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# Cognitive Behavioral Therapy for Anxiety Disorders – Predictors of Outcome

A Systematic Review

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## Abstract

*Objective:* This study aims to identify the personal client characteristics that may predict treatment outcome in patients with an anxiety disorder.

*Methods:* A systematic review investigated recent trials identified through databases of Scopus and PsycINFO, with the search string including the broad term “anxiety disorder”, predict\*, and “cognitive behavioral therapy”. Titles and abstracts were scanned to exclude trials before 2010, treatment conditions other than individual face-to-face CBT, biological predictors, and trials including children younger than 16 years. 30 articles met these criteria and were further investigated for results.

*Results:* Baseline severity of symptoms, comorbidity, neuroticism, self-stigma, harm avoidance, anxiety sensitivity, and resistance in the first session were associated with a poorer outcome. Self-esteem, shame, self-efficacy, perceived control, outcome expectancy, vigilant bias, emotion reactivity, homework adherence and lower heart rate variability emerged as potential predictors of a better outcome.

*Conclusions:* The most consistent predictors were severity of symptoms and comorbidity. Sociodemographic variables have consistently been demonstrated to have no impact on therapy outcome. Although personal features have not been investigated in as many studies, they still have been identified as predictors. The results highlight the potential value of a more personalized and elaborated intake interview and treatment approach. Methods to investigate the identified predictors during the intake phase and addressing them in composing a treatment approach to optimize treatment results are discussed.

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## Introduction

Anxiety disorders are among the most common mental disorders worldwide (Kessler et al. 2005; Kadri et al. 2007). According to the systematic review of Baxter, Scott, Vos and Whiteford (2013), one out of 14 people meet the diagnostic criteria for an anxiety disorder at some point in their lives. They found a lifetime prevalence adjusted for methodological differences of 7,3%, which ranged from 5,3% in African cultures to 10,4% in Euro/Anglo cultures. Anxiety disorders exert a substantial negative impact on the quality of life (Olantunji, Cisler & Tolin, 2007). For example, social anxiety disorder is associated with lower work productivity, impaired functioning in social and romantic relationships, and financial dependence (Eskildsen, Hougaard & Rosenberg, 2010). There is also evidence for people with post-traumatic stress disorder (PTSD) to have high rates of public financial assistance and diminished subjective well-being (Zatzick et al., 1997). On that account, it is important to aid the client with an effective psychological treatment. Personalized medicine was first applied to the sector of medicine where the medical treatment is tailored to the needs of the individual. The approach relies on scientific research, which explains how the person's molecular and genetic profile makes it susceptible to certain diseases. Understanding for whom, and under what conditions, treatments exert their greatest effect is equally important in the mental health sector. This has been addressed in the treatment of depression, but much less has been done in the context of anxiety disorder treatment (Simon & Perlis, 2010).

In general, before the start of the treatment, the client is interviewed in an intake to examine the factors and symptoms that have led him to seek psychological assistance. Afterwards, the therapist most likely consults the Diagnostic and Statistical Manual of Mental Disorders (2000) to conclude the investigation with a diagnosis. The most used classification system by the American Psychiatric Association subdivides anxiety disorders into 10 categories: Panic disorder with or without agoraphobia (PD), agoraphobia, specific phobia, social phobia/anxiety (SAD), generalized anxiety disorder (GAD), obsessive-compulsive disorder (OCD), posttraumatic stress disorder (PTSD), acute stress disorder, and others.

In order to compose a treatment approach according to the needs of a client, the most common treatments have to be understood first. The evidence-based treatments of anxiety disorders include behavioral, cognitive, physical and pharmacological interventions. Overall, they are focused on the decline of avoidance and other safety behavior, and on the decrease of anxiety

and tension. This review focuses on the most common treatment, also described in the multidisciplinary guidelines by the Trimbos Institute (2003). According to those guidelines, after psycho-education, the practitioner can choose between pharmacological and psychological treatment, where the latter consists of exposure or cognitive therapy. Furthermore, depending on the type of anxiety disorder, social skills training, task concentration training, and applied relaxation can be added.

In this review, the term “cognitive behavioral therapy (CBT)” is used as a generic label including a number of different techniques that are applied in various combinations. What most of those techniques have in common is that they involve systematic and repeated practice, where the client and the therapist work together. Additionally, the client will continue to work outside the session without the supervision of the therapist. The behavior is at least partially new to the client and requires effortful modification. CBT commonly combines cognitive restructuring with techniques such as exposure, applied relaxation, task concentration, and social skills training. These techniques will be described in the following section.

A form of exposure is used in the treatment of every anxiety disorder, whereas task concentration and social skills training are mostly used to treat social anxiety. Because of its effect, exposure in vivo is mostly used. Exposure in vitro is most commonly used in the treatment of PTSS. The newest form of treatment, virtual reality therapy, can be widely used. One example could be the exposure to more dangerous situations (acrophobia), but it can also be used to simulate social situations. In every form of exposure, a client enters and remains in a feared situation despite being distressed. The client is instructed to stay in the feared situation until the anxiety is reduced to a moderate level. This is expected to produce new learning or habituation and thereby to reduce the anxiety in the short term as well as in the long term. Exposure is typically initialized with the creation of a fear and avoidance hierarchy, where the feared situations are ranked according to the degree of anxiety they produce. The finished hierarchy then acts as a roadmap, where the training begins with the lower-ranked situations and moves up gradually to the more feared situations. (Hofmann & Otto, 2008)

In applied relaxation, clients are trained in Progressive Muscle Relaxation (PMR; Berstein, Borkovec, & Hazlett-Stevens, 2000), which is a well-known technique for the management of physiological arousal. The clients are then instructed to use the relaxation during daily activities and, when sufficiently trained, also in feared situations (Öst, 1987). This relaxation

technique is an optional addition to the CBT of anxiety disorders. Developed by Mulkens, Bögels, de Jong and Louwers (2001), Task Concentration Training (TCT) helps people with social anxiety disorder learn to focus attention on the pertinent aspects of the situation, instead of focusing inward on feelings, thoughts, and symptoms. Another treatment can be Social Skills Training, which works under the assumption that people with social anxiety disorder do not possess adequate social interaction skills. Practicing these skills is accomplished with a combination of modeling, behavioral rehearsal, corrective feedback, and positive reinforcement. According to Emmelkamp, Bouman, and Visser (2009), this training can also be useful in the treatment of other anxiety disorders such as generalized anxiety disorder, obsessive-compulsive disorder, or agoraphobia.

The multidisciplinary guidelines (Trimbos Institute, 2003) are developed from systematically searching the available scientific literature and consulting the expertise of practitioners and patients. Although these evidence-based treatments mostly lead to a positive therapeutic outcome, there are still patients that do not respond at all or remain significantly symptomatic (Van Ameringen, Mancini, Pipe and Bennet, 2004). In an effort to improve the treatment results, researchers have investigated which patients fail to benefit from standard treatment. Individual baseline characteristics could have a significant impact on the effectiveness of mental health treatment. Researchers have to uncover pre-treatment variables (e.g., demographics, clinical characteristics) that have a predictive relation with outcome measures. According to Wolitzky-Taylor, Arch, Rosenfield and Craske (2012), an approach can be taken to understand which types of individuals will respond best to the treatment, regardless of the nature of the treatment (non-specific predictors). This review will take this approach to provide prognostic information by clarifying what types of patients will respond to CBT.

The number of articles intending to find out which factors influence treatment outcome has increased during the last years. Therefore, this report aims to review and update these earlier investigations. This review divides the various variables into the following three categories: sociodemographic characteristics, clinical characteristics, and personal features. This is in line with the categorization in the majority of investigations. Most studies mention clinical variables such as comorbid disorders, for example mood disorders, other anxiety disorders (e.g. agoraphobia), or personality disorders frequently co-occurring with anxiety disorders. The outcomes of these studies were different. For the most part, non-mood disorder comorbidity seems to have little to no influence on CBT outcomes for anxiety disorders (Kampman, Keijsers, Hoogduin, & Hendriks, 2008; Mennin, Heimberg, & Jack,

2000; Ollendick, Ost, Rueterskiold, & Costa, 2010; Schadé et al., 2007; Turner, Beidel, & Dancu, 1996). However, as reported by Borge, Hoffart and Sexton (2010), a comorbid body dysmorphic disorder might hinder improvement in the treatment of social anxiety as it can be an additional reason for social avoidance. Eskildsen, Hougaard and Rosenberg (2010) found that comorbid depression and avoidant personality disorder before treatment negatively influenced the outcome of treatment for social anxiety. The finding that certain additional anxiety disorders are associated with greater improvement in the targeted anxiety disorder is exceptional (e.g. Brown, Antony, & Barlow, 1995).

The extent to which baseline severity of a disorder impacts the outcome also differs across studies. Kampman et al. (2008) found that the severity of panic disorder symptoms adversely affects the outcome. Ramnerö and Öst (2004) found that the severity of agoraphobia influences the outcome of treating panic disorder negatively. However, Watanabe et al. (2010) detected no consistent pre-treatment predictors.

Besides these clinical variables, personal factors also seem to have an influence on the outcome of treatment. Both poor health and high baseline neuroticism have been associated with a poorer prognosis from CBT for those with late-life anxiety (Schuurmans et al., 2009). In their review on predictors of outcome for the behavioral treatment of panic disorder and agoraphobia (PDA), Steketee and Shapiro (1995) concluded that from client characteristics such as sociodemographic attributes, aspects of the disorder, comorbidity, personality traits, Axis-II disorders and cognitive factors, most predictor variables used were not consistently associated with the outcome. However, they found that positive expectancy of outcome seems predictive of a good outcome. Accordingly, Price and Anderson (2012) showed that outcome expectancy plays a role as it influences the outcome of cognitive behavior therapy.

These findings and characterization of the predicting features may let therapists personalize the treatment approach. Potentially, this review can help to improve the effect of CBT of anxiety disorders by aiding therapists in the composition of a more personalized approach. The evidence-based multidisciplinary guidelines (Trimbos Institute, 2003) describe treatments according to the diagnosis. The Trimbos Institute provided those guidelines according to many randomized controlled trial-studies. In those large-scale studies, individual differences and possible comorbidity are in all likelihood not taken into account. Most clients with an anxiety disorder meet the criteria for at least one other current anxiety or mood disorder (Brown & Barlow, 1992; Brown, Campbell, Lehman, Grisham & Mancill, 2001). Thus, practitioners often have to deal with comorbidity and need to determine which protocol will

be followed first. Therefore, this review can be viewed as a guide that takes into account many possible individual characteristics connected to the effect of treatment. So, after collecting all needed information about the client, the therapist can make the optimal approach to CBT. Therapists in the process of determining the treatment can react according to this information by expanding it with elements that address possible risk factors and amplify ensuring factors. This review could also identify for whom CBT does not work as well as is expected according to the guidelines.

## Method

A systematic search was conducted on 3rd December 2016 to document possible predictors of outcome in CBT for anxiety disorders. Methods were consistent with those recommended by Cuijpers (2016). A broad search string was developed to search relevant electronic databases (SCOPUS, PsycINFO). These databases were chosen to identify as many articles as possible. The search string included the following broad term: (“anxiety disorder\*” AND predict\* AND outcome) AND (CBT OR “cognitive behavioral therapy” OR “cognitive behavioural therapy”). Aiming to provide an update to earlier reviews, results were limited to original studies published between 2010 and 2016. The results were limited to Dutch, English and German articles. Excluded were meta-analyses, literature reviews, dissertation abstracts, and studies where different treatment conditions other than individual face-to-face CBT (e.g. medication) were aggregated in the analyses. Articles that investigated biological predictors were excluded as well, to guarantee that the therapist can address the predicting factors in his treatment approach. Furthermore, this review took only research into consideration that was about adults and adolescents (age 16-65). The treatment protocol for children differs too much to get comparable results.

