Reducing behavioral avoidance with internet-delivered cognitive behavior therapy for generalized anxiety disorder

Alison E.J. Mahoney[a],[*], Jill M. Newby[a],[b], Megan J. Hobbs[a], Alishia D. Williams[a],[c], Gavin Andrews[a]

[a] Clinical Research Unit for Anxiety and Depression, University of New South Wales at St. Vincent's Hospital, Level 4 O'Brien Centre, 394-404 Victoria Street, Darlinghurst, NSW 2010, Australia
[b] School of Psychology, University of New South Wales, Sydney, NSW 2052, Australia
[c] Department of Clinical and Health Psychology, Utrecht University, Domplein 29, 3512 JE Utrecht, The Netherlands

A B S T R A C T

Recent research has sought to identify maladaptive behaviors that are associated with generalized anxiety disorder (GAD). Although maladaptive behaviors may contribute to the maintenance of the disorder, little is known about how these behaviors change during the course of cognitive behavior therapy and whether such changes relate to treatment outcomes. This study examined changes in maladaptive behaviors, symptoms of GAD and depression, and disability across internet-based cognitive behavior therapy (iCBT) for GAD in two large clinical samples (N = 206 and 298). Assessments were completed at pre and post-treatment. Significant reductions in patients' maladaptive behaviors (WBI), GAD and depression severity (GAD-7 and PHQ-9), and disability (WHODAS-II) were observed following iCBT. Reductions in maladaptive behaviors predicted post-treatment GAD symptom severity after controlling for pre-treatment GAD symptom severity and reductions in depression and disability. Findings provide further support for the importance of maladaptive behaviors in contemporary conceptualizations of GAD and highlight the need for experimental investigations to examine the possible causal relationships between maladaptive behaviors and GAD.

1. Introduction

Generalized anxiety disorder (GAD) involves excessive worry and anxiety about everyday concerns (American Psychiatric Association [APA], 2013). While cognitive and somatic criteria are used to define GAD in DSM-5, research has begun to explore the behavioral features of the disorder (Beesdo-Baum et al., 2012). Although some studies have found that people with GAD engage in maladaptive behaviors, such as excessive situational avoidance, checking, reassurance-seeking, and planning (e.g., Beesdo-Baum et al., 2012; Schut et al., 2001; Coleman et al., 2011), there has been very little systematic investigation in this area. The role of maladaptive behaviors in the maintenance of GAD is therefore not well understood.

Prominent psychological theories underscore the importance of cognitive factors in the maintenance of GAD (Borkovec et al., 2004; Dugas et al., 1998; Wells, 1999). Cognitive avoidance, whereby mental strategies such as thought suppression are used in an effort to avoid distressing thoughts and emotions, has been theorized to maintain GAD (Borkovec et al., 2004). Maladaptive beliefs have also been implicated

in the maintenance of the disorder, for example, beliefs associated with intolerance of uncertainty and metacognition (Dugas et al., 1998; Wells, 1999). Psychotherapies that target these cognitive factors significantly reduce patients' pathological worry and anxiety (see Andrews et al., 2016, for an overview). Behavioral forms of avoidance have been conceptually linked to the cognitive factors that are thought to maintain GAD. Behavioral avoidance involves avoiding or managing distress by performing actions such as seeking reassurance, checking, or avoiding anxiety-provoking situations. The Metacognitive Model of GAD, for example, posits that when excessive reassurance-seeking is used to reduce worry, individuals with GAD do not learn that worry is controllable and harmless, and thereby perpetuate problematic metacognitive beliefs about worry (Wells, 1999). Despite the conceptual link between cognitive factors and maladaptive behaviors, there has been scant empirical scrutiny of the nature of these associations. Although cognitive behavioral therapy (CBT) for GAD often aims to reduce maladaptive behaviors (Robichaud, 2013; Wells, 1999), it is unclear whether maladaptive behaviors reduce following CBT and whether reductions in these behaviors are associated with reductions in GAD

symptom severity.

