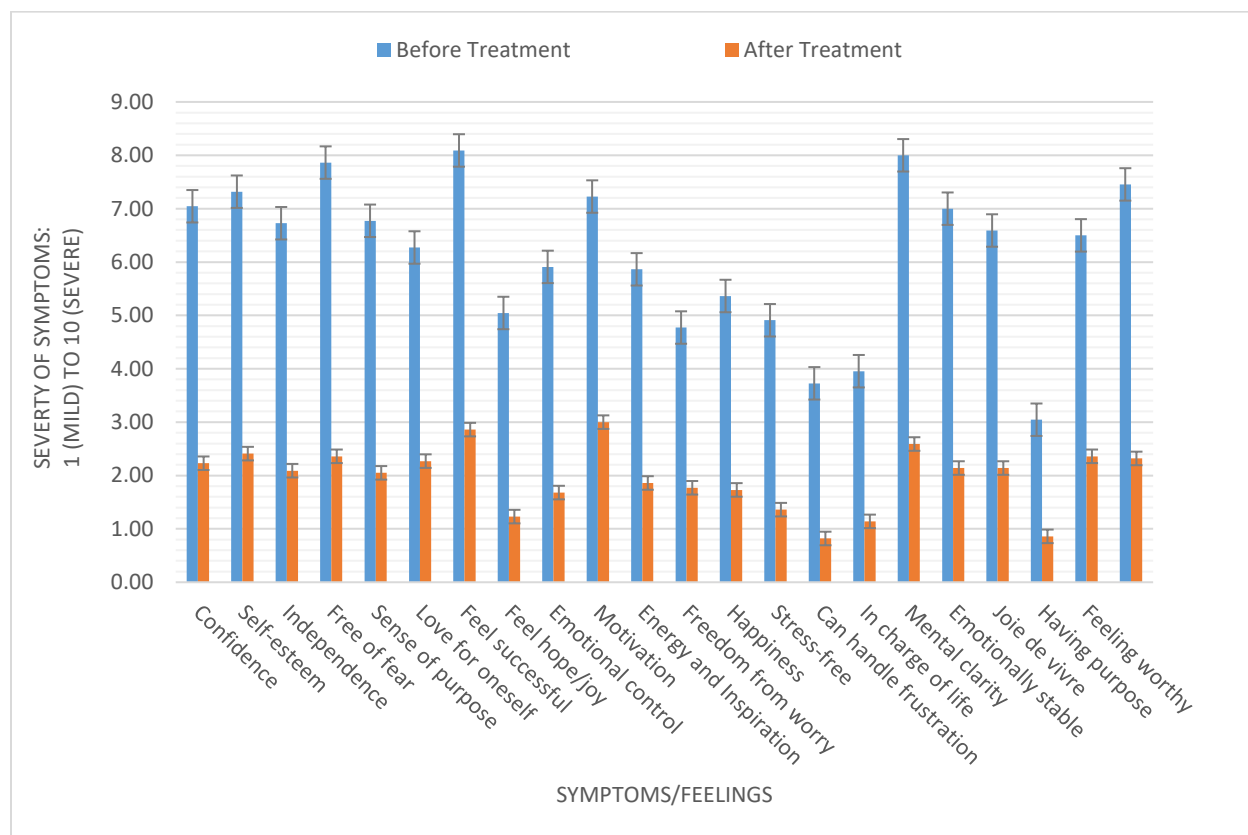| Patient diagnosis	Anxiety		Anxiety and Depression		Depression		Total	
Treatment stage	Before	After	Before	After	Before	After	Before	After
Mean	4.70	1.39	6.22	1.92	6.23	2.41	5.59	1.72
SD	1.40	0.46	1.48	0.55	2.36	0.95	1.35	0.47
95% CI	0.62	0.20	0.66	0.24	1.05	0.42	0.60	0.21
Pearson Corr.	0.76		0.93		0.78		0.90	
T Stat	14.20		20.34		10.32		19.00	
P(T<=t) two-tail	3.07E-12		2.69E-15		1.12E-09		1.04E-14	
t Critical two-tail	2.08		2.08		2.08		2.08	