Titles and abstracts were scanned to identify papers fitting the eligibility criteria. Then the full text of the relevant articles was obtained and reviewed.

A diagram details the study identification and selection process (Fig.1) following the PRISMA guidelines. Using the described search string in the two databases, 703 articles were found (328 in SCOPUS and 375 in PsycINFO). The articles were exported into the reference software “Endnote”. There, 325 duplicates were removed. The remaining unique 378 titles and abstracts were screened by year, originality and language, and 115 articles were excluded. Subsequently, the full text of 263 articles was assessed for eligibility. Finally, 233 articles were excluded because of one of the following reasons: the age of respondents, neurological

predictor, another form of therapy, moderators/mediators, not outcome predictors, anxiety disorder was not the main research object. The remaining 30 studies were included in the qualitative synthesis.

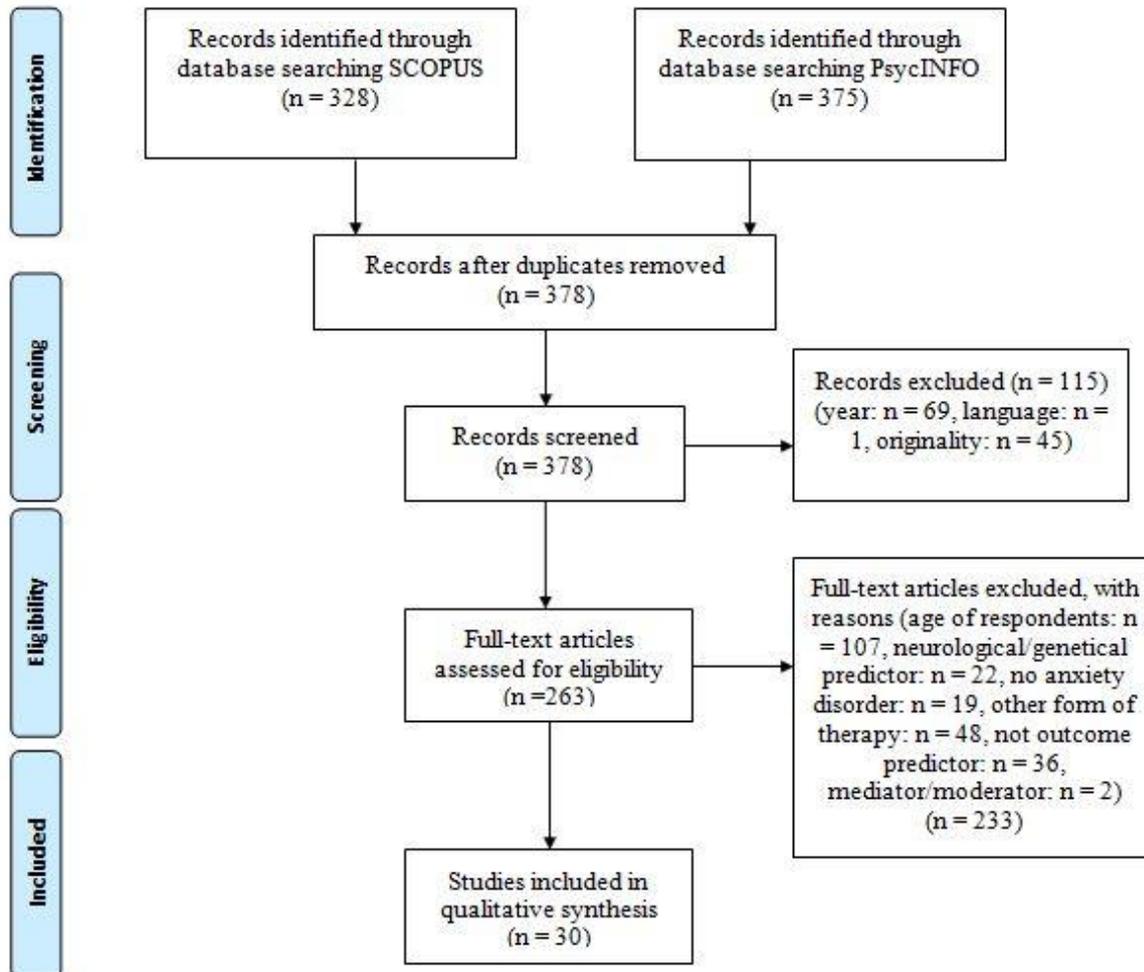


Figure 1. Flowchart of the study selection process. Search string: ("anxiety disorder\*" AND predict\*AND outcome) AND (cbt OR "cognitive behavioral therapy" OR "cognitive behavioural therapy"), based on Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The PRISMA Group (2009)

## Results

The 30 reviewed studies were designed differently. 18 studies were randomized controlled trials, whereas 11 were observational (prospective) studies and one was a single-armed uncontrolled trial. Overall, 6824 participants were included in 30 studies. The mean number of participants in the analyzed studies was 227, where the smallest was a single armed uncontrolled trial with only 15 participants and the biggest were the studies that included a total of 1004 participants from the Coordinated Anxiety Learning and Management (CALM)

trial. Most studies assessed specific anxiety disorders, but altogether, every anxiety disorder was included in this review. A summary of the results can be seen in Table 1.

**Table 1**  
*Summary of study outcomes per variable*

Type of predictor	Quantity of studies addressing the predictor (N=30)	Quantity of studies with significances found
<b>Sociodemographic characteristics</b>		
Age	7	1
Gender	6	0
(Personal status)	6	4
<b>Clinical characteristics</b>		
Age of onset	2	0
Duration of illness	3	0
Severity of symptoms	10	7
Comorbidities	11	7
<b>Personal features</b>		
Personality	3	3
Childhood maltreatment	1	0
Attachment	1	0
Alcohol use	1	0
Emotion regulation strategies	1	1
Anxiety sensitivity	2	2
Heartbeat perception accuracy/ heart rate variability	2	2
Attentional bias/ avoidance	4	2
Capacity for participation	1	1

### **Sociodemographic characteristics**

Nine studies examined the impact of different sociodemographic features (including age, gender, educational level, and marital status) on anxiety disorder treatment outcomes (Table 2).

#### *Age*

Only one of the seven articles assessing age as a predictor of the outcome of CBT for an anxiety disorder found a significant impact. According to Hendriks, Kampman, Keijsers, Hoogduin and Voshaar (2014), increasing age can have a positive effect on agoraphobic avoidance in people with panic disorder treated with CBT. In contrast, in their small study, Yoshinaga et al. (2013) did not discover age as a significant predictor of outcome by people with social anxiety disorder. Similarly, Wolitzky-Taylor, Arch, Rosenfield and Craske (2012), who included people with various anxiety diagnoses, found age not to be a significant

predictor of outcome. Furthermore, according to the investigation of Kyrios, Hordern and Fassnacht (2015) age is not a significant predictor for the outcome of CBT for obsessive-compulsive disorder. Additionally, Hoyer et al. (2016) found no correlation between socio-demographic variables and social anxiety outcome measures in their randomized control trial. In their observational study with over 100 participants, Prasko et al. (2015) found no significant difference between the age of responders and non-responders. Finally, Voderholzer et al. (2013) also did not find a significant correlation between age and therapy outcome for people with obsessive-compulsive disorder (OCD).

#### *Gender*

Similarly to age, none of the six studies found a significant impact of gender. In their randomized controlled trial, Wolitzky-Taylor, Arch, Rosenfield and Craske (2012) addressed all anxiety disorders whereas Kyrios et al. (2015) limited the population in their observational study to OCD patients. Prasko et al. (2015) addressed all anxiety disorders but PTSD.

#### *Personal status*

While two studies reported a positive influence, three others did not find a predictive quality of educational or marital status. Prasko et al. (2015) reported marital status as a differentiating variable between responders and non-responders. In their randomized controlled trial, Joesch et al. (2013) established that social support and being married or living with a partner were associated with less risk of following worse trajectories. Kyrios et al. (2015) found only years of education to have a positive influence on the treatment outcome, marital status and other sociodemographic variables had no predictive quality. In their small single-arm trial, Yoshinaga et al. (2013) did not find any predictive sociodemographic variable. Hoyer et al. (2016) also assessed whether education could be a predictor of treatment outcome in their randomized controlled trial. They did not find a significant correlation either. In the data of a randomized controlled trial, Kelly, Jakubovski and Bloch (2015) assessed various socioeconomic variables and found that unemployment and income were associated with poor treatment response.

**Table 2***Studies describing the impact of sociodemographic characteristics on the outcome of CBT for different anxiety disorders*

Author	Year	Design	Participants			Predictor	Anxiety disorder	Description
			N	Age ( <i>M (SD)</i> )	Sex			
Hendriks, Kampman, Keijsers, Hoogduin, & Voshaar	2014	observational (prospective)	172	≥18	66% female	Age	PD	This study compared the effectiveness of CBT in younger (18-60) and older adults (≥60). Manual-based CBT was delivered individually and consisted of 14 weekly 50-min sessions. Outcome was measured using the agoraphobic conditions questionnaire (ACQ), the mobility inventory (MI), the Beck Depression Inventory (BDI), and the symptom checklist (SCL-90). The results implied post-treatment improvement in both groups. Only for agoraphobic avoidance (MI) the results indicated a larger improvement for the older patients. Panic-attack frequency decreased a little less in the under-60s group than in the plus-60s group.
Hoyer et al.	2016	RCT	244	18-70	55% female	Age, sex, education	SAD	This study investigated the role of baseline characteristics as predictors of outcome (end-state functioning, response and remission) by outpatients. Severity was assessed at baseline and end of treatment with the Liebowitz Social Anxiety Scale (LSAS). A maximum of 30 individual 50-min sessions of cognitive therapy (including diagnostics) were applied with up to six double sessions with 100-min duration. Multiple linear regression analyses and logistic regression analyses were applied. Sociodemographic variables were uncorrelated with social anxiety and outcome indicators.
Joesch, et al.	2013	RCT	482	43.4 (13.3)	70% female	Employment status, social support, marital status	PD, GAD, SAD, PTSD	This study aimed to identify clusters of participants with similar patterns of change in anxiety severity and impairment (trajectory groups); and characteristics that predict trajectory group membership. The data was conducted in the Coordinated Anxiety Learning and Management (CALM) trial conducted in primary care clinics. The treatment consisted of 10-12 weeks of CBT, anti-anxiety medication, or both. Outcome was measured by the Overall Anxiety Severity and Impairment Scale (OASIS). The study applied group-based trajectory modeling. Not working at baseline was identified as a risk factor associated with the less favorable two groups. More social support and being married or living with a partner was associated with less risk of following the unfavorable trajectories. The extent of social support persisted as a protective factor.