One study to date has examined how maladaptive behaviors change across the course of psychotherapy for GAD. Beesdo-Baum et al. (2012) evaluated how often patients used maladaptive behaviors to control or prevent worrying during behavior therapy. Approximately half of that sample completed a worry exposure treatment and the remainder completed a course of applied relaxation. Both treatments significantly reduced maladaptive behaviors, and the magnitude of these reductions was similar for each treatment. At post-treatment, about half the patients no longer reported engaging in a pathological level of avoidant behaviors. Pre-treatment behavioral avoidance was largely unrelated to post-treatment anxiety and worry scores. However, higher post-treatment behavioral avoidance significantly predicted higher worry scores at follow-up. This highlights the potential importance of addressing maladaptive behaviors for improving long-term treatment outcomes.

The current study sought to examine changes in maladaptive behaviors following CBT for GAD. The Beesdo-Baum et al. (2012) study was a secondary analysis of randomized controlled trial data that employed a relatively small sample of GAD patients (n = 56). To complement these data, we will examine changes in maladaptive behaviors in two large samples of patients undertaking internet-delivered CBT (iCBT) for symptoms of GAD in routine clinical care. The first sample comprised patients undertaking iCBT for their symptoms of GAD and the second sample comprised patients undertaking iCBT for their symptoms of GAD and depression. This replication and extension is particularly important given the high comorbidity between GAD and major depressive disorder (MDD: Brown et al., 2001). Furthermore, Beesdo-Baum et al. examined whether baseline behavioral avoidance predicted post-treatment outcomes. To extend these findings, the current study will evaluate whether *reductions* in maladaptive behaviors following CBT predict post-treatment GAD symptom severity. The psychological treatments examined by Beesdo-Baum et al. were both behavior therapies that explicitly omitted cognitive treatment components (see Hoyer et al., 2009). This may limit the generalizability of their results to CBT, which is more commonly implemented in practice (Andrews et al., 2016). Although the measurement of maladaptive behaviors associated with GAD was central to the hypotheses of the Beesdo-Baum et al. study, no established measure of such behaviors was available at the time of the study. However, a brief self-report measure of maladaptive behaviors associated with GAD has been recently developed and evaluated (Mahoney et al., 2016; Mahoney et al., 2017), and will be utilized in this study. Consistent with contemporary cognitive theories of GAD, we predicted that CBT would significantly reduce GAD symptom severity and avoidant behaviors, and that reductions in maladaptive behaviors would predict post-treatment GAD symptom severity controlling for pre-treatment GAD symptom severity, changes in depression, and changes in disability.

2. Materials and methods

2.1. Participants

504 consecutive patients referred to an online clinic (ThisWayUp) by their general practitioner or mental health professional between the 12th August 2013 and 9th February 2015 were included in this study. All patients reported clinically severe symptoms of GAD (Generalized Anxiety Disorder-7 total score ≥ 10, Spitzer et al., 2006) and enrolled in an online cognitive behavior therapy (iCBT) course for their GAD (n = 206 'GAD iCBT') or their comorbid GAD and depression (n = 298 'Mixed Anxiety and Depression iCBT'). Two thirds of patients included in this study were female and had an average age of 37 years. The two treatment groups did not differ by sex (GAD iCBT: 64.6% female vs. Mixed Anxiety and Depression iCBT: 66.8% female, $\chi^2(1) = 0.27$, $p = 0.61$) or age (GAD iCBT $M(SD) = 37.93(14.05)$ vs Mixed Anxiety and Depression iCBT $M(SD) = 37.69(12.94)$, $t(502) = 0.20$, $p = 0.84$).

2.2. Measures

2.2.1. Worry Behaviors Inventory

The WBI is a 10-item, self-report measure that assesses how often behaviors are characteristically used to control, prevent or avoid worrying about everyday concerns (Mahoney et al., 2016). For example, items assess checking, planning, reassurance-seeking and avoiding situations that are worrying. Respondents report how frequently they engage in maladaptive behaviors on a 5-point scale where 0 = *none of the time*, 1 = *a little of the time*, 2 = *some of the time*, 3 = *most of the time* and 4 = *all of the time*. Evidence of internal consistency (α = 0.86, Mahoney et al., 2016) and test-retest reliability (r = 0.89 over 2–4 weeks, Mahoney et al., 2017) has been provided, as has evidence of convergent/divergent validity (via correlations with measures of repetitive behaviors and symptoms of anxiety and depressive disorders), discriminant validity (the WBI discriminates between individuals with and without clinical levels of GAD symptoms), and treatment sensitivity (Mahoney et al., 2016, 2017). The internal consistency of the WBI prior to treatment was α = 0.83 (GAD iCBT sample) and 0.79 (Mixed Anxiety and Depression iCBT sample).

