

# Yoga-Enhanced Cognitive Behavioural Therapy (Y-CBT) for Anxiety Management: A Pilot Study

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Cognitive behavioural therapy (CBT) is an effective treatment for generalized anxiety disorder, but there is still room for improvement. The aim of the present study was to examine the potential benefit of enriching CBT with kundalini yoga (Y-CBT). Participants consisted of treatment resistant clients at a community mental health clinic. A total of 32 participants enrolled in the study and 22 completed the programme. After the Y-CBT intervention, pre-post comparisons showed statistically significant improvements in state and trait anxiety, depression, panic, sleep and quality of life. Results from this preliminary study suggest that Y-CBT may have potential as a promising treatment for those suffering from generalized anxiety disorder. Copyright © 2014 John Wiley & Sons, Ltd.

## Key Practitioner Messages:

- Yoga-enhanced cognitive behavioural therapy (Y-CBT) may be a promising new treatment for those suffering from generalized anxiety disorder.
- Y-CBT may also reduce depression in those suffering from generalized anxiety.
- Y-CBT may reduce depression and anxiety in a clinic population where clients suffer from multiple diagnoses including generalized anxiety disorder.

**Keywords:** Anxiety, Y-CBT, Yoga, Meditation, Cognitive Behavioural Therapy, Depression

Generalized anxiety disorder (GAD) is a chronic, relatively common psychiatric disorder with high rates of comorbidity. In the USA, the lifetime prevalence rate is about 5.7% (Kessler, Berglund, Demler, Jin, & Walters, 2005). The central feature of GAD is intense, incapacitating, chronic worry. To reduce these symptoms, cognitive behavioural therapy (CBT), a widely used psychotherapeutic treatment, targets maladaptive thought patterns to affect behavioural change and emotional wellbeing. CBT emphasizes the real-time impact of the person's dysfunctional thought processes and beliefs (Beck, 1995) and employs a goal-focused, directive approach, often supplementing with worksheets and other structured assignments (Greenberger & Padesky, 1995). CBT teaches clients to detect internal and external cues and employ strategies that will enable better management of the psychological and physiological symptoms of anxiety (e.g., Ruscio, Borkovec, & Ruscio, 2001).

Extensive research generally supports the merits of CBT, and it is sometimes considered the 'gold standard' for the treatment of anxiety disorders (Hofmann & Smits, 2008). However, many people with GAD remain symptomatic or do not respond at all to standard CBT (Evans et al., 2008).

In a meta-analysis of randomized placebo controlled studies with participants who met diagnostic criteria for anxiety disorder, Hofmann and Smits (2008) concluded that although research supported the efficacy of CBT as a treatment for anxiety, there is much room for improvement. Researchers have attempted to improve CBT with behavioural techniques, some of which are derived from contemplative practices such as meditation. These new therapies are considered to fall under the broad tent of behavioural therapy. Examples include dialectic behavioural therapy (Linehan, 1993), acceptance and commitment therapy (Pankey & Hayes, 2003) and mindfulness-based cognitive therapy (Segal, Williams, & Teasdale, 2002).

Mindfulness, a component of these techniques, includes concentrated attention, suspension of judgment and increasing awareness of the present moment; recent studies suggest that these strategies might be effective for treating depression and anxiety (Finucane & Mercer, 2006; Hofmann, Sawyer, Witt, & Oh, 2010; Kim et al., 2009). Mindfulness-based cognitive therapy may also include some gentle yoga (Saeed, Antonacci, & Bloch, 2010; Teychenne, Ball, & Salmon, 2008). Yoga is a system of physical exercise and mental/emotional focus that incorporates components of the mind (cognitive and meditative concentration) and the body (postures and breathing exercises). While the goal of yoga historically has been to create a spiritual state of unity, it is also practiced to produce physical

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and emotional wellbeing. Research suggests that yoga can improve mood (Streeter *et al.*, 2010), anxiety (Khalsa & Cope, 2006; Kirkwood, Rampes, Tuffrey, Richardson, & Pilkington, 2005), sleep disturbance, hypertension and headaches (Field, 2011). For example, Streeter *et al.* (2010) recruited a nonclinical sample through advertisements and then randomly assigned participants to a yoga ( $n=19$ ) or walking ( $n=15$ ) group. Participants in the yoga group reported significantly greater improvement in mood and in anxiety than the walking group.