**Table 2 (continued)**

Author	Year	Design	Participants			Predictor	Anxiety disorder	Description
			N	Age ( <i>M (SD)</i> )	Sex			
Kelly, Jakubovski, Bloch	2015	RCT	1004	43.7 (13.7)	71% female	High school completion, employment status, income, insurance status, marital status	GAD, PD, SAD, PTSD	An exploratory analysis from the CALM trial that was conducted in primary care clinics. The treatment consisted of 10-12 weeks of CBT, anti-anxiety medication, or both. Logistic regression was used to examine baseline characteristics associated with remission and response overall and by treatment condition. Receiver operating curve analyses identified subgroups associated with similar likelihood of response and remission or global anxiety symptoms. Remission was defined as score <6 on the 12-item Brief Symptom Inventory (BSI-12) anxiety and somatization subscales. Response was defined as at least 50% reduction on BSI-12, or meeting remission criteria. Several measures indicating poor socioeconomic status were strongly associated with poor treatment response, including unemployment, personal income, and current receipt of disability payment.
Kyrios, Hordern, & Fassnacht	2015	Observational (prospective)	79	18-67	63% female	Gender, age, relationship status, years of education	OCD	This study investigated differences between treatment completers and non-completers undergoing 16 weekly 50 minute individual sessions of CBT. The authors also examined treatment response as defined by post-treatment symptom severity and clinically reliable change, as well as predictors of treatment response. To measure the outcome, they used the Yale-Brown Obsessive-Compulsive Scale (YBOCS), the BDI, the Beck Anxiety Inventory (BAI), and the Obsessional Belief Questionnaire (OBQ). Only of years of education, predicted post-treatment symptom severity.
Prasko, et al.	2015	Observational (prospective)	191	37.1 (12.4)	72% female	Marital status, employment, gender, age	PD, SAD, GAD, mixed anxiety-depressive disorder, OCD, adjustment disorders, others	Short (5-6 weeks) psychodynamic psychotherapy or systematic cognitive behavioral therapy. Pharmacology treatment remained mainly unchanged. The following outcome measures were used in the study: the Clinical Global Impression – Severity of Illness scale (CGI), Dissociative Experience Scale (DES), Somatoform Dissociation Questionnaire (SDQ-20), BDI, and the BAI. Marital status showed statistically significant difference between responders and non-responder in BAI. No significant gender differences were found in comparison of patients improved or remitted. The mean age of responders and non-responders did not differ significantly either. Also regarding employment status, there were no differences in respond rate and in remission rate.

**Table 2 (continued)**

Author	Year	Design	Participants			Predictor	Anxiety disorder	Description
			N	Age ( <i>M (SD)</i> )	Sex			
Voderholzer et al.	2013	Observational (Prospective)	60	32.5 (8.4)	58% female	Age, sex	OCD	This study assessed whether neuropsychological test results in OCD change after CBT and whether neuropsychological and clinical variables predict response to CBT. Hospitalized medication-free patients were treated for 12 weeks with 2 hour sessions of CBT including exposure and response prevention. The YBOCS was used as an outcome measure to assess symptom severity pre- and post-treatment. Neither sex nor age showed a significant correlation with the therapy outcome.
Wolitzky-Taylor, Arch, Rosenfield, & Craske	2012	RCT	147	18-60	88% female	Race/ethnicity, gender, age	PD, GAD, PTSD, SP, OCD	Patients completed 12 sessions of ACT or CBT and were assessed with the Mood and Anxiety Symptom Questionnaire for General Anxiety (MASQ-GA) at baseline, post-treatment, and 6- and 12-month follow-up assessments. Gender, age, and race/ethnicity did not significantly influence outcomes on the MASQ-GA.
Yoshinaga, et al.	2013	Single-arm, uncontrolled	15	29.9 (9.2)	80% female	Gender, age, employment status, marital status	SAD	This trial employed a 14-week 90 min per session individual CBT intervention. The primary outcome measure was the LSAS, with secondary measurements of other social anxiety and depressive severity. Assessments were conducted at baseline, after a waiting period before CBT, during CBT, and after CBT. Results showed that none of the baseline demographic and clinical variables were significant predictors of the post-treatment LSAS score.

*Note.* PTSD: post-traumatic stress disorder, GAD: generalized anxiety disorder, PD: panic disorder with or without agoraphobia, SAD: social anxiety disorder, OCD: obsessive-compulsive disorder. More information about the outcome values can be found in Table 7 in the Appendix.

## Clinical characteristics

Studies describing the impact of different clinical characteristics (including age of onset, duration, symptom severity, and comorbidity) on anxiety disorder treatment outcomes are listed in Table 3.

### *Age of onset*

The impact of the age of onset on the CBT outcome was investigated in an observational study by Ociskova, Prasko, Latalova, Kamaradova and Grambal (2016). They included various anxiety disorders and found no significant correlation of age of onset with a relative change in psychopathology. In their small single-armed trial including only patients with social anxiety, Yoshinaga et al. (2013) also did not find age of onset as a significant predictor.

### *Duration of illness*

None of the three studies that investigated predictors of outcome on anxiety disorders found duration to be a significant predictor. This includes the observational study of Voderholzer et al. (2013), who addressed participants with OCD, as well as Yoshinaga et al. (2013) single-armed trial with social anxiety patients, and the observational study of Ociskova et al. (2016) including various anxiety disorders.

### *Severity*

The impact of baseline anxiety severity was analyzed in ten articles, while two focused on the severity or presence of specific symptoms. Eight of these ten studies found a negative correlation between severity and treatment outcome. This includes studies with various anxiety disorders. Two other studies did not yield similar results.

Prasko et al. (2015) found that patients with lower scores on an anxiety scale achieved remission more frequently, which means that lower baseline severity could predict better outcomes. They included patients with SAD, OCD and mixed anxiety-depressive disorders. In their randomized controlled trial assessing patients with SAD, Hoyer et al. (2016) showed that higher symptom severity at treatment start was the only significant negative predictor of remission, explaining 15% of the variance. In their small randomized controlled trial including only PTSD patients, Wu, Li, and Cho (2014) found that a higher total score on the Hospital Anxiety and Depression Scale (HADS) was predictive of a worse outcome at 6-month follow-up only for a Self-Help Program condition, not for the Brief-CBT program. Haug et al. (2015) analyzed the data of patients with panic disorder and with social anxiety disorder. The results of their randomized controlled trial indicated that a higher level of impairment was associated with a poorer treatment outcome. Kelly, Jacobovski, and Bloch

(2015) discovered in their randomized control trial that higher severity of GAD, PD, SAD, and PTSD symptoms was negatively associated with the likelihood of both remission and response. Kyrios, Hordern, and Fassnacht (2015), who included only OCD patients, discovered a higher initial symptom severity to be significantly predictive of poorer post-treatment outcome. Reinecke, Rinck, Becker, and Hoyer (2013) assessed whether the extent of negative bias for neutral worry words (generalization bias) from patients with GAD could predict treatment outcome. Their results suggest that the degree of pre-treatment bias has predictive value regarding therapeutic success, where patients with less bias should show more improvement.

The common OCD symptom “thought-action fusion” belief was investigated in the randomized controlled trial of Jónsson, Hougaard and Bennedsen (2011). In terms of the predictive value of the OCD belief measures, this study indicates that stronger held moral type of thought-action fusion may predict poorer outcome in group CBT, but not in individual CBT.

In contrast, only two out of 10 studies could not find an association between baseline anxiety severity and treatment outcome. Wolitzky-Taylor, Arch, Rosenfield, and Craske (2012) who included every anxiety diagnosis in their randomized controlled trial, could not find baseline severity of symptoms as a predicting factor. Furthermore, Ociskova et al. (2016), who studied various anxiety disorders, could not find a correlation between severity and outcome either.

### *Comorbidities*

11 studies assessed the influence of comorbidities (including personality, other anxiety, and mood disorders) on the outcome of CBT.

Seven studies demonstrated a predictive value of comorbidity on treatment outcome. With the exception of a comorbid other anxiety disorder, all of these studies found the impact of comorbidity to be negative.

Assessing SAD, OCD and mixed anxiety-depressive disorders, Prasko et al. (2015) discovered that patients with a comorbid diagnosis of mild depression at the beginning achieved response and remission less frequently than patients without a comorbid mild depression. Patients with comorbid a personality disorder also did not achieve remission as frequently as a patient without a personality disorder. In their RCT assessing participants with SAD, Hoyer et al. (2016) discovered that the degree of comorbidity was an indicator of lower probability to achieve response. Furthermore, also in a RCT, Kelly, Jacobovski, and Bloch

(2015) found that the presence and severity of comorbid depressive symptoms were strongly associated with poorer outcomes of the treatment of GAD, PD, SAD, and PTSD. In another RCT, including PTSD, SAD, GAD, and PD, Joesch et al. (2013) found that being sicker at baseline was a risk factor associated with less favorable outcomes, where being sick was measured with the number of anxiety disorders, the presence of comorbid major depressive disorder, and the number of major chronic medical conditions. Additionally, Ociskova et al. (2016), who included PD, GAD, SAD patients, or mixed anxiety–depressive disorder, discovered that patients who did not have a comorbid personality disorder improved significantly more in their overall mental state than participants who had a comorbid personality disorder. In another RCT, including only PD and SAD, Haug et al. (2015) found different results for the kind of comorbid disorder. Patients with a comorbid cluster C personality disorder had an overall poorer treatment outcome, whereas having a comorbid anxiety disorder was associated with a better treatment outcome among patients with PD but not among those with SAD. Similarly, Wolitzky-Taylor, Arch, Rosenfield, Craske (2012) discovered that patients with a comorbid mood disorder scored higher on post-treatment symptom scales than those without a mood disorder. A comorbid anxiety disorder was however not significantly related to outcome measurements.

Four studies found that treatment outcomes were not impeded by comorbidity. Davis, Barlow and Smith (2010) revealed that patients with pretreatment comorbidity were categorized as good treatment responders, and as having achieved high end-state functioning at the same rate as individuals without comorbidity. They included various anxiety disorders in their observational study. Similarly, in their small single-armed trial with patients with SAD, Yoshinaga et al. (2013) found none of the baseline clinical variables such as comorbidity to predict treatment outcome significantly. Furthermore, Voderholzer et al. (2013) concluded that the presence of a personality disorder in addition to OCD showed no significant correlation with the therapy outcome. Kyrios, Hordern, and Fassnacht (2015) concluded the same in their smaller observational study on OCD.

**Table 3***Studies describing the impact of different clinical characteristics on CBT outcomes of anxiety disorders*

Author	Year	Design	Participants			Predictor	Anxiety disorder	Description
			N	Age ( <i>M (SD)</i> )	Sex			
Davis, Barlow, Smith	2010	Observational (prospective)	150	32.5 (10.9)	54% female	Comorbidity	PD, OCD, SAD, GAD, SP	This study examined the impact of comorbidity on treatment outcome and the effects of CBT for anxiety and depressive disorders on comorbid disorders. The sample consisted of outpatients. There was no set limit on the number of treatment sessions, but the average number was 14.21, and was typically 60min in length. The Work and Social Adjustment Scale (WSAS) was used to measure response. Patients with comorbid disorders began treatment with more severe symptomatology, but the presence of comorbidity did not impede treatment. Chi-square statistics revealed that patients with pretreatment comorbidity were categorized as treatment responders and as having achieved high end-state functioning at the same rate as individuals without comorbidity.
Haug et al.	2015	RCT	173	32.4 (8.9)	52% female	Comorbidity, higher impairment	PD, SAD	The study randomized patients either to 12 sessions of face-to-face CBT or a longer program of Stepped Care. The clinician severity rating (CSR) and the Self-report (SR) –Composite were used to measure the outcome. Patients with lower social functioning, higher levels of impairment from the anxiety disorder and a comorbid cluster C personality disorder had a poorer treatment outcome. However, a comorbid anxiety disorder was associated with a better treatment outcome only among patients with PD but not patients with SAD.
Hoyer et al.	2016	RCT	244	18-70	55% female	Severity, comorbidity	SAD	This study investigated the role of baseline characteristics as predictors of outcome (end-state functioning, response and remission) by outpatients. Severity was assessed at baseline and end of treatment with the LSAS. A maximum of 30 individual 50-min sessions of cognitive therapy (including diagnostics) were applied with up to six double sessions with a 100-min duration. Multiple linear regression analyses and logistic regression analyses were applied. Indicators of comorbidity were at least slightly and significantly correlated with social anxiety and outcome. Symptom severity at the beginning of the treatment (LSAS pre) was the only significant predictor of remission. The degree of comorbidity remained a significant predictor of (more) symptom severity at the end. It also indicated a lower probability to achieve response.