2.2.2. Generalized Anxiety Disorder 7-item scale

The GAD-7 is a 7-item self-report screener for a probable diagnosis of GAD and of GAD symptom severity over the past two weeks (Spitzer et al., 2006). A total score ≥ 10 indicates a probable GAD diagnosis (sensitivity = 89%, specificity = 82%: Spitzer et al., 2006). Studies support a unidimensional structure, reliability (α = 0.92, r = 0.83 over one week) and validity of the GAD-7 (e.g., convergent/divergent validity with measures of anxiety, depression and self-esteem; criterion validity with respect to diagnosis via structured interview; treatment sensitivity) (Löwe et al., 2008; Newby et al., 2013; Spitzer et al., 2006). The internal consistency of the GAD-7 prior to treatment was α = 0.89 (GAD iCBT sample) and 0.90 (Mixed Anxiety and Depression iCBT sample).

2.2.3. Patient Health Questionnaire-9

The PHQ-9 is a 9-item self-report screener for probable MDD in the past two weeks (Kroenke et al., 2001). Evidence of a one or two-factor structure, reliability (α = 0.86, r = 0.84 over 48 h), and validity (including convergent/divergent validity via correlations with measures of depression, disability and substance use; criterion validity via sensitivity/specificity with respect to diagnosis via structured interview; treatment sensitivity) of the PHQ-9 has been provided (Beard et al., 2016; Kroenke et al., 2001). The internal consistency of the PHQ-9 prior to treatment was α = 0.82 (GAD iCBT sample) and 0.79 (Mixed Anxiety and Depression iCBT sample).

2.2.4. World Health Organization Disability Assessment Schedule 2.0

The 12-item WHODAS-II measures general health-related disability and functioning over the past 30 days (Üstün et al., 2010). Factor analyses indicate a hierarchical structure, with one underlying *Global Disability* latent variable (Andrews et al., 2009). Evidence of reliability (α = 0.98, r within 7 days = 0.98) and validity is extensive (e.g., concurrent validity with measures of handicap, health and functional independence; responsiveness to change; discriminant validity via discrimination between those who are well and those with physical or mental disorders) (Üstün et al., 2010). The internal consistency of the WHODAS prior to treatment was α = 0.85 (both samples).

2.3. Procedure

All patients were prescribed iCBT by their primary physician or mental health professional, who maintained clinical responsibility for their respective patients across treatment. As is routine in our clinical service, prescribing professionals were advised that their patients were unlikely to benefit from iCBT if they were experiencing very severe

Table 1
Linear mixed model results for patients undertaking iCBT for GAD.

Measure	Pre EMM (SD)	Mid EMM (SD)	Post EMM (SD)	Mean pre-post difference	F (df)	r (for within group ES)	Hedge's g (95% CI)
WBI	21.11 (7.48)	17.97 (6.89)	14.81 (6.72)	6.30	35.22 (2, 245.01)**	0.49	0.66 (0.40–0.92)
GAD-7	14.88 (3.27)	–	7.64 (6.59)	7.24	244.37 (1, 79.62)**	0.36	2.06 (1.74–2.37)
PHQ-9	11.91 (5.50)	–	7.61 (7.67)	4.30	79.32 (1, 82.93)**	0.60	0.93 (0.65–1.20)
WHODAS-II	13.75 (7.39)	–	9.53 (9.62)	4.22	41.63 (1, 84.24)**	0.56	0.70 (0.43–0.98)

Note. WBI = Worry Behaviors Inventory; GAD-7 = Generalized Anxiety Disorder 7-item Scale; PHQ-9 = Patient Health Questionnaire-9; WHODAS-II = World Health Organization Disability Assessment Schedule 2.0; r = Pearson correlation between pre and post iCBT scores; ES = effect size.

** $p < 0.001$.

depression, active suicidal ideation, drug or alcohol dependence, schizophrenia, bipolar disorder or were taking atypical anti-psychotics or benzodiazepines. All patients gave their informed electronic consent for their data to be collected, pooled, analysed and published in scientific journals. Patients could opt out of the use of their data for these purposes via email with no impact on their eligibility for, or care during treatment.