A review of over 150 studies of yoga as a therapeutic intervention revealed a number of research trials reporting reductions in anxiety across a variety of medical disorders (Khalsa, 2004). In another review, Kirkwood *et al.* (2005) identified eight controlled studies, all with positive results. Other single group (uncontrolled) studies showed improvements in anxiety for populations with primarily anxiety disorders (de Vicente, 1987) and with mixed psychopathology (Allen & Steinkohl, 1987).

Although limited in quality, these studies suggest that the practice of yoga may benefit the treatment of anxiety, including GAD. Yoga may exert its effect on psychophysiology by invoking the relaxation response, an endogenous, coordinated response in which arousal of the autonomic nervous system and activation of the hypothalamic pituitary axis are reduced in direct opposition to the well-known fight-or-flight stress response (Jacobs, 2001). Furthermore, the meditative component of yoga practice involving relaxed control of attention has direct effects on cognitive activity by reducing the ruminative and mind wandering activity of the default mode network (DMN) in the brain (Hasenkamp, Wilson-Mendenhall, Duncan, & Barsalou, 2012). Broyd and colleagues (2009) found that higher activity in parts of this network is associated with depression, anxiety, rumination and other negative self-referential thoughts. Rumination and self-focused attention are central features of anxiety disorders and depression (Rochat, Billieux, & Van Der Linden, 2012). Zhao and colleagues (2007) reported that when compared with controls, students with anxiety disorders were less able to deactivate aspects of the DMN.

Evidence suggests that mindfulness, meditation and yoga may improve DMN functioning (Brewer *et al.*, 2011; Jang *et al.*, 2011). Taylor and her colleagues (2011), in a nonclinical sample, found that when responding to negative pictures, long-term meditators were more likely to deactivate parts of the DMN with a corresponding attenuation of emotional intensity than were beginner meditators. Continued practice may improve control of attention and thereby improve emotion regulation and the ability to interpret external and internal stimuli in a more positive manner, further reducing initiation of negative thoughts (Lutz, Slagter, Dunne, & Davidson, 2008). Combining yoga with CBT might prove beneficial because of these

effects. The aim of the present study is to evaluate a newly developed yoga-enhanced CBT (Y-CBT) protocol developed by two of the authors (MK and JGF). This intervention combines CBT and group processes with targeted kundalini yoga and meditation interventions that may have efficacy for reducing anxiety and elevating mood. We hypothesized that Y-CBT would demonstrate significant decreases in anxiety and depression in this treatment-resistant clinic population.

## METHOD

### *Participants*

A total of 32 participants were enrolled in the study. All were diagnosed with GAD, and all had coexisting diagnoses.

The study was conducted at the Riverside Outpatient Center at Upton, one of the eight clinics within Riverside Community Care Inc.'s network of services. Riverside is a nonprofit human services organization, serving central and eastern Massachusetts. As one of the largest providers of behavioural health services in the state, Riverside provides community-based mental healthcare and other human services to over 40 000 Massachusetts residents annually. Riverside's overall philosophy is one of recovery and empowerment. Ethical approval for the study was obtained from the Riverside Human Rights Committee, South. Participants were recruited from within the clinic with fliers and referrals from clinicians. Informed consent forms were collected at the facility.

Participants were drawn from the clinic population and were well known to the referring psychiatrist and masters or doctoral level clinicians. Clients who were 18 years or older and were assessed by the referring clinician to have met the diagnostic and statistical manual of mental disorders, fourth edition, (DSM-IV-TR) criteria for GAD were eligible to participate in the study. Participants were excluded if they expressed acute suicidal or homicidal ideation or showed acute psychotic symptoms.

The average age of the 32 participants was 43.21 years [range = 23–62; standard deviation (SD) = 10.08], and most ( $n=26$ , 81%) were women. Participants were considered treatment-resistant as they had been in treatment as usual at the clinic for an average of 2.79 years (range = 0.02–11.09 years; SD = 3.79) and were still symptomatic. Treatment as usual included ongoing pharmacology and individual therapy, which could include psychodynamic elements, nonspecific person centred support and elements of CBT including work with cognitive distortions.