**Table 3 (Continued)**

Author	Year	Design	Participants			Predictor	Anxiety disorder	Description
			N	Age ( <i>M (SD)</i> )	Sex			
Joesch et al.	2013	RCT	482	43.4 (13.3)	70% female	Comorbid anxiety disorders, major depressive disorder, number of major chronic medical conditions	PTSD, SAD, GAD, PD	This study aimed to identify clusters of participants with similar patterns of change in anxiety severity and impairment (trajectory groups), and characteristics that predict trajectory group membership. The data was conducted in the CALM trial conducted in primary care clinics. The treatment consisted of 10-12 weeks of CBT, anti-anxiety medication, or both. Outcome was measured by the Overall Anxiety Severity and Impairment Scale (OASIS). Univariate estimates suggest being sicker at baseline was a risk factor associated with following the two less favorable trajectories, where being sick was measured with the number of anxiety disorders, the presence of comorbid major depressive disorder, and the number of major chronic medical conditions. In multivariate analyses, the number of anxiety disorders remained a significantly associated risk factor.
Jónsson, Hougaard, Bennedsen	2011	RCT	70	32.2 (10.0)	71% female	Symptom severity	OCD	The primary aim of the study was to investigate dysfunctional beliefs in the form of inflated responsibility (IR) and thought-action fusion (TAF) as predictive and mediating variables in individual and group CBT for OCD. Patients received 15 weekly sessions of CBT. In a stepwise regression analysis, the responsibility attitude scale (RAS) and the thought-action fusion scale (TAFS) were related to the YBOCS to determine outcome. Pre-treatment scores on TAFS-Moral was the only belief measure that predicted poorer treatment outcome, both in predicting end-state and in predicting change. In terms of the predictive value of the OCD belief measures, this study indicates that stronger held moral type of TAF may predict poorer outcome in group CBT, while this was not the case in individual CBT.

**Table 3 (Continued)**

Author	Year	Design	Participants			Predictor	Anxiety disorder	Description
			N	Age ( <i>M (SD)</i> )	Sex			
Kelly, Jacobovski, Bloch	2015	RCT	1004	43.7 (13.7)	71% female	Comorbid depression, severity	GAD, PD, SAD, PTSD	An exploratory analysis from the CALM trial was conducted in primary care clinics. Patients were randomized to usual care or a collaborative care intervention. Logistic regression was used to examine baseline characteristics associated with remission and response overall and by treatment condition. Receiver operating curve analyses identified subgroups associated with a similar likelihood of response and remission or global anxiety symptoms. Remission was defined as score <6 on the 12-item Brief Symptom Inventory (BSI-12) anxiety and somatization subscales. Response was defined as at least 50% reduction on BSI-12, or meeting remission criteria. Presence and severity of comorbid depressive symptoms were strongly associated with poorer outcomes to the anxiety disorder treatment.
Kyrios, Hordern, Fassnacht	2015	Observational (prospective)	79	18-67	63% female	Symptom severity, comorbidity	OCD	This study investigated differences between treatment completers and non-completers in patients, undergoing 16 weekly 50 minute individual sessions of CBT. The authors also examined treatment response as defined by post-treatment symptom severity and clinically reliable change, as well as predictors of treatment response. To measure the outcome, they used the YBOCS, the BDI, the BAI, and the OBQ. Only pre-treatment symptom severity significantly predicted post-treatment outcome. Neither comorbidity nor medication significantly predicted the outcome.
Ociskova, Prasko, Latalova, Kamaradova, Grambal	2016	Observational (prospective)	109	40.0 (12.1)	67% female	Age of onset, duration, severity, comorbidity with depression, personality disorder	PD, GAD, SAD, or mixed anxiety–depressive disorder	The main aim of the study was to investigate the relationship between self-stigma and the treatment efficiency of anxiety disorders. Patients were treated for six weeks in 25 group and 5 individual sessions. Several scales and questionnaires were completed at the beginning and end of treatment: The CGI, the BDI, the BAI, and the DES. The relative change in psychopathology did not significantly correlate with age of onset, duration, number of previous hospitalizations, indices of psychopharmaceuticals, and the pretreatment severity. However, patients without a comorbid personality disorder improved significantly more than participants with a comorbid personality disorder.

**Table 3 (Continued)**

Author	Year	Design	Participants			Predictor	Anxiety disorder	Description
			N	Age ( <i>M (SD)</i> )	Sex			
Prasko et al.	2015	Observational (prospective)	191	37.1 (12.4)	72% female	Severity of anxiety and depression, comorbidity	SAD, mixed anxiety-depressive disorder, OCD, adjustment disorders	Short (5-6 weeks) psychodynamic psychotherapy or systematic cognitive behavioral therapy was completed. Pharmacology treatment remained mainly unchanged. The following outcome measures were used in the study: the CGI, the DES, the SDQ-20, the BDI, and the BAI. Patients with initial mean BAI scores lower than 25 reached clinical remission more frequently than patients with higher initial BAI scores. Patients with initial BDI scores lower than 20 achieved response and remission more frequently than patients with higher BDI scores. Patients with a comorbid mild depression achieved response less frequently than patients without comorbid mild depression and also reached remission less often than the no depression group. There was no statistically significant impact of anxiety disorder comorbidity on response or remission rate. Patients with comorbid personality disorder did not achieve both response and remission as frequently as patients without comorbid personality disorder.
Reinecke, Rinck, Becker, Hoyer	2013	Observational (prospective)	23	43.4 (12.7)	70% female	Generalization bias	GAD	This study assessed whether the extent of negative bias for neutral worry words before treatment or the extent of bias change during treatment are indicators of treatment success and stability. Participants were treated with 15 weekly sessions of CBT. Linear regression analyses were run. Treatment success was measured as improvement on the White Bear Suppression Inventory (WBSI) and the Penn State Worry Questionnaire (PSWQ), which were given to patients before and after treatment and at follow-up. Although no association was found for the PSWQ, pre-treatment bias predicted the extent of symptom improvement measured with the WBSI during the 6 months following treatment. These results suggest that the degree of pre-treatment bias for neutral words and the magnitude of bias change during treatment have predictive value regarding therapeutic success. Patients with a weaker bias before treatment showed immediate improvement through intervention. In contrast, patients with a stronger pre-treatment bias showed reduced immediate improvement after treatment but increased improvement at follow-up.

**Table 3 (Continued)**

Author	Year	Design	Participants			Predictor	Anxiety disorder	Description
			N	Age ( <i>M (SD)</i> )	Sex			
Voderholzer et al.	2013	Observational (Prospective)	60	32.5 (8.4)	58% female	Duration of disorder, presence of personality disorder	OCD	This study assessed whether neuropsychological test results in OCD change after CBT and whether neuropsychological and clinical variables predict response to CBT. Medication-free, hospitalized patients were treated for 12 weeks with 2-hour sessions of CBT including exposure and response prevention. The YBOCS was used as an outcome measure to assess symptom severity before and after treatment. Neither the duration nor a comorbid personality disorder showed a significant correlation with the therapy outcome.
Wolitzky-Taylor, Arch, Rosenfield, Craske	2012	RCT	147	18-60	88% female	Comorbidity, severity	PD, GAD, PTSD, SP, OCD	Patients completed 12 sessions of ACT or CBT and were assessed with the MASQ-GA at baseline, post-treatment, and 6- and 12-month follow-up assessments. Those with a comorbid mood disorder at baseline had higher MASQ-GA scores at posttreatment and after 12-month than those without a mood disorder. Anxiety disorder comorbidity was not significantly related to MASQ-GA, baseline severity (i.e. baseline CSR of principal diagnosis) and did not predict the outcome.
Wu, Li, Cho	2014	RCT	60	35.7 (11.3)	32% female	Severity	PTSD	In this trial, a 4-session Brief-CBT program was compared to a self-help booklet consisting of a structured 4-week Self-Help Program. Both conditions were conducted in individual format with survivors of motor vehicle crashes. Linear regression analyses found that a higher pretreatment Hospital Anxiety and Depression Scale (HADS) total score was predictive of a worse outcome at 6-month follow-up only for the Self-Help Program condition, not for the B-CBT program.
Yoshinaga et al.	2013	Single-arm, uncontrolled	15	29.9 (9.2)	80% female	Comorbidity, subtype, age of onset, duration	SAD	This trial employed a 14-week 90min per session individual CBT intervention. The primary outcome measure was LSAS, with secondary measurements of other social anxiety and depressive severity. Assessments were conducted at baseline, after a waiting period before CBT, during CBT, and after CBT. Results showed that none of the baseline demographic and clinical variables were significant predictors of the post-treatment LSAS score.

*Note.* PTSD: post-traumatic stress disorder, GAD: generalized anxiety disorder, PD: panic disorder with or without agoraphobia, SAD: social anxiety disorder, OCD: obsessive-compulsive disorder, SP: specific phobia. More information about the outcome values can be found in Table 7 in the Appendix.

## Personal features

### *Personal characteristics*

Studies describing the impact of client characteristics and early experience (including personality, childhood maltreatment, and attachment) are listed in Table 4.

#### *Personality*

In their randomized controlled trial, Wolitzky-Taylor, Arch, Rosenfield and Craske (2012) found the personality trait neuroticism to have a negative impact on the outcome of CBT for anxiety disorders. Hoyer et al. (2016) assessed the impact of other personality factors, namely harm-avoidance, self-esteem, shame, novelty seeking, and reward dependence, on the therapy outcome of social anxiety disorder. They found no relation between any outcome variable and both novelty seeking and reward dependence. However, harm avoidance and self-esteem were significantly associated with better end-state, and shame was significantly associated with response, indicating that patients with more shame were more likely to achieve response. Ociskova et al. (2016) discovered a significant correlation between outcome variables and self-stigma, harm avoidance, and self-directedness. After backward-stepwise multiple regression, self-stigma remained as the best significant predictor of treatment effectiveness. Thus, a lower level of harm avoidance and self-stigma and higher amounts of self-directedness were connected to greater improvement in therapy for panic disorder, generalized anxiety disorder, social anxiety disorder, and mixed anxiety-depressive disorder.

#### *Childhood maltreatment*

No significant relation between any types of childhood maltreatment and post-treatment scores was found by Bruce, Heimberg, Goldin and Gross (2013). In their small randomized controlled trial, they included only participants with social anxiety disorder.

#### *Attachment*

Hoyer et al. (2016) could not find a predictive value of any attachment style to the outcome of CBT for people with social anxiety disorder.