Figure 1. Mean severity of 22 self-reported indicator feelings before versus after seven treatment sessions in patients with anxiety compared with those with anxiety and depression, and in all 53 patients (on a scale of 1 to 10, 1 being mild symptoms, and 10 being severe symptoms).
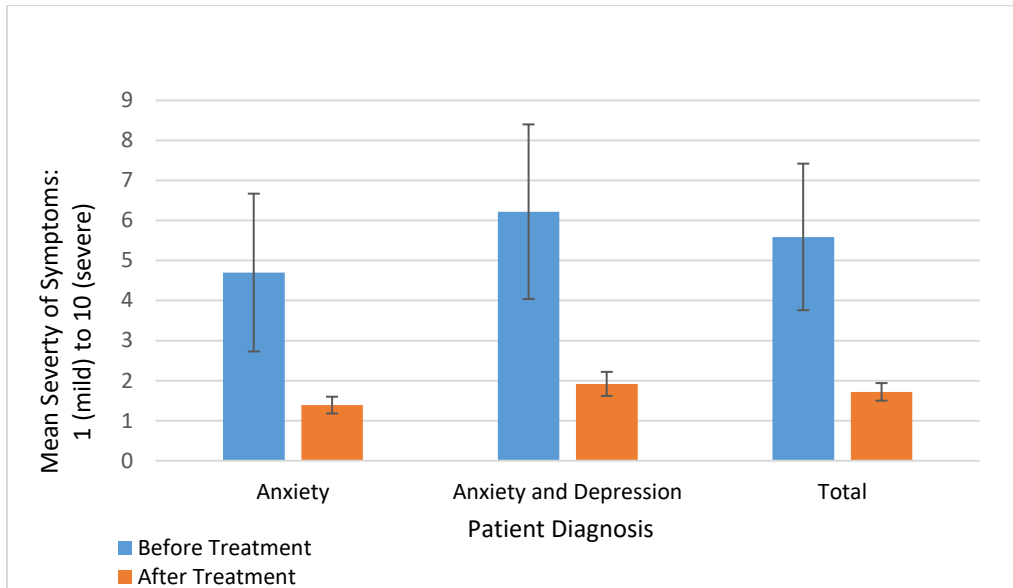
Figure 2. Self-reported change in 21 emotional well-being parameters in patients diagnosed with anxiety, before and after treatment.

Figure 3. Self-reported change in 21 emotional well-being parameters in patients diagnosed with anxiety and depression, before and after treatment.

Discussion

We found that patients in this study had differing levels of severity of symptoms according to diagnosis reported on the questionnaire, such that patients with anxiety and depression had significantly higher scores, indicating lower emotional well-being, than patients diagnosed with anxiety alone. Both sets of patients showed significant improvement in symptoms after seven sessions of subliminal auditory therapy. Follow-up sessions with patients confirmed these results as long-term – a suitable area for a subsequent study.

Studies have shown that while the brain is unconscious during sleep, events, sounds and smells that occurred while sleeping were integrated and stored in long-term memory, and had an effect on behavior once subjects awoke (Daltrozzo, et al. 2012, Arzi et al. 2012, 2014; Kouider et al. 2014, Ruch et al. 2014). Our findings add to increasing evidence for the ability of the unconscious brain to internalize, integrate and remember stimuli, and utilize this information in conscious behavior, affecting mood, emotion and decision-making in the short and long term (Monahan et al. 2000. Reuss et al. 2011).

Our findings provide evidence that subliminal auditory messages, when repeated, in this case in seven 30-minute sessions, have a direct impact on patient emotional state and well-being in patients suffering from anxiety alone, depression alone, and depression and anxiety. Our findings illustrate the potential clinical efficacy of using subliminal manipulation to improve long-term well-being and the emotional state of patients with anxiety and/or depression. Larger scale controlled trials with randomized designs are now required to compare this approach with conventional interventions.

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Compliance with Ethical Standards

Animal Rights

No animal studies were carried out by the authors for this article.

Conflict of Interest

[The authors' names] declare that they have no conflict of interest.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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