In addition to GAD, all participants had other significant coexisting diagnoses on the basis of DSM-IV-TR criteria and ongoing assessment and treatment planning by the clinician and psychiatrist. Twenty-four participants

(75%) had an additional mood disorder diagnosis, with 18 participants (56%) meeting the criteria for major depressive disorder. Other comorbid diagnoses included substance use disorders (four), attention deficit hyperactivity disorder (two), posttraumatic stress disorder (four), panic disorder (three) and schizophrenia (three).

### Treatment

Yoga-enhanced CBT (Y-CBT) integrates yoga and meditation with traditional and alternative cognitive behavioural therapeutic techniques. Its goal is to restructure destructive cognitive and emotional patterns associated with the physical and psychological symptoms of anxiety. The six weekly one and a half hour sessions of Y-CBT consisted of the following: (1) yoga/meditation; (2) instruction and experiential cognitive restructuring using both traditional and alternative CBT interventions; and (3) group discussion/process. The groups were co-led by two experienced clinicians, one of whom was also a certified kundalini yoga instructor. For homework, participants were encouraged to practice the techniques and rate the effects on a rating scale.

Three sets of 6-week sessions were held, with approximately 10–11 participants enrolled per session. We recruited a minimum of 10 participants for each group; once a group began, it was closed to new members, and recruitment began for the next group. In a typical week, instruction began with controlled breathing, a variety of kundalini yoga postures and active meditations. Kundalini yoga, as taught by Yogi Bhasan, is a well-known, accessible style of practice in the USA. It is a safe style with generous allowances for practitioner limitations and is routinely adapted for therapeutic and research purposes (Shannahoff-Khalsa, 2004). Kundalini yoga emphasizes a mind–body awareness and places importance on techniques for physical and emotional wellbeing, reduces muscular tension and creates flexibility of the spine. The similarity to hatha yoga is that both practices include many of the same physical postures. However, kundalini yoga also includes additional physical postures and exercises and the use of breathing techniques in conjunction with mindfulness meditations, postures and physical exercises not traditionally found in hatha. Each session contained about 30 min of yoga/meditation, including breathing practices (especially long, slow abdominal breathing), loosening warm-up exercises (particularly for spinal flexibility), physical postures and movements, yoga meditations incorporating mindfulness, awareness, breath regulation and deep relaxation practices.

All yoga sets were low impact. Instruction was sensitive to lowering the incident of embarrassment because participants struggling with anxiety often experience symptoms of severe anxiety in group settings. For most exercises, participants remained seated in their chairs and kept their

eyes closed for improved focus and privacy. Yoga sets were chosen specifically to target tension, symptoms of anxiety and to improve emotional wellbeing.

Similar to mindfulness, yoga teaches acceptance of the present moment. Participants were taught to notice and allow their thoughts and physical sensations without fighting or suppressing them. In addition, participants were encouraged to hold kundalini yoga poses (asanas) or movements while practicing breathing techniques and often focusing on affirmations or alternative cognitive constructs in order to alter thought patterns.

Affirmations were generated from a variety of sources, including inspirational quotes and the experiences of the participants. For example, in the kundalini yoga 'victory meditation', the word *victory* is used as a focal cognitive construct. Participants were asked to sit comfortably in their chairs with their spines straight and eyes closed. They raised their right arm up straight, perpendicular to the floor, palm facing forward and held still. The left hand was on the chest, all fingers together, parallel to the floor. Participants were instructed to 'hold the posture, inhale deeply through the nose, hold the breath and then exhale slowly through the nose'. As they continued this breath and posture, they were asked to mentally focus on the word *victory*. When their arms began to tire, they were instructed to stretch higher as a metaphoric victory; the alternative cognitive construct and experience of victory replaced the common reflexive negative construct of defeat. This is an example of an alternative Y-CBT intervention: a new cognitive construct was paired with a new physical state, altering the experience of the mind and body.