**Table 4***Studies describing the impact of personality factors on the outcome of CBT for different anxiety disorders*

Author	Year	Design	Participants			Predictor	Anxiety disorder	Description
			N	Age ( <i>M (SD)</i> )	Sex			
Bruce, Heimberg, Goldin, Gross	2013	RCT	68	32.4 (8.6)	46% female	Childhood maltreatment	SAD	The study assessed the relationships between specific types of childhood maltreatment and CBT outcomes in patients with SAD. Participants received 16 sessions of CBT over a period of 4 months. Outcome was assessed using the self-report version of the LSAS, the brief fear of negative evaluation scale (BFNE), the Sheehan disability scale (SDS), and the satisfaction with life scale (SWLS). Only emotional abuse and emotional neglect significantly predicted greater disability and lower life satisfaction at baseline and throughout treatment. No significant relation between any types of childhood maltreatment and post-treatment scores was found on these measures after controlling for baseline severity.
Hoyer et al.	2016	RCT	244	18-70	55% female	Personality, self-esteem, shame, attachment style	SAD	This study investigated the role of baseline characteristics as predictors of outcome (end-state functioning, response and remission) by outpatients. Severity was assessed at baseline and end of treatment with the LSAS. A maximum of 30 individual 50-min sessions of cognitive therapy (including diagnostics) were applied with up to six double sessions of 100 min each. Multiple linear regression analyses and logistic regression analyses were applied. Personality indicators, namely harm avoidance, self-esteem and shame, were consistently associated with social anxiety at the end of treatment, and with remission. Novelty seeking and reward dependence were not related to any outcome variable. Personality variables also had an impact on the end-state. Self-esteem was significantly associated with a better end-state (lower LSAS scores). Shame was significantly associated with response, such that patients with more shame were more likely to achieve response. No interpersonal problem or attachment scale was systematically associated with response as an outcome variable.

**Table 4 (continued)**

Author	Year	Design	Participants			Predictor	Anxiety disorder	Description
			N	Age ( <i>M (SD)</i> )	Sex			
Ociskova, Prasko, Latalova, Kamaradova, Grambal	2016	Observational (prospective)	109	40,0 (12.1)	67% female	Self-stigma, self-directedness	PD, GAD, SAD, or mixed anxiety–depressive disorder	The main aim of the study was to investigate the relationship between self-stigma and the treatment efficiency of anxiety disorders. Inpatients were treated for six weeks in 25 group and 5 individual sessions. The Internalized Stigma of Mental Illness (ISMI) scale, the Adult Dispositional Hope Scale (ADHS), and the Temperament and Character Inventory – revised (TCI-R) were used to identify baseline characteristics. Several other scales and questionnaires were used as outcome variables and were completed at the beginning and end of treatment: The CGI, the BDI, the BAI, and the DES. The objective change in psychopathology measured by the relative-change CGI <sub>Obj</sub> significantly correlated with the initial levels of dissociation (DES), pathological dissociation (DES-T), self-stigma (ISMI), hope (ADHS), and the personality traits (TCI-R) of harm avoidance and self-directedness. After a backward-stepwise multiple-regression analysis, self-stigma remained as the only significant predictor of relative change.
Wolitzky-Taylor, Arch, Rosenfield, Craske	2012	RCT	147	18-60	88% female	Neuroticism	PD, GAD, PTSD, SP, OCD	Patients completed 12 sessions of ACT or CBT and were assessed with the MASQ-GA at baseline, post-treatment, and 6- and 12-month follow-up assessments. To identify personality factors, the NEO Personality Inventory Revised (NEO-PI-R) was used before treatment. Higher levels of neuroticism were predictive of higher levels of anxiety.

*Note.* PTSD: post-traumatic stress disorder, GAD: generalized anxiety disorder, PD: panic disorder with or without agoraphobia, SAD: social anxiety disorder. More information about the outcome values can be found in Table 7 in the Appendix.

### *Behavioral characteristics*

The impact of other personal features like pre-treatment behavior (including alcohol use problems, emotion regulation strategies, capacity for participation, anxiety sensitivity, heartbeat perception accuracy, and bias) is described in studies that are listed in Table 5.

#### *Alcohol use*

According to Wolitzky-Taylor et al. (2015), the presence of an alcohol problem did not affect the outcome of CBT for people with panic disorder, social anxiety disorder, generalized anxiety disorder, or post-traumatic stress disorder.

#### *Emotion regulation strategies*

Emotional reactivity was found to be a predictor of positive outcome of social anxiety disorder treatment in the small randomized controlled trial of Niles et al. (2013).

#### *Capacity for participation*

In the observational study of Renaud, Russel, and Myhr (2014), capacity for participation was found to reflect the ability to identify and articulate thoughts and feelings, and share them in a neutral and focused way. This factor further includes security operations, which is defined as the psychological processes/behaviors that decrease anxiety and maintain a positive view of the self. It also includes accessibility of automatic thoughts, awareness and differentiation of emotions. The authors showed that capacity for participation as a predictor was negatively correlated with end-state severity.

#### *Anxiety sensitivity*

Gutner et al. (2013) explored in their RCT whether cognitive misappraisals, i.e. anxiety sensitivity (AS) at baseline predicted a change in PTSD symptoms by solely female participants. They demonstrated that the anxiety sensitivity total score predicted a change in PTSD total scores, as well as for most symptoms including avoidance, numbing, and hyperarousal cluster scores. Thus, a high AS at baseline predicted a greater change in the symptoms of PTSD. Wolitzky-Taylor, Arch, Rosenfield and Craske (2012) also demonstrated a significant predictive value of the anxiety sensitivity index, where scores near the mean were associated with positive outcome scores, and high and low scores were both associated with negative outcome scores.

#### *Heartbeat perception accuracy/Heart rate variability*

Masdrakis et al. (2015) found no impact of heartbeat perception (HBP) accuracy on the reduction of panic attacks, whereas higher baseline HBP-accuracy was associated with larger

therapeutic gains concerning agoraphobic behaviors and beliefs. A low and mean baseline heart rate variability, however, was associated with a better overall outcome, in the small RCT of Davies et al. (2015).

#### *Attentional bias/Avoidance*

Attentional bias as predictor was assessed in three studies. Niles, Mesri, Burklund, Lieberman, and Craske (2013) found it to be a predictor of treatment response, where patients with slower response times to negative faces had fewer symptoms after CBT. Deficits in disengaging attention from facial threat were found to be a positive predictor of CBT outcome for all anxiety disorders by Barry, Sewart, Arch and Craske (2015). Participants who showed more deficits in disengaging were more likely to be treatment responders.

Price, Tone and Anderson (2011) found that greater vigilant bias predicted the outcome of CBT for people with SAD negatively. For the clients with avoidant biases, no such association was found, their response was smaller. Similarly, Davies, Niles, Pittig, Arch, and Craske (2015) found that high avoidance does not predict, but moderate the outcome of CBT for panic disorder.

**Table 5***Studies describing the impact of behavioral variables on the outcome of CBT for different anxiety disorders*

Author	Year	Design	Participants			Predictor	Anxiety disorder	Description
			N	Age ( <i>M (SD)</i> )	Sex			
Barry, Sewart, Arch, Craske	2015	RCT	96	36.5 (10.9)	57% female	Deficits in disengaging attention from external and internal threat	PD, SAD, GAD, OCD, SP, PTSD	This study examined whether components of attention are differentially related to reductions in clinical severity and whether they are also related to return of clinical severity after treatment. Patients were assessed before treatment, immediately after treatment and 24 months later using the Anxiety Disorders Interview Scale IV (ADIS) and the Dot Probe Task. The treatment consisted of 12 sessions of CBT. Change in the bias did not predict follow-up response. Treatment response was neither related to the change in bias from pre- to post-treatment nor to post-treatment attention biases. When participants showed most deficits in disengagement from threatening facial stimuli, they were more likely to be treatment responders at post and at follow-up.
Davies, Niles, Pittig, Arch, Craske	2015	RCT	60	35.8 (11.9)	47% female	Heart rate variability High avoidance	PD	Participants completed twelve 60-min sessions of either CBT or ACT. Baseline physiological and behavioral variables were measured prior to entering treatment. Self-reported anxiety symptoms were assessed at pre-treatment, post-treatment, and 6- and 12-month follow-up from baseline. A repeated measures multi-level model using the Mood and Anxiety Symptom Questionnaire, General Anxiety Subscale (MASQ-GA) as an outcome measure. The High Frequency Heart Rate Variability index (HF-HRV) was calculated before the treatment. To assess behavioral avoidance, a second hyperventilation task was added. Heart rate variability was an overall predictor of outcome, whereas behavioral avoidance emerged only as a moderator. Low and mean baseline heart rate variability were associated with a better overall outcome.

**Table 5 (continued)**

Author	Year	Design	Participants			Predictor	Anxiety disorder	Description
			N	Age ( <i>M (SD)</i> )	Sex			
Gutner, Nillni, Suvak, Wiltsey-Stirman, Resick	2013	RCT	70	34.5 (12.7)	100% female	Anxiety sensitivity	PTSD	The study explored whether anxiety sensitivity (AS) at baseline predicted change over time in symptoms, and if these changes differed by subscales of the Anxiety Sensitivity Index (ASI). Interpersonal trauma victims were randomly assigned to six weeks of cognitive processing therapy, cognitive therapy, or written accounts. They found that pretreatment AS impacted PTSD diagnostic scale (PDS) total scores and symptoms clusters differentially. AS total score predicted change in PTSD total scores, as well as for avoidance, numbing, and hyperarousal cluster scores. Follow-up analyses revealed that total ASI scores predicted change in each of the PTSD symptom clusters with the exception of re-experiencing symptoms.
Masdrakis, et al.	2015	Observational (prospective)	25	36.1 (3.9)	80% female	Heartbeat perception accuracy	PD	The study explored the potential association between HBP-accuracy and the short-term outcome of a structured brief-CBT for the acute treatment of PDA. Outcome measurements included the Mobility Inventory (MI) and the Agoraphobic Cognitions Questionnaire (ACQ). Patients underwent brief-CBT which consisted of eight weekly sessions of one hour's duration. While no significant association emerged between baseline HBP-accuracy and post-CBT panic attacks' reduction, higher baseline HBP-accuracy was associated with larger therapeutic gains regarding agoraphobic behaviors and beliefs (ACQ).
Niles, Mesri, Burklund, Lieberman, Craske	2013	RCT	65	28.1 (6.5)	48% female	Attentional bias, emotional reactivity	SAD	The study tested attentional bias and negative emotional reactivity as moderators and predictors of treatment outcome in a trial comparing CBT and ACT. Patients received 12 weekly 60-min sessions of CBT or ACT. Predictors were assessed using the spatial cueing attentional bias task, and the international affective picture task. The LSAS, the Social Interaction Anxiety Scale (SIAS), and the Social Phobia Scale (SPS) were used as self-report outcome measure. The outcome variables were assessed at baseline, post-treatment, and at 6 and 12 months after treatment. Simple effects tests revealed that slower response time to negative faces predicted fewer symptoms after both ACT and CBT, but the relationship was marginally stronger in the CBT group. Neither negative affect while viewing neutral images, nor positive affect while viewing positive images did significantly moderate or predict outcome.