The GAD and Mixed Anxiety and Depression iCBT courses each contain six lessons. Patients have 12 weeks to complete all lessons and are encouraged to complete a lesson every 1–2 weeks. Both iCBT courses have been shown to be efficacious and effective in routine care, and have been described in detail elsewhere (Newby et al., 2013; Mewton et al., 2012; Robinson et al., 2010). In brief, the programs involve (a) psycho-education about the nature of GAD (and depression in the Mixed iCBT course), (b) arousal reduction skills, (c) cognitive restructuring to shift unhelpful thought patterns (including those associated with cognitive distortions, intolerance of uncertainty and metacognition), (d) graded exposure and behavioral experiments to reduce cognitive and behavioral avoidance, and (e) relapse prevention. All patients completed the WBI, GAD-7, PHQ-9, and WHODAS-II at pre and post-treatment. Patients receiving the GAD iCBT course also completed the WBI at mid-treatment (before commencing lesson 4).

2.4. Data analytic strategy

2.4.1. Treatment adherence and outcomes

All analyses were conducted using SPSS version 22. A linear mixed model with random intercepts for each outcome measure (i.e., WBI, GAD-7, PHQ-9 and WHODAS-II) was estimated. For each outcome, measurement occasion (pre-, mid-, and post-treatment where appropriate) was treated as a categorical variable. Restricted maximum likelihood (REML) was used to produce unbiased parameter estimates while using all available data (Salim et al., 2008). Preliminary model construction focussed on selecting the most appropriate covariance structure for the residual correlation matrix. In the GAD iCBT sample, model fit indices supported the selection of the autoregressive (AR1) covariance structure for the WBI and PHQ-9, and the heterogenous autoregressive (HARI) covariance structure for the GAD-7 and WHODAS-II. In the Mixed Depression and Anxiety iCBT sample, effects for all measures were modelled using the unstructured covariance structure. Hedge's g group effect sizes were computed based on the pooled standard deviation and corrected for the correlation between

repeated measurements. Following Robinson et al. (2010), the criteria for responding to treatment following iCBT was defined as a $\geq 50\%$ reduction in GAD-7 scores from pre- to post-treatment. Consistent with Beesdo-Baum et al. (2012), current post-treatment WBI scores were compared to those found in a non-clinical sample reported by Mahoney et al. (2017) in order to provide an additional index of treatment effects on maladaptive behaviors associated with GAD.

2.4.2. Relationship between maladaptive behaviors and GAD symptom severity

Bivariate Pearson correlation coefficients were calculated to quantify the associations between the WBI and GAD symptom severity at pre-treatment and post-treatment. Partial correlations estimated the strength of associations once depression symptoms and functional impairment were taken into account.

2.4.3. Avoidance behaviors as predictors of post-treatment GAD symptoms

Among patients who completed treatment, hierarchical regressions were used to assess whether reductions in maladaptive behaviors predicted post-treatment GAD symptoms after controlling for pre-treatment GAD symptom severity and changes in depression and disability with treatment. In these regressions, the dependent variable was post-treatment GAD-7 score. Pre-treatment GAD-7 score was entered at Step 1, while pre to post-treatment changes in the PHQ-9 and WHODAS-II were entered at Step 2. At Step 3, pre to post-treatment changes in the WBI were entered.

3. Results

3.1. Treatment adherence and outcomes

In the GAD iCBT course 35.9% of patients completed all six lessons, 14.1% completed five lessons, 13.1% completed four lessons, 10.2% completed three lessons, 11.7% completed two lessons, 11.7% completed one lesson, and 3.3% of patients completed no lessons. These proportions were similar for the Mixed Anxiety and Depression iCBT course (with 35.6%, 9.1%, 9.4%, 14.1% 13.8%, 14.1% and 4.0% completing 6, 5, 4, 3, 2, 1 and 0 lessons, respectively).

Tables 1 and 2 show the estimated marginal means and treatment effects on patients' maladaptive behaviors, symptoms and disability. All pre-treatment means fall within previously reported clinical ranges (Andrews et al., 2009; Mahoney et al., 2016; Spitzer et al., 2006;

Table 2
Linear mixed model results for patients undertaking iCBT for Mixed Anxiety and Depression.