Alternative CBT interventions draw from the basic concepts of traditional CBT. A typical CBT intervention involves replacing the content of a thought with a new thought. In Y-CBT, thoughts are seen as just one component of a Y-CBT restructuring intervention. The term 'alternative CBT interventions' indicates that although people are taught to change the content of their thoughts, they are also taught to restructure their relation to their thoughts and their physiologic interaction with the thought.

Elements common to CBT treatment for anxiety (Erickson, 2003) were included in each weekly session. Participants were instructed about anxiety and its physiology, encouraged to try out behavioural exercises, taught to examine their automatic thoughts and to understand the role of appraisal, and instructed to use cognitive restructuring to establish relapse prevention strategies. To individualize the treatment, in one group session, participants were subdivided into small groups of two to four participants where they were instructed in traditional CBT cognitive restructuring techniques (Beck, Rush, Shaw, & Emery, 1979) and alternative CBT interventions, which replace distorted cognitions using yoga and meditation-based cognitive solutions; these included instructional

thoughts related to attention to alterations in breath, observation of thoughts as they arose and focusing awareness on physical sensations and spinal posture.

During the instructional portion of the group, leaders shared the treatment rationale with participants, explaining that anxiety has both physical and cognitive symptoms and that each is reactive to the other (worry leading to heart racing; heart racing to more worry). Leaders also explained the integration of yoga and CBT by exploring both their potential discrepancies and their overlapping properties. For example, both yoga and CBT attempt to shift distorted cognitions to reduce anxiety; although the specific techniques derived from these two modalities are different, both work together very effectively because while yoga reduces the physiological causes of anxiety, thereby reducing the tendency for negative thoughts to arise, CBT focuses on altering the content of negative thoughts as they arise ('I can't', shifted to 'I can'). By addressing both the physiological and cognitive symptoms simultaneously, Y-CBT may more fully target the symptoms of anxiety.

Group process was another important component of the treatment. It gave participants time to explore these alternate cognitive strategies and techniques in more detail: they shared their experiences of the yoga and meditation, raised questions about challenges and supported each other as changes began to positively impact their daily functioning. During group discussion, the interplay between cognitions, emotions and physical sensations was reinforced, and skills were taught to reduce the discrepancy between *feeling* and *knowing*. If members became anxious during discussions, techniques were practiced to manage the symptoms of anxiety as they arose.

## Measures

Before and after the 6-week treatment, the following self-report measures were administered:

The *State Trait Anxiety Inventory* (STAI) (Spielberger, 1983) is a widely used self-report measure of anxiety that has demonstrated excellent internal consistency and test-retest stability (Spielberger, 1983). There are two subscales. The STAI-S measures *state anxiety*, the current levels of anxiety, whereas the STAI-T assesses *trait anxiety*, the participant's characteristic tendency to be anxious. Each subscale contains 20 items, rated on a Likert-type, four-point scale.

The *Treatment Outcome Package* (TOP) was used to measure a variety of outcomes, including depression, panic and suicidality. The TOP is a self-report measure for mental health treatment outcomes (Kraus, Seligman, & Jordan, 2005), and its validity and reliability have been assessed in several studies (Kraus et al., 2005; Moras, 2005). For example, the TOP/depression subscale of this questionnaire measures depression with statements such as 'felt down or depressed' and 'felt worthless'. This subscale is highly correlated with the Beck Depression Inventory (Kraus et al., 2005). Other subscales include quality of life, suicidality, sleep disturbance and violence. Table 1 shows TOP scales with two sample items each.

## RESULTS

### Sample Description

At intake, *t*-tests showed no significant differences between completers and noncompleters for age, number of years in treatment or for initial levels of anxiety (state or trait). Of the 12 scales measured by the TOP, only the violence scale