**Table 5 (continued)**

Author	Year	Design	N	Participants Age ( <i>M (SD)</i> )	Sex	Predictor	Anxiety disorder	Description
Price, Tone, Anderson	2011	Observational (prospective)	24	41.4 (11.3)	29% female	Attention bias (avoidant vs vigilant)	SAD	This study compared responses to CBT for social phobia between individuals with avoidant and vigilant biases for threatening faces at pretreatment. Participants were assessed by the LSAS and the dot probe task before treatment. Treatment consisted of eight sessions of Virtual Reality Exposure and CBT. Only for the group with vigilant biases, bias scores predicted an outcome such that greater vigilance bias was associated with greater post-treatment social anxiety. No such association was found for avoidant biases.
Renaud, Russel, Myhr	2014	Observational (prospective)	256	37.2 (12.5)	66% female	Capacity for Participation	All	Outpatients completed an average total of 19 sessions on a weekly basis. Symptom severity was assessed before and after treatment using the CGI. To examine whether underlying factors of the Suitability Shot-Term Cognitive Therapy (SSCT) scale predicted change in CGI, they conducted a multiple regression analysis. A factor analysis of the SSCT scale yielded two factors: Capacity for Participation in CBT Process and Attitudes Relevant to the CBT Process. The multiple regression analysis revealed that only the first predicted improvement at termination. Higher scores on the Capacity for Participation in the CBT process were negatively correlated with post-treatment CGI scores.
Wolitzky- Taylor, et al.	2015	RCT	1004	43.5 (13.4)	71% female	Alcohol use problems	PD, SAD, GAD, PTSD	This study investigated the data of the CALM trial regarding the impact of alcohol use symptom severity on anxiety disorder treatment outcomes. Patients completed 7 sessions of CBT on average. The outcome measures (BSI-12, ASI, Patient Health Questionnaire (PHQ)) were completed at baseline as well as 6, 12, and 18-months after baseline. The potential predictor was assessed using the Alcohol Use Disorders Identification Test (AUDIT). The presence of an alcohol problem did not affect BSI outcomes. There was no effect of AUDIT score on ASI outcomes.

*Note.* PTSD: post-traumatic stress disorder, GAD: generalized anxiety disorder, PD: panic disorder with or without agoraphobia, SAD: social anxiety disorder, SP: specific phobia. More information about the outcome values can be found in Table 7 in the Appendix.

### *Therapeutic behavior*

Studies describing the impact of different individual behavior on the outcome of CBT for anxiety disorders (in-treatment behavior, expectancy of current treatment, perceived control, and motivational language) are listed in Table 6.

#### *In-treatment behavior*

Glenn et al. (2013) found homework adherence to predict a positive outcome of CBT for PD, PTSD, SAD, and GAD. Less homework-adherent patients scored significantly worse across all symptomatic outcome measures at 12 and 18 months. Patients who renounced exposure were significantly more symptomatic across all measures at both times.

#### *Expectancy of current treatment*

The three studies assessing the impact of outcome expectancy (cost and probability estimates, hope) did find the influence to be positive. Brown et al. (2014) discovered in their RCT sample of people with PD, GAD, SAD and PTSD that those who increased more in outcome expectancy tended to decrease more in symptoms over time. Ociskova et al. (2016) concluded that hope may be a significant predictor of effectiveness in anxiety disorder treatment. They included the diagnoses of PD, GAD, SAD and mixed anxiety-depressive disorder in their sample. Furthermore, de Castella et al. (2015) discovered that implicit beliefs like social costs, perceived social self-efficacy, and maladaptive interpersonal beliefs predicted how much people with social anxiety disorder benefited from treatment.

#### *Perceived control*

Galagher, Narragon-Gainey, and Brown (2014) showed perceived control as a predictor of recovery from GAD, PD, OCD and SAD after CBT. Brown et al. (2014) agreed with the result of their RCT that self-efficacy significantly predicted all of the outcome variables. They did not include people with OCD in their sample.

#### *Motivational language*

Resistance in the first session and counter change talk was reported to have a negative impact on the CBT of generalized anxiety disorder respectively in one study. (Westra, 2011; Lombardi, Button & Westra, 2014)

**Table 6***Studies describing the impact of therapeutic behavior on the outcome of CBT for different anxiety disorders*

Author	Year	Design	Participants			Predictor	Anxiety disorder	Description
			N	Age ( <i>M (SD)</i> )	Sex			
Brown et al.	2014	RCT	482	43.5 (13.2)	71% female	Self-efficacy (SE), Outcome expectancy (OE)	PD, GAD, SAD, PTSD	This study investigated data of the CALM trial regarding changes in self-efficacy and outcome expectancy across treatments. Patients completed 7 sessions of CBT on average. Questions about self-efficacy and outcome expectancy were used together with the OASIS as predictor measures. The BSI, ASI, PHQ-8, and the Sheehan Disability Scale (SDS) were used as outcome variables. The intercept of OE predicted the latent slopes for all of the outcomes were significantly negative. OE significantly predicted three of the outcomes' latent slopes. The linear slope of SE significantly predicted the slopes of all of the outcome variables negatively. People who increased more in OE or SE over time tended to decrease more in symptoms over time.
De Castella et al.	2015	RCT	53	34.0 (9.3)	55% female	Implicit beliefs	SAD	This study examined the role of emotion beliefs as a mechanism of change. Patients were randomized to 16 weekly 1.5-hour sessions of CBT or a 16 week waitlist. The predictive variables were assessed using the Implicit Beliefs about Social Anxiety (IBSA) scale, the Social Costs Questionnaire (SCQ), the Perceived social self-efficacy (PSSE), and the Maladaptive Interpersonal Beliefs Scale (MIBS). Follow-up planned tests showed lower fixed entity beliefs about their anxiety after CBT. Implicit beliefs explained unique variance in social anxiety, above and beyond that explained by baseline social anxiety. Patients' implicit beliefs also predicted how much they benefited from treatment, even when controlling for baseline social anxiety and other categories of beliefs.

**Table 6 (continued)**

Author	Year	Design	Participants			Predictor	Anxiety disorder	Description
			N	Age ( <i>M (SD)</i> )	Sex			
Gallagher, Naragon-Gainey, Brown	2014	Observational (prospective)	606	34.7 (11.9)	63% female	Perceived control	GAD, PD, OCD, SAD	The goal was to determine whether perceived control functions as a transdiagnostic predictor of recovery. Patients were treated with a maximum of 16 sessions of CBT. The outcome was measured using different versions of the Anxiety Disorder Interview Schedule for DSM IV (ADIS-IV). Additional self-reports questionnaires such as the Albany Panic and Phobia Questionnaire (APPQ), the Maudsley Obsessive-Compulsive Inventory (MOCI), and the revised anxiety control questionnaire (ACQ-R) were used. A very large magnitude of incremental effects was found, which underscores the importance of intraindividual changes in perceived control in predicting intraindividual changes in anxiety following treatment. Intraindividual changes in perceived control stayed predictors of changes in symptoms across two years of follow-up assessments.
Glenn et al.	2013	RCT	439	43.4 (13.4)	71% female	Dose, Homework Adherence	PD, PTSD, GAD, SAD	Using data of the CALM trial, the study investigated the role of treatment dose and patient engagement as predictors of long-term treatment outcomes. Patients were treated with a self-chosen dose of CBT. The assessment battery containing the BSI-12, the PHQ-8, and the SDS, was administered at baseline, 6, 12, and 18 months. After the propensity adjustment, patients with no exposures were significantly more symptomatic across all measures at 12 and 18 months than patients with completed exposure. Less homework-adherent patients scored significantly higher across all measures at 12 and 18 months than more homework-adherent patients. Low-commitment patients scored significantly higher across all measures at 18 months, but not at 12 months.

**Table 6 (continued)**

Author	Year	Design	Participants			Predictor	Anxiety disorder	Description
			N	Age ( <i>M</i> ( <i>SD</i> ))	Sex			
Lombardi, Button, Westra	2014	RCT	37	40.9 (11.7)	71% female	Motivational language	GAD	The study examined whether client motivational language can predict treatment outcomes. The patients were treated with six weekly 2-hour sessions, followed by two 1-hour sessions of CBT. First, the problematic behavior was identified, then statements that expressed either change talk (CT) or counter change talk (CCT) were analyzed. The PSWQ was used as an outcome measure. The motivational skill code (MISC) 1.1 was used to identify motivational language. Those who did not respond to treatment had significantly higher levels of CCT compared to responders. For CT, no significant differences between responders and nonresponders were found.
Ociskova, Prasko, Latalova, Kamaradova , Grambal	2016	Observational (prospective)	109	40.0 (12.1)	67% female	Hope	PD, GAD, SAD, mixed anxiety– depressive disorder	The main aim of the study was to investigate the relationship between self-stigma and the treatment efficiency of anxiety disorders. Inpatients were treated for six weeks in 25 group and 5 individual sessions. The ISMI scale, the ADHS, and the TCI-R were used to identify baseline characteristics. Several other scales and questionnaires were used as outcome variables and were completed at the beginning and end of treatment: The CGI, the BDI, the BAI, and the DES. The objective change in psychopathology measured by the relative-change CGIObj significantly correlated with hope (ADHS) along with other factors.
Westra	2011	RCT	38	40.9 (11.7)	71% female	Motivation for change, in-session resistance	GAD	This study investigated the ability of observed in-session resistance in CBT session 1 (CR-1) and two self-report measures of motivation for changing (the Change Questionnaire (CQ) & the Client Motivational for Therapy Scale (CMOTS)) to predict outcome (PSWQ). Patients were treated with six weekly 2-hour sessions, followed by two 1-hour sessions of CBT. Higher scores on the CQ predicted greater worry reduction. When adopting linear regressions and controlling for baseline client worry severity, only observed resistance at session 1 remained significantly predictive of poorer outcome.

*Note.* PTSD: post-traumatic stress disorder, GAD: generalized anxiety disorder, PD: panic disorder with or without agoraphobia, SAD: social anxiety disorder. More information about the outcome values can be found in Table 6 in the Appendix.

## Discussion

This review aimed to provide an overview of which personal factors at baseline may have an impact on the outcome of individual cognitive behavioral therapy for anxiety disorders. It intended to provide support for therapists in the composition of a personalized CBT approach to achieve maximal effects. Summarizing the results in this review, the severity of the disorder, comorbidities, and several personal features have been found to impact the outcome of CBT. The investigated predictors are elaborated below.

As for sociodemographic variables (age, gender, education/marital status), consistent with previous reviews (Porter & Chambless, 2015; Steketee & Shapiro, 1995), most of the reviewed studies could not find any significant predictive value. This underscores the finding that CBT can be used for people with many different sociodemographic backgrounds.

The results were more inconsistent for clinical variables (including age of onset, duration, symptom severity, and comorbidity). As for age of onset and duration, no predictive value or correlation could be found. This is consistent with the previously mentioned findings of Ramnerö and Öst (2004), who found duration of agoraphobia to be unrelated to the treatment outcome for patients with panic disorder and with the findings of Steketee and Shapiro (1995), who did not find a predictive value of age of onset in their sample of OCD patients.

Consistent with previous findings of Kampman et al. (2008) and Ramnerö and Öst (2004), severity seemed to have a negative impact on outcome in eight of the studies. Although all studies used different outcome measures, at uncertainty during the intake, the severity of the anxiety disorder was determined by using the Beck Anxiety Inventory (BAI). According to the review of Julian (2011), this test has sound psychometric properties and demonstrated a sensitivity to change. A possible approach is to take more time with clients who suffer from more severe symptoms. Shapiro et al. (1994) demonstrated that longer treatment was more effective among patients with more severe depression; this could also be the case with anxiety disorders.

Seven of the eleven articles assessing comorbidity found a significant negative correlation with outcome. Four other studies could not show a significant correlation. These different results could be attributable to different study populations. The articles who could not find a correlation were, without exception, observational trials, whereas the other studies included RCTs which generally have a more homogenous study population because of strict exclusion

criteria. An example of the more open structure of a naturalistic study is the article of Davis, Barlow, and Smith (2010), where the therapists were allowed to add sessions for patients with comorbid disorders. Accordingly, the impact of comorbidity was not significant. Moreover, most observational studies had relatively small sample sizes, like the study of Yoshinaga et al. (2013) with only 15 participants, which generally leads to less significant results.