Measure	Pre EMM (SD)	Post EMM (SD)	Mean pre-post difference	F (df)	r (for within group ES)	Hedge's g (95% CI)
WBI	20.66 (6.82)	14.61 (7.02)	6.05	84.33 (1, 112.67)**	0.50	0.89 (0.66–1.12)
GAD-7	15.09 (3.25)	7.03 (7.66)	8.06	314.45 (1, 115.07)**	0.26	2.10 (1.83–2.36)
PHQ-9	16.23 (5.04)	8.21 (9.41)	8.02	209.81 (1, 116.60)**	0.36	1.59 (1.34–1.84)
WHODAS-II	15.47 (7.51)	10.76 (11.39)	4.71	56.28 (1, 115.99)**	0.61	0.64 (0.42–0.87)

Note. WBI = Worry Behaviors Inventory; GAD-7 = Generalized Anxiety Disorder 7-item Scale; PHQ-9 = Patient Health Questionnaire-9; WHODAS-II = World Health Organization Disability Assessment Schedule 2.0; r = Pearson correlation between pre and post iCBT scores; ES = effect size.

** $p < 0.001$.

Kroenke et al., 2001) and each measure reduced significantly across treatment. Within-group effect sizes indicated medium to large effects for all outcome measures. The percentage of individuals classified as treatment responders was 55.4% (41/74) of patients who completed the GAD iCBT course and 58.5% (62/106) of patients who completed the Mixed Anxiety and Depression iCBT course.

In comparison to WBI scores drawn from a community sample (n = 55, Mahoney et al., 2017), patients in the GAD iCBT sample, had significantly greater post-treatment WBI scores (current post-treatment WBI $M(SD)$ = 14.81(6.72) vs. Community WBI $M(SD)$ = 10.07(5.99), t (127) = 4.15 p < 0.001, d = 0.74). However, the average post-treatment WBI score of those patients who responded to treatment did not significantly differ from the community average (current post-treatment WBI-responder $M(SD)$ = 11.93(5.43) vs Community $M(SD)$ = 10.07(5.99), $t(94)$ = 1.57, p = 0.12, d = 0.33). This pattern of results was replicated among patients in the Mixed Anxiety and Depression iCBT sample.

3.2. Relationship between maladaptive behaviors and GAD symptom severity

In the GAD iCBT sample, pre-treatment GAD-7 and WBI scores were significantly correlated (r = 0.39, p < 0.001). This correlation continued to be significant after controlling for patients' pre-treatment depression and disability (Partial r = 0.19, p < 0.01). Pre-treatment WBI scores were not significantly associated with post-treatment GAD-7 scores (r = 0.18, p = 0.12). However, reductions in WBI scores with treatment were associated with reductions in the GAD-7 (r = 0.50, p < 0.001). Importantly, the partial correlation between reductions in the GAD-7 and reductions in WBI controlling for reductions in depression and disability with treatment was also significant (Partial r = 0.27, p < 0.05). This pattern of results was replicated among patients in the Mixed Anxiety and Depression iCBT sample.

3.3. Maladaptive behaviors as predictors of post-treatment GAD symptoms

In the sample that completed the GAD iCBT course (n = 74), pre-treatment GAD symptom severity and reductions in depression symptom severity were significantly associated with post-treatment GAD symptom severity (see Table 3). Reductions in disability significantly predicted post-treatment GAD-7 scores at Step 2 but not at Step 3. At Step 3, reductions in maladaptive behaviors with treatment emerged as a significant predictor of GAD symptoms at post-treatment. This pattern of results was identical for the sample of patients who completed the Mixed Anxiety and Depression iCBT course (n = 106), with one expectation; reductions in disability were not significantly associated with post-treatment GAD-7 scores.

4. Discussion

This study is the first to demonstrate that maladaptive behaviors significantly reduce following internet-based CBT, and that reductions in these behaviors are associated with milder GAD symptom severity following treatment. These results were found in two large samples of patients undertaking CBT for GAD or GAD and depression. The standardized assessment of the maladaptive behaviors associated with GAD was central to testing the hypotheses of this study. We employed a newly developed and psychometrically evaluated measure to assess these behaviors across treatment (the WBI, Mahoney et al., 2016).