Table 1. Scales of the TOP with Sample Items

TOP Scales	Sample Items	Sample Items
DEPR (depression)	Felt worthless	Felt little or no interest in most things
VIOLN (violence)	Physically hurt someone or an animal	Had thoughts of killing someone else
SCONF (social conflict)	Felt too much conflict with someone	Been emotionally hurt by someone
LIFEQ (life quality)	Been satisfied with your relationships with others	Been satisfied with your daily responsibilities
SLEEP	Had trouble falling asleep	Awakened frequently during the night
SEXFN (sexual function)	Felt no desire for or pleasure in sex	Felt emotional or physical pain during sex
WORKF	Had your performance criticized	Been acknowledged for your accomplishments
PSYCS	Felt something or someone was controlling your mind	Seen or heard something that was not really there
PANIC	Had a racing heart	Had shortness of breath
SA (substance abuse)	Found yourself thinking about a drink or getting high	Used alcohol or drugs to relieve uncomfortable feelings such as sadness, anger or boredom
MANIC	Been too talkative	Felt on top of the world
SUIC	Thought about killing yourself or wished you were dead	Planned or tried to kill yourself

showed a significant difference between completers and noncompleters, with noncompleters showing a higher level of violence. Correlations between years in treatment at the clinic and all of the posttest–pretest scores were low, ranging from  $r = -0.12$  (mania) to  $0.27$  (violence); for example, for the correlation between years in treatment and posttest–pretest scores for STAI-S was  $r = 0.17$ ; for STAI-T,  $r = 0.20$ .

Twenty-two participants (69%) completed the 6-week Y-CBT intervention; 17 were women. Assessments were carried out prior to and after the treatment; completers completed both the pretests and posttests. They attended an average of 4.86 of the six sessions. One completer attended three sessions, and 21 participants (95%) completed four or more sessions; attendance per session ranged from 6 to 11, with session size averaging 7.22 participants.

No adverse events or difficulties with the intervention were reported. Although we did not formally or routinely solicit this information, each week, the participants discussed their experience using the techniques. Their response was generally favourable, and they remained curious to understand and utilize the concepts and techniques.

### Measures

Table 2 shows the means, SDs, significance levels and effect sizes of all questionnaire subscales before and after the 6-week Y-CBT intervention. Statistically significant improvements were observed for both state and trait anxiety and for the TOP scales on depression, panic, suicidality, sleep disturbance, sexual function and quality

of life. After Y-CBT, the STAI-S mean dropped 12.50 points (23%); the STAI-T mean dropped 9.51 (16%) and the TOPs depression scores dropped by 1.30 (47%).

Statistical analysis of mean changes from pretests to posttests were assessed using paired *t*-tests. Hedges's *g* was used to measure effect size; Hedges's *g* is a variation of Cohen's *d* that corrects for biases because of small sample sizes (Hedges & Olkin, 1985).

### DISCUSSION

The purpose of this study was to examine the potential efficacy of Y-CBT as a group treatment for clients diagnosed with GAD. At pretest, participants were still symptomatic after having undergone individual therapy at the clinic for an average of 2.97 years. The results from this pilot study indicate that treatment-resistant outpatient mental health clients, who received 6 weeks of Y-CBT, experienced significant improvement in their anxiety levels (trait and state) and significant decreases in reported symptoms of comorbid depression and panic.

Yoga-enhanced CBT (Y-CBT) techniques affect change in maladaptive physiologic and cognitive processes through yoga and meditation, group process and elements of CBT. CBT has been widely studied. Borkovec, Newman, Pincus, and Lytle (2002) found no significant differences between cognitive therapy, applied relaxation and a combination of both of these. However, all treatments showed a strong effect size (for example, an effect size of 0.97 for the combined treatment for GAD). In the current study, participants' posttest scores were higher than those reported by Borkovec *et al.*

Table 2. Pre-test and posttest comparison for the Y-CBT intervention: Hedge's *g*

Outcome Measure	N	Mean pre	SD pre	Mean post	SD post	<i>p</i> value	Effect size Hedge's <i>g</i>	Confidence limits	
								95% lower	95% upper
STAI									
STAI—trait	19	58.59	12.23	49.08	12.46	0.0001	1.03	0.36	1.12
STAI—state	22	54.48	11.92	41.98	11.54	0.0001	0.74	0.64	1.42
TOP									
TOP—DEPRS	21	2.76	1.69	1.47	1.58	0.0001	0.76	0.39	1.12
TOP—PSYCS	21	1.39	1.75	0.21	0.82	0.0002	0.67	0.31	1.02
TOP—PANIC	21	2.4	2.73	0.81	1.55	0.0008	0.60	0.25	0.95
TOP—SLEEP	21	1.42	1.61	0.48	1.4	0.0008	0.59	0.25	0.94
TOP—LIFEQ	21	2.14	1.16	1.67	1.27	0.0281	0.37	0.04	0.70
TOP—SEXFN	20	0.56	1.74	-0.23	0.59	0.0154	0.42	0.08	0.76
TOP—SCONF	21	1.24	1.88	0.24	1.31	0.0016	0.56	0.21	0.90
TOP—SUIC	21	1.45	1.74	0.69	0.91	0.0097	0.44	0.11	0.78
TOP—MANIA	21	-0.19	0.57	-0.30	0.80	0.3803	0.14	-0.18	0.46
TOP—SA	21	0.67	2.14	0.45	1.30	0.5143	0.11	-0.21	0.43
TOP—WORKF	19	-0.61	0.82	-0.79	0.48	0.1919	0.23	-0.11	0.56