A comorbid mood or personality disorder seems to impact the outcome negatively, while a comorbid other anxiety disorder seems to have no or even a positive impact on the outcome (Haug et al., 2015). The first result is consistent with the systematic review of Schneider Arch, and Wolitzky-Taylor (2015), where comorbid depressive disorder predicted poorer fear and avoidance outcomes. There is a high prevalence of depression as a secondary disorder to anxiety disorders (Brown, Campbell, Lehman, Grisham, & Mancil, 2001; Lamers et al., 2011). There are several possible explanations for the frequent comorbidity between anxiety disorders and depressive disorders: some anxiety disorders share symptoms with a depressive disorder, they follow similar neurochemical processes, and the personality factor neuroticism can be a risk factor for both disorders (Talkovsky, Green, Osequeda, & Norton, 2017). The latter is in line with previous findings of Brown et al. (1995). According to Haug et al. (2015), PD patients can display improvement from comorbid disorders that are not specifically targeted in treatment, which could reflect that the techniques and procedures used for changing and coping with PD symptoms also apply to other anxiety disorders.

Comorbidities should be identified during the intake by thoroughly asking about the symptoms of other disorders in the DSM. The Structured Clinical Interview for DSM-IV axis I disorders (SCID-I) and the SCID-II for personality disorders can give an orientation. The SCID is designed to be an efficient, user-friendly, and reliable clinical interview for making DSM diagnoses.

An approach to react according to possible comorbidity is to take more time so that both disorders can be approached simultaneously. Kelly, Jacobovski, and Bloch (2015) suggest applying a collaborative care model with CBT and pharmacotherapy in the context of a comorbid depression. This is also advised in the guidelines by the Trimbos institute (2003). A comorbid personality disorder can also make the treatment more complex; symptoms that increase the severity of the anxiety disorder should be approached in a separate treatment.

Various categories of personal features (childhood maltreatment, attachment, alcohol use problems, personality, bias, emotion regulation strategies, heartbeat perception accuracy, in-treatment behavior, expectancy of current treatment, perceived control, and motivational

language) were taken into consideration. Generally, these personal features were investigated by few studies, which makes the evidential value less strong.

Childhood maltreatment, attachment, and alcohol use were assessed by just one study each, which found no significant correlation with post-treatment outcome. The first variable is generally not often represented in research, other studies which did not meet the eligibility criteria of this review, showed inconsistent results (e.g. Santacana et al., 2016; Alden et al. 2006). The second variable was discussed in the article of Strauß and Schwark (2007) who reviewed clinical attachment research in the 10 preceding years. With regard to the predictive quality of attachment style, they showed inconclusive results, while not differentiating between mental disorders. Overall, a majority of their reviewed studies identified a positively predicting effect of secure attachment. However, in a number of their included studies, the significance of the impact was limited. It is important to notice that alcohol use predicted only a worse long-term outcome after 18 months (Wolitzky-Taylor, et al., 2015). This indicates that CBT does not need a different approach for those with and without histories of childhood maltreatment, or attachment problems. Wolitzky-Taylor et al. (2015) also state that there may be no need to postpone treatment of anxiety disorders until alcohol problems are addressed, at least among those with mild to moderate alcohol problems. Nevertheless, these results should be interpreted with some caution as only three studies investigated these variables.

Several other personal characteristics were found to be predictive of outcome.

Neuroticism, self-stigma, and harm avoidance seem to be possible risk factors.

Wolitzky-Taylor, Arch, Rosenfield and Craske (2012) concluded these characteristics provide a prognostic indication. They advise clinicians to assess neuroticism at baseline to identify those individuals who may be in need of additional treatment. Schuurmans et al. (2009) concluded that neuroticism might reflect a disbelief in the possibility to change which may hinder the effect of psychological treatment. Hoyer et al. (2016) argued that high harm avoidance might be connected to difficulties in experimenting with new behavior, which would require more effort to achieve disconfirmation beliefs, which are an important factor in the mechanisms in cognitive therapy.

To examine these personal characteristics, open questions asked during the intake could address the coping mechanisms of the client. The observation of nonverbal behavior could also assist in identifying personal characteristics. Wolitzky-Taylor, Arch, Rosenfield and Craske (2012) used the NEO Personality Inventory—Revised (NEO-PI-R) to assess personality traits. This test can function as an orientation to what the therapist should pay

attention to. The Self-Stigma of Mental Illness Scale (SSMIS) could deliver further information about the client's view of himself. Wolitzky-Taylor, Arch, Rosenfield and Craske (2012) advise additional treatment; motivational interviewing techniques could be used to address the possible disbelief of the potential to change. Motivational interviewing (MI) is defined as a collaborative, goal-oriented conversation style with special attention for change talk. MI is designed to strengthen the personal motivation and commitment for a specific goal by eliciting and exploring the client's own reasons for change in an environment of acceptance and compassion (Miller & Rollnick, 2014).

Self-esteem, which can also be assessed using the SSMIS, was associated with better end-state functioning after CBT for people with social anxiety disorder, and shame was associated with better response. Whereas the frequent concomitant of social phobia, weaker self-esteem, could be related to severity of the disorder, shame can possibly be seen as a motivator for change (Stangier et al., 2011). The latter is consistent with the findings of Lickel et al. (2014), who discovered that feelings of shame predicted a desire of self-change. It still needs to be emphasized that both variables did not predict outcome consistently across the researcher's outcome definitions. Therefore, their findings need to be interpreted cautiously (Hoyer et al., 2016). Referring to the first variable, Staring et al. (2016) discovered that self-esteem can effectively be enhanced by activating positive representations, which may then inhibit negative representations. This method is used in the Competitive Memory Training (COMET), which aims to enhance the accessibility of positive self-representations in long term memory by repeatedly activating these representations and to condition them to relevant stimuli. It can be theorized that these positive representations could also be activated with positive psychological techniques. Another possibility is to apply CBT for low self-esteem which is described in a self-help protocol by Fennell (2016). It works in six steps by firstly investigating anxious predictions, secondly questioning self-critical thoughts, thirdly enhancing self-acceptance, fourthly breaking the vicious cycle, fifthly creating a new bottom line, and lastly planning for the future. This self-help program can be used before treatment without the need of a therapist. The effectiveness of Fennell's earlier protocol has been demonstrated by Waite, McManus and Shafran (2012).

Referring to the second variable, shame could be used as a motivator throughout the treatment, which is in line with the findings of Lickel et al. (2014). A possible course of action would be to start with a thorough function analysis and point out the many disadvantages that continuing with the same behavior has over time.

According to two studies, other implicit beliefs such as perceived control and self-efficacy also seem to play a role in the effectiveness of CBT. In line with the findings of Gallagher, Narragon-Gainey, and Brown (2014), who discovered perceived control as a transdiagnostic predictor, Morrissey-Kane and Prinz (1999) reported that a higher degree of perceived control predicted lower depression, better adherence, and a more positive outcome. The SSMIS could also be used to assess these variables, as it has been demonstrated that self-stigma, self-esteem and self-efficacy are related to shame, perceived control and outcome expectancy (Luoma & Platt, 2015; Ajzen, 2002; Brown et.al, 2014). According to Brown et al. (2014), performance accomplishments (e.g. successfully attending exposure) could not only enhance outcome expectancy but also self-efficacy. Additionally, motivational techniques such as actively praising small successes and reframing could also enhance self-efficacy. According to Westra, Arkowitz and Dozois (2009), MI seems to be a promising adjunct to CBT.

Consistent with the findings of Safren, Heimberg, and Juster (1997), outcome expectancy was found to be related to a positive outcome in three studies.

As mentioned above, outcome expectancy could also be assessed using the SSMIS. However, the question about what the client expects of his treatment and what he would like to achieve most likely belongs to the standard repertoire of the first interview. These findings emphasize the value for raising outcome expectancy, including psychoeducation about positive response rates as well as convincing treatment rationales and reminders of achievements. According to Brown et al. (2014) motivational interviewing techniques could also increase outcome expectancy. Hope may be related to outcome expectancy in the sense that both are about what the patient wants to accomplish with the therapy. According to Ociskova et al. (2016), to enhance treatment outcome, it is important for the patients to know what they want.

Accordingly, concrete therapeutic goals should be formulated at the end of the intake process. Additionally, in line with Brown et al. (2014), it could be helpful to discuss the pros and cons of behavioral change to increase both outcome expectancy and hope.

Anxiety sensitivity (AS) was found correlating with outcome. It is important to note that higher anxiety sensitivity cannot be seen as a risk factor. Gutner et al. (2013) found that high anxiety sensitivity did not hinder the treatment of PTSD. Nevertheless, they discovered that a reduction in AS was related to a symptom reduction. Additionally, Wolitzky-Taylor, Arch, Rosenfield and Craske (2012) discovered that those with moderate levels of anxiety sensitivity improved more with cognitive behavioral therapy than those with higher or lower levels. According to them, CBT, which targets misappraisals, may be less relevant for people

with lower levels of AS because the treatment does not match the underlying dysregulation. On the other hand, highly rigid beliefs about anxiety symptoms may be more difficult to address, resulting in less improvement. This latter result is consistent with the findings of Meuret et al. (2010), who found that higher levels of cognitive misappraisal of anxiety symptoms predicted poorer outcomes from CBT for panic disorder.

It may be advised to use the Anxiety Sensitivity Index (ASI) as an orientation to formulate relevant intake questions.

As an approach for CBT, those patients with higher levels of anxiety sensitivity may need motivational techniques (i.e. MI) to enhance treatment engagement. In contrast, patients with low anxiety sensitivity might not need to be treated with CBT because they seem to be able to solve their problems themselves. According to Reiss (1987), patients with low anxiety sensitivity seem to interpret anxiety symptoms as merely an unpleasant state of temporary nervousness that will dissipate. They should not be caught in a vicious circle in which life problems produce anxiety and anxiety produces additional anxiety. They should be able to tolerate even high levels of anxiety/stress and still function adequately.

Emotion reactivity was investigated and positively associated with outcome in just one study. Specifically greater emotional reactivity to negative images predicted outcome in the trial of Niles et al. (2013). In their systematic review of anxiety disorder treatment moderators, including articles through 2014, Schneider, Arch, and Wolitzky-Taylor (2015) also found only this study that addresses emotional reactivity. As emotion reactivity is also a feature of neuroticism, which was also identified as a predictor, it can be estimated that future research would come to the same conclusions. According to Niles et al. (2013), one explanation for the positive association is that a patient who shows the greatest deficit in emotion regulation benefits most from a treatment like CBT that targets emotion regulation. Another explanation could be that elevated negative emotional reactivity indexes the capacity to access negative emotion, which is then targeted in behavioral treatment. The authors also state that emotional reactivity could have a positive impact on exposure, where the greater the emotional arousal, the greater the learning.

Niles et al. (2013) assessed emotional reactivity by showing the participants positive, negative and neutral images and testing their emotional state with the Positive and Negative Affect Schedule (PANAS) afterwards. It might be more practical to assess emotional reactivity during the intake through asking about previous emotional experiences while observing the client's nonverbal behavior. A treatment approach for deficits in emotional reactivity could be to emphasize more on the sessions in CBT that focus on emotion regulation. It could be

advised to let the client practice longer with the thought record worksheets and emphasize on defining the emotions.

With regard to heartbeat, only the heartbeat rate variability was found to correlate with outcome, in the sense that lower variability was associated with an overall better outcome. Davies et al. (2015) state, that heart rate variability is a reliable measure of emotion regulation, which, as stated above, is a target in CBT. Their results provide evidence that CBT may be more potent for individuals with lower heart rate variability. This finding relates to the explanation of Niles et al. (2013) that patients with more deficits in emotion regulation can profit more from a treatment that focuses on emotion regulation. Because it would not be practical to ask the client to wear a heart rate monitor during the intake process, the medical records could be requested from the general practitioner. During the treatment, it can be advised to emphasize on emotion regulation techniques such as cognitive reappraisal to help the client achieve a more variable heart rate and the optimal outcome.