As predicted, CBT was associated with significant reductions in the maladaptive behaviors that patients used to control, prevent or avoid worrying about everyday concerns. Maladaptive behaviors are theorized to contribute to the maintenance GAD (Dugas et al., 1998; Wells, 1999), and it is therefore important to demonstrate that CBT is capable of reducing them. We observed a moderate effect size reduction in maladaptive behaviors among patients completing the GAD iCBT course (g = 0.66) and a large effect size reduction for patients completing the Mixed Anxiety and Depression iCBT program (g = 0.89). It is possible that the Mixed Anxiety and Depression iCBT program lead to greater reductions of avoidant behaviors because of the course's stronger emphasis on behavioral activation and graded exposure (detailed description of programs in Newby et al., 2017). It is yet to be seen whether incorporating more behavioral treatment components into CBT for GAD will result in even greater reductions in GAD symptoms and maladaptive behaviors. Consistent with Beesdo-Baum et al. (2012), the levels of avoidant behaviors among patients who responded well to treatment (around 50–60% of treatment completers) were similar to the levels of maladaptive behaviors reported by a non-clinical sample (Mahoney et al., 2017). That is, most patients completing iCBT no longer reported engaging in a pathological level of maladaptive behaviors following treatment. As expected, both iCBT courses also lead to large effect size reductions in symptoms of GAD and depression, and moderate effect size reductions in disability. Current effect size reductions are larger than those found in previous evaluations of these iCBT courses (Mewton et al., 2012; Newby et al., 2014a, 2014b). It is likely that these discrepancies are due to differences in sample characteristics; the current study restricted its sample to individuals reporting symptoms consistent with a probable diagnosis of GAD (i.e., GAD-7 score ≥ 10), whereas previous evaluations have included patients who reported sub-threshold symptoms of GAD. Adherence to both iCBT programs was modest with just over a third of patients completing all six lessons of their course. Although most patients completed most lessons, current completion rates are somewhat lower than those found in previous investigations (e.g., 44.9–49.2% completion in Newby et al., 2017). Again these differences are likely to reflect variations in sample characteristics across studies (e.g., inclusion of sub-threshold cases and exclusion of patients who failed to complete one lesson of

Table 3
Predicting post-treatment GAD symptoms in the GAD iCBT sample.

Criterion	Predictors	ΔR^2	B	SEB	Beta	t	Part r
GAD-7 post-treatment	Step 1: GAD-7 pre-treatment	0.13**	0.47	0.14	0.36	3.28**	0.36
	Step 2: GAD-7 pre-treatment	0.34***	0.64	0.12	0.50	5.52***	0.48
	PHQ-9 Δ		−0.41	0.09	−0.43	−4.40***	−0.39
	WHODAS-II Δ		−0.19	0.07	−0.28	−2.95**	−0.26
	Step 3: GAD-7 pre-treatment	0.04*	0.65	0.13	0.50	5.74***	0.48
	PHQ-9 Δ		−0.36	0.09	−0.37	−3.85***	−0.33
	WHODAS-II Δ		−0.12	0.07	−0.18	−1.80	−0.15
	WBI Δ		−0.15	0.06	−0.25	−2.48*	−0.21

Note. Δ = change from pre- to post-treatment. WBI = Worry Behaviors Inventory; GAD-7 = Generalized Anxiety Disorder 7-item Scale; PHQ-9 = Patient Health Questionnaire-9; WHODAS-II = World Health Organization Disability Assessment Schedule 2.0.

*** p < 0.001.
** p < 0.01.
* p < 0.05.

iCBT). Our findings provide further support for the effectiveness of iCBT delivered in routine care settings, however, they also demonstrate that there is considerable scope to enhance outcomes for the substantial portion of patients who do not complete treatment or who continue to experience elevated symptoms following therapy.