STAI: State = current level of anxiety, Trait = characteristic tendency to be anxious. TOP: DEPR = depression, PSYCS = psychosis, PANIC = panic, SLEEP = sleep, LIFEQ = quality of life, SEXFN = sexual function, SCONF = social conflict, SUIC = suicidality, MANIA = mania, SA = substance abuse, WORKF = work. The violence scale was not included as the SD *post* was 0 and Hedge's *g* could not be calculated.

(2002), and the effect size was smaller. However, these differences may be explained by differences in sample characteristics. The admission criteria by Borkovec et al. (2002) excluded participants diagnosed with panic, severe depression, substance abuse and psychosis. In contrast, all participants in the current study had these and other significant, comorbid axis I diagnoses.

A recent meta-analysis focused on CBT treatment for anxiety disorders across randomized placebo controlled studies; 27 studies met all inclusion criteria, with two studies for GAD (Hofmann & Smits, 2008). The pooled Hedges's  $g$  for CBT treatment for GAD was 0.51,  $p = 0.03$ . The authors report that this moderate effect size finding is similar to other meta-analyses that used considerably less stringent inclusion criteria. For example, Erickson (2003), working with a clinic population, enrolled participants with a variety of anxiety disorders in CBT anxiety management treatment. He reported an eta pretest–posttest effect size of 0.73 for GAD. Whereas some effect sizes (such as eta-square) are based on the explained variance, Hedges's  $g$  is based on the difference in means. In our current study, the effect sizes were Hedges's  $g = 0.74$  [95% CI (0.64, 1.42),  $p < 0.0001$ ] for STAI-S and Hedges's  $g = 1.03$  [95% CI (0.36, 1.12),  $p < 0.0001$ ] for STAI-T. The magnitude of the Hedges's  $g$  effect size may be interpreted using Cohen's convention as small (0.2), medium (0.5) and large (0.8). This suggests that Y-CBT may be a promising treatment alternative.

It should be noted that the effect size estimates of our study were likely to be an overestimate because they were not based on intent-to-treat analyses. However, a recent meta-analysis of mindfulness-based treatments for anxiety and depression (Hofmann et al., 2010) suggests that the controlled effect size estimates of these treatments are in the similar range as uncontrolled (pre–post) effect sizes. Nevertheless, controlled studies are needed to provide answers to these important questions. For uncontrolled studies, similar in design to the current study, the review found effect sizes in the moderate range (Hedges's  $g = 0.63$ ) for reducing anxiety and similar results for reducing depression (Hedges's  $g = 0.59$ ). In the current study, effect sizes were  $g = 0.74$  [95% CI (0.64, 1.42),  $p < 0.0001$ ] for STAI-S,  $g = 1.03$  [95% CI (0.36, 1.12),  $p < 0.0001$ ] for STAI-T and 0.76 [95% CI (0.39, 1.12),  $p < 0.0001$ ] for the depression subscale of the TOP. The Hofmann *et al.* (2010) review also reported that the largest effect sizes were found for participants with anxiety disorders and depression with (Hedges's  $g$ ) of 0.97 and 0.95, respectively. However, whereas all participants in the current sample were diagnosed with other concurrent major psychiatric diagnoses, in several of the studies reviewed, participants with severe psychiatric symptoms were excluded. For example, Evans *et al.* (2008) recruited participants via posted notices and letters sent to the faculty and excluded all people with major depression.