A key finding of this study was that greater reductions in maladaptive behaviors during treatment predicted better treatment outcomes in terms of lower post-treatment GAD symptoms. Cognitive theories emphasize the importance of addressing cognitive factors in the treatment of GAD, however, current findings suggest that reducing maladaptive behaviors may also be important in the treatment of GAD. The comparative importance of maladaptive behaviors in maintaining GAD now needs to be better understood. It is unclear if reductions in maladaptive behaviors during CBT would continue to predict treatment outcomes once reductions in cognitive factors were taken into account. Research is also needed to explore the mechanisms by which maladaptive behaviors contribute to symptoms of GAD. Cognitive factors like cognitive avoidance, intolerance of uncertainty or metacognitive distortions may mediate the relationship between behavioral avoidance and symptoms of GAD, and altering these cognitive factors via cognitive techniques may result in the reduction of maladaptive behaviors and symptoms of GAD. To explore these possibilities, future studies could consider randomized control trials of interventions based on specific theoretical accounts of GAD (i.e., intolerance of uncertainty therapy or metacognitive therapy) and examine whether reductions in specific cognitive variables (e.g., metacognitive beliefs) and maladaptive behaviors mediate the effect of treatment on GAD symptoms. Serial multiple mediator models could investigate whether reductions in cognitive variables across therapy predict reductions in maladaptive behaviors (and vice versa) to mediate the effect of treatment on symptoms (e.g., see Newby et al., 2014b and Hayes and Rockwood, 2017). Furthermore, experimental work is need to establish whether manipulating specific cognitive variables causes different levels of engagement in maladaptive behaviors (as has been shown in the obsessive-compulsive disorder literature, e.g. Bouchard et al., 1999). It seems likely that the relationships between cognitive and behavioral variables are complex. Reducing maladaptive behaviors without reference to cognitive factors appears to significantly reduce symptoms of GAD (Beesdo-Baum et al., 2012) and cognitive variables such as intolerance of uncertainty or metacognitive distortions can be reduced by treatments that do not target them directly (van der Heiden et al., 2012). Nevertheless, the current study represents an important first step in understanding how maladaptive behaviors change across the course of treatment for GAD.

This study has several limitations that need to be considered. Participants were gathered from a clinic providing routine care where structured diagnostic interviews were not conducted and all data was based on self-report questionnaires. Treatment follow-up data was also not available. As a result, the long-term role of maladaptive behaviors on the naturalistic course of GAD could not be evaluated. This study was not a randomized controlled trial, and as such, the reductions that we observed in maladaptive behaviors could have been due to other factors, such as spontaneous remission, rather than the iCBT courses.

5. Conclusions

This study has shown that maladaptive behaviors associated with GAD significantly reduce following CBT. Reductions in these behaviors predicted treatment outcomes, which supports the proposition that behavioral avoidance may contribute to the maintenance of GAD.

Conflict of interest

None.

References

American Psychiatric Association, 2013. Diagnostic and Statistical Manual for Mental Disorders, 5th ed. Author, Washington, DC.

Andrews, G., Kemp, A., Sunderland, M., Von Korff, M., Üstün, T.B., 2009. Normative data for the 12 item WHO disability assessment schedule 2.0. PLoS One 4, e8343.

Andrews, G., Mahoney, A.E.J., Hobbs, M.J., Genderson, M., 2016. Treatment of Generalized Anxiety Disorder: Therapist Guides and Patient Manual. Oxford University Press, Oxford.

Beard, C., Hsu, K.J., Rifkin, L.S., Busch, A.B., Björgvinsson, T., 2016. Validation of the PHQ-9 in a psychiatric sample. J. Affect. Disord. 193, 267–273.

Beesdo-Baum, K., Jenjahn, E., Hofler, M., Lueken, U., Becker, E.S., Hoyer, J., 2012. Avoidance, safety behavior, and reassurance seeking in generalised anxiety disorder. Depress. Anxiety 29, 948–957.

Borkovec, T.D., Alcaine, O.M., Behar, E., 2004. Avoidance theory of worry and generalised anxiety disorder. In: Heimberg, R.G., Turk, C.L., Mennin, D. (Eds.), Generalised Anxiety Disorder: Advances in Research and Practice. Guilford Press, New York, NY.

Bouchard, C., Rhéaume, J., Ladouceur, R., 1999. Responsibility and perfectionism in OCD: an experimental study. Behav. Res. Ther. 37, 239–248.

Brown, T.A., Campbell, L.A., Lehman, C.L., Grisham, J.R., Mancill, R.B., 2001. Current and lifetime comorbidity of the DSMIV anxiety and mood disorders in a large clinical sample. J. Abnorm. Psychol. 110, 585–599.

Coleman, S.L., Pieterfesa, A.S., Holaway, R.M., Coles, M.E., Heimberg, R.G., 2011. Content and correlates of checking related to symptoms of obsessive compulsive disorder and generalised anxiety disorder. J. Anxiety Disord. 25, 293–301.

Dugas, M.J., Gagnon, F., Ladouceur, R., Freeston, M.H., 1998. Generalised anxiety disorder: a preliminary test of a conceptual model. Behav. Res. Ther. 36, 215–226.

Hayes, A.F., Rockwood, N.J., 2017. Regression-based statistical mediation and moderation analysis in clinical research: observations, recommendations, and implementation. Behav. Res. Ther. 98, 39–57.

Hoyer, J., Beesdo, K., Gloster, A.T., Runge, J., Hofler, M., Becker, E.S., 2009. Worry exposure versus applied relaxation in the treatment of generalized anxiety disorder. Psychother. Psychosom. 78, 106–115.

Kroenke, K., Spitzer, R., Williams, J.B., 2001. The PHQ-9: validity of a brief depression severity measure. J. Gen. Intern. Med. 16, 606–613.

Löwe, B., Spitzer, R.L., Williams, J.B., Mussell, M., Schekkberg, D., Kroenke, K., 2008. Depression, anxiety and somatization in primary care: syndrome overlap and functional impairment. Gen. Hosp. Psychiatry 30, 191–199.

Mahoney, A.E., Hobbs, M.J., Newby, J.M., Williams, A.D., Sunderland, M., Andrews, G.A., 2016. The worry behaviors inventory: assessing the behavioral avoidance associated with generalized anxiety disorder. J. Affect. Disord. 203, 256–264.

Mahoney, A., Hobbs, M.J., Newby, J.M., Williams, A.D., Andrews, G., 2017. Psychometric properties of the worry behaviors inventory: replication and extension in a large clinical and community sample. Behav. Cogn. Psychother. 31, 1–17.

Mewton, L., Wong, N., Andrews, G., 2012. The effectiveness of internet cognitive behavioral therapy for generalized anxiety disorder in clinical practice. Depress. Anxiety 29, 843–849.

Newby, J.M., Mackenzie, A., Williams, A.D., McIntyre, K., Watts, S., Wong, N., Andrews, G., 2013. Internet cognitive behavioral therapy for mixed anxiety and depression: a randomized controlled trial and evidence of effectiveness in primary care. Psychol. Med. 43, 2635–2648.

Newby, J.M., Mewton, L., Williams, A.D., Andrews, G., 2014a. Effectiveness of transdiagnostic internet cognitive behavioral treatment for mixed anxiety and depression in primary care. J. Affect. Disord. 165, 45–52.

Newby, J.M., Williams, A.D., Andrews, G., 2014b. Reductions in negative repetitive thinking and metacognitive beliefs during transdiagnostic internet cognitive behavioral therapy (iCBT) for mixed anxiety and depression. Behav. Res. Ther. 59, 53–60.

Newby, J.M., Mewton, L., Andrews, G., 2017. Transdiagnostic versus disorder-specific internet-delivered cognitive behavior therapy for anxiety and depression in primary care. J. Anxiety Disord. 46, 25–34.

Robichaud, M., 2013. Cognitive behavior therapy targeting intolerance of uncertainty: application to a clinical case of generalised anxiety disorder. Cogn. Behav. Pract. 20, 251–263.

Robinson, E., Titov, N., Andrews, G., McIntyre, K., Schwencke, G., Solley, K., 2010. Internet treatment for generalized anxiety disorder: a randomized controlled trial comparing clinician vs. technician assistance. PLoS ONE 5, e10942.

Salim, A., Mackinnon, A., Christensen, H., Griffiths, K., 2008. Comparison of data analysis strategies for intent-to-treat analysis in pre-test–post-test designs with substantial dropout rates. Psychiatry Res. 160, 335–345.

Schut, A.J., Castonguay, L.G., Borkovec, T.D., 2001. Compulsive checking behaviors in generalised anxiety disorder. J. Clin. Psychol. 57, 705–715.

Spitzer, R.L., Kroenke, K., Williams, J.B., Löwe, B., 2006. A brief measure for assessing generalised anxiety disorder: the GAD-7. Arch. Intern. Med. 166, 1092–1097.

Üstün, T.B., Kostanjsek, N., Chatterji, S., Rehm, J., 2010. Measuring Health and Disability: Manual for WHO Disability Assessment Schedule. World Health Organisation, Malta.

van der Heiden, C., Muris, P., van der Molen, H.T., 2012. Randomized controlled trial on the effectiveness of metacognitive therapy and the intolerance-of-uncertainty therapy for generalized anxiety disorder. Behav. Res. Ther. 50, 100–109.

Wells, A., 1999. A metacognitive model and therapy for generalised anxiety disorder. Clin. Psychol. Psychother. 6, 86–95.