Koszycki, Benger, Shlik and Bradwejn (2007) excluded participants with additional clinically prominent axis I disorders, including major depression or a history of bipolar or psychotic disorders. When the multidagnostic and treatment resistant nature of the participants in the current study are taken into account, the results of this study compare quite favourably with those in this review.

Yoga-enhanced CBT may be effective in part because the yoga postures and the regulation of breath repetitively invoke the relaxation response leading to reduced stress activation with resulting decreases in sympathetic and hypothalamic pituitary axis activity. These strategies seem to be particularly effective for targeting worry, which is often a future-oriented maladaptive cognitive process that is a predominant feature in GAD (Hofmann et al., 2005). These physiologic processes may also make it easier to watch and 'step back' from (defuse) anxious thoughts.

It can also be argued that yoga practice and CBT both lead to reductions in dysfunctional thought processes, but in contrast to CBT which trains individuals to identify and then replace dysfunctional thoughts, yoga or meditation may reduce the tendency for dysfunctional thoughts to arise in the first place due to reductions in DMN activity. In this way, CBT and yoga may complement each other to reduce anxiety, both by reducing the tendency for negative thoughts to arise (yoga) and by replacing the maladaptive thoughts that do arise (CBT).

During the Y-CBT treatment, participants were taught to improve their relationship to their thoughts by responding to stressful situations more reflectively rather than reflexively. Through the sustained practice of yoga and meditation, long-term changes may take place in the perception of both internal (thoughts) and external (environmental) events. This may result in a reduction in the number of such events that will elicit anxiety and a decline in the intensity of these responses. However, only randomized controlled trial studies can provide clear support for this intervention.

Finally, because of these improved physiologic and cognitive functions, yoga may enhance the participant's ability to accept and incorporate the cognitive restructuring of CBT in an accelerated and integrated fashion. Overall, Y-CBT may offer greater benefit than traditional CBT because it simultaneously targets faulty cognitive and physiologic processes.

Although the data support the potential of this treatment, the study also has limitations. Y-CBT combines several elements, and further studies, similar to Borkovec et al. (2002), are needed to identify the mechanisms of change: how much change is attributable to yoga or mindfulness techniques and how much to CBT remains to be explored. Additionally, the attrition rate was 31%. Santana and Fontenelle (2011) reviewed six CBT studies for the treatment of anxiety disorders and found dropout rates from 10.3% to 26%, with higher rates for participants diagnosed with anxiety and comorbid depression (Issakidis &

Andrews, 2004). In a review of meditation/yoga treatments for anxiety disorders, Krisanaprakornkit, Krisanaprakornkit, Piyavhatkul and Laopaiboon (2006) found only two randomized controlled trials both in outpatient clinics. One study compared meditation, biofeedback and relaxation therapy, whereas the other used kundalini yoga. Dropout rates were 44% and 33%, respectively. The physical movement aspect of yoga may account for higher dropout rates. In their review of yoga and anxiety, Shapiro *et al.* (2007) report attrition rates of 50–62% for exercise treatments over 6 months, whereas Kirkwood *et al.* (2005) stated a 50% attrition for exercise programmes within 3–6 months in his review.

Future research should explore the reasons for the dropout rate and ways to decrease it. For example, in this study, a higher level of screening was omitted in the interest of affording access in general clinic settings where there are many time and financial constraints. However, it is possible that the use of a more elaborate screening process including a Structured Clinical Interview for *DSM-IV* to assess diagnosis would be helpful. It is also likely that had group leaders and participants met prior to treatment, some participants who later dropped out would not have participated. A multiweek lead-in questionnaire prior to the intervention could have established that there were no significant changes in symptoms prior to the treatment.

Accessibility, adherence and feasibility information, along with more information about work, economic and marital status, medications and previous psychiatric history would also provide useful information about completers and non-completers alike. A qualitative follow-up questionnaire about the participant's experience and data about the long-term effects of this treatment are also needed. Finally, this investigation is a small pilot study, future research can explore these recommendations, in a larger scale, randomized control study. Despite these limitations, the current study supports the potential efficacy of Y-CBT, and it appears to be a promising new treatment for those suffering from GAD.

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