Regarding bias, only vigilant bias was discovered as predictive in one of the two studies. Clients suffering from SAD with a vigilant bias were more responsive to CBT than those with avoidant bias (Price, Tone, & Anderson, 2011). This may relate to the finding that deficits in disengaging from threat were found to be a positive predictor in the sense that, in exposure, it is necessary to stay focused on the threat instead of avoiding it (Barry, Sewart, Arch, & Craske; 2015). This is analogous to the finding that avoidance of exposure affected the outcome of treatment negatively (Glenn, 2013). To assess coping mechanisms like vigilant or avoidant bias, the brief version of the Coping Orientation to Problems Experienced (COPE) scale could give a possible orientation for intake questions. Data supports this scale's psychometric qualities with good internal consistency and construct validity. During treatment, the client should be motivated further to head towards fearful situations and thus overcome his anxiety.

In-treatment behavior such as homework adherence was found by one study as a positive predictor. Glenn et al. (2013) concluded that a higher treatment dose in general as well as patient commitment predicted better outcomes. This finding underscores the importance of paying attention to the patient's motivation and encouraging his engagement. This can be accomplished through MI. Before treatment, the need for further motivation could be assessed by asking the client about earlier experience with demanding tasks.

Finally, two studies found that resistance is a negative predictor of outcome. According to Westra (2011), resistance can be considered an indirect measure of motivation or ambivalence about change or treatment. These findings underscore the importance of the clinician's sensitivity to motivation for change before and during treatment. Learning to identify motivational statements may provide opportunities for clinicians to enhance motivation and thereby possibly treatment outcome. By being trained in the work of motivational interviewing, a therapist should be able to identify and react adequately to change talk and counter-change talk. According to Miller and Rollnick (2014), change talk can be recognized with the acronym CAT, which stands for Commitment (e.g. "I will do it."), Activation (e.g. "I'm ready for..."), and Taking steps (e.g. "I have already bought the necessary equipment."). Against every statement of change, a strong statement for the status quo can be brought in with counter-change talk (e.g. "I will stay smoking.", "I'm accepting the risks of smoking.", "I brought the equipment back to the store."). To elicit change talk, the therapist is advised to use the acronym to devise matching open questions. Additionally, the authors describe several strategies to help with these questions. The confidence/importance ruler can be used to examine the importance of making a specific change. Asking about consequences is a negative way to elicit change talk. Looking back to the time before the problems and comparing that to the present time can also underscore the need to change. Looking to the future where the problems are overcome could also elicit change talk.

This review focused on the significance rather than on the effect sizes of each factor. The most consistent predictive factors were severity and comorbidity. Those factors were investigated by many studies and identified as predictors. In contrast, sociodemographic variables have consistently no association with outcome. Other variables such as the personal features were not examined by as many studies, though also identified as predictors. In conclusion, in planning an individualized CBT approach, a therapist should pay attention to the severity of the disorder, possible comorbidities, and personal features like neuroticism, self-stigma and shame, self-esteem, self-efficacy, perceived control, outcome expectancy, anxiety sensitivity, harm avoidance, vigilant bias, emotion reactivity, homework adherence and resistance. These variables can be assessed during the intake using several self-reports as an orientation for the according questions. The BAI was proposed to assess severity of the anxiety disorder, the SCID-I for psychological disorders and the SCID-II for personality disorders can give an orientation of comorbidities, and personal characteristics can be identified with the NEO-PI-R, the SSMIS, the ASI, and the COPE. The medical records can give information about heart rate variability and possible emotion regulation deficits. The

client's overall motivation and outcome expectancy can be assessed by asking about previous experience. Where it is necessary, self-esteem should be heightened through described techniques. Motivational techniques can enhance overall engagement and expectancies. Finally, emotion regulation exercises should be emphasized on patients with deficits in that area. Taken as a whole, this review underscores the idea of personalized medicine, which centers on the client and his individual features more than on the diagnosis alone.

## **Limitations and Future Implications**

The present review identified a number of limitations in the recent literature on predictors of the outcome in CBT for anxiety disorders.

First, the included studies are designed differently. This fact could make them less comparable. On the other hand, the RCTs, with their strict inclusion criteria, homogenous samples and possibly smaller sample sizes, may limit the power to detect a relationship between predictors and outcome and the generalizability.

Second, the aim to achieve generalizable results leads to a heterogeneity in size and a composition of samples (various anxiety disorders), which can reduce the value of the results. Aiming to serve as a guide for therapists to optimize the treatment of all anxiety disorders, this review did not acknowledge the possibility that the type of anxiety disorder could be in itself a predictor of outcome. Furthermore, there are clear methodological differences among selected articles, including study design, outcome measures, and duration of treatment. The corresponding disadvantage is the risk of incomparability. A naturalistic study is designed much more flexibly than a randomized controlled trial. Largely diverging results could have been the consequence.

Third, regarding the sample of participants, there were five studies that based their conclusions on the same individuals by analyzing the results of the CALM trial, which took place between 2006 and 2009 in primary care clinics in the US. This fact could influence the generalizability of the present review precariously because the sample is now predominantly North American. Consequently, this could have led to less valid global results. Fourth, because patients with SAD are most commonly treated in group sessions, they were less present in this review. The decision to exclude studies in which patients were treated in group CBT was made to enhance comparability.

Fifth, with all literature reviews, there is the possibility of a publication bias, which can occur when merely published articles are included. Research has shown that studies with significant results tend to be published sooner than studies with non-significant results, and that

published studies tend to report a greater treatment effect than those from grey literature (Song, et al., 2010).

Finally, this review identified predictors that were investigated by just a limited number of studies. The evidential value of these findings is therefore limited. This includes age of onset, childhood maltreatment, attachment, alcohol use, emotional reactivity, anxiety sensitivity, perceived control, and motivational techniques.

In conclusion, there are several implications for future research.

This review took an exploratory approach to identify any possible predictors of outcome for anxiety disorders in general. Future research could investigate the found predictors specifically to confirm or contradict the present findings. Additionally, it should include articles that are as homogenous as possible in study design, outcome measures, and duration of treatment. A meta-analysis like that could yield more significant results. To achieve this, it could be necessary to include less recent articles. This could also be advantageous in order to include an equal number of anxiety disorders. Furthermore, future reviews should only include studies with different populations. Moreover, a future review should preferably include more unpublished articles to reduce the chance of publication bias. According to Jooba, Schmitz, Annabel, and Boksa (2012), this could be accomplished by using open access journals, because many are committed to publish manuscripts regardless of whether they report positive or negative results as long as their methodology is sound. Steinginga and Evans (2015) from the publisher “Elsevier” point to a new feature on SCOPUS where the user can limit the search results to open access journals only. While searching the database, the researcher can hereby examine the search results for a sufficient amount of open access journals. Finally, future research should investigate age of onset and some of the personal characteristics more deeply, which have been examined merely superficially in the present review. This could be accomplished by reviewing less recent articles, or composing new trials.

This review identified several predictors of CBT outcome, which can be assessed during the intake and be considered during the composition of a personalized treatment approach to improve the effect. It underscores the possibilities of CBT and gives future implications that can enhance the effect even more.

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\*= The 30 included studies in this systematic review

## Appendix

**Table 7**

*More information about the outcome values in the studies*

Author	Predictors	Results
Barry, Sewart, Arch, & Craske (2015)	Deficits in disengaging attention from external and internal threat	A significant difference in the pretreatment disengagement index for faces between responders and nonresponders was reported, $t(46)=-2.15, P<.05$ . There was no difference in the pretreatment engagement index between responders and nonresponders, $t(46)=1.81, P>.05$ . Change in the bias did not predict follow-up response, $OR = 1.011, 95\% CI = 0.999-1.025, P > .05$ . A significant difference between treatment responders and nonresponders was found in terms of their pretreatment disengagement index for waves, $t(46)=-2.25, P < .05$ , but not in their engagement index, $t(40) = 1.23, P > .05$ . Neither change in the disengagement index from pre- to posttreatment, $OR = 1.013, 95\% CI = 0.999-1.027, P>.05$ , nor change in the engagement index, $OR = 0.989, 95\% CI = 0.999-1.005, P > .05$ , was a significant predictor of treatment response.
Brown et al. (2014)	Self-efficacy, Outcome expectancy	The intercept of OE predicted the latent slopes for all of the outcomes were significantly negative. OE significantly predicted three of the outcomes' latent slopes: for BSI $P = .0069$ , for ASI $P = .0201$ , for SDS $P = .0420$ , but not PHQ-8 ( $P = .0904$ ). The linear slope of SE significantly predicted the slopes of all of the outcome variables negatively. People who increased more in OE or SE over time tended to decrease more in symptoms over time.
Bruce, Heimberg, Goldin, & Gross (2013)	Childhood maltreatment	Only emotional abuse and emotional neglect significantly predicted greater disability and lower life satisfaction at baseline and throughout treatment. There were no other significant main effects of maltreatment or maltreatment $\times$ time interactions and no significant effects of any sort in the analysis of fear of negative evaluation (BFNE). The findings indicate that no form of childhood maltreatment moderated response to CBT for SAD.
Davies, Niles, Pittig, Arch, & Craske (2015)	Heart rate variability, high avoidance	Baseline HRV predicted outcome in a nonlinear manner that did not differ by group ( $z = 3.48, p = .001, R^2 = .26$ ). Heart rate variability was an overall predictor of outcome, whereas behavioral avoidance emerged only as a moderator. Low and mean baseline heart rate variability were associated with better outcome overall.
Davis, Barlow, & Smith (2010)	Comorbidity	Chi-square statistics revealed that patients with pretreatment comorbidity were categorized as treatment responders (75.3%) and as having achieved high end-state functioning (32.5%) at the same rate as individuals without comorbidity (responder, 63.3%; high end-state, 33.3%; responder, $\chi^2(1, N=150)= 2.31, p N.10$ ; high end-state functioning, $\chi^2(1, N=150)=0.01, p N.5$ ).

**Table 7 (continued)**

Author	Predictors	Results
Gallagher, Naragon- Gainey, & Brown (2014)	Perceived control	The incremental $R^2$ ranged from .53 to .59. The very large magnitude of these incremental effects underscores the importance of intraindividual changes in perceived control in predicting intraindividual changes in anxiety following treatment. Intraindividual changes in perceived control stayed predictors of changes in symptoms across two years of follow-up assessments.
Glenn et al. (2013)	Dose, homework adherence	After the propensity adjustment, patients with no exposures were significantly more symptomatic ( $ps < 0.004$ ) across all measures at 12 and 18 months than patients with completed exposure. Less homework adherent patients scored significantly higher ( $ps < 0.012$ ) across all measures at 12 and 18 months than more homework adherent patients. Low commitment patients scored significantly higher across all measures at 18 months ( $ps < 0.006$ ), but not at 12 months.
Gutner, Nillni, Suvak, Wiltsey-Stirman, & Resick (2013)	Anxiety sensitivity	The first growth curve analysis showed total pre-treatment ASI scores were significantly associated with all three change parameters. The second analysis showed that total ASI scores were significantly associated with the linear change parameter with the association between total ASI score and the quadratic coefficient approaching statistical significance ( $p = .06$ ). The third analysis showed total ASI, ASI-physical, and ASI-mental exhibited similar associations with change in PTSD, whereas ASI-social was not significantly associated with the linear or quadratic change coefficients.
Haug et al. (2015)	Comorbidity, higher impairment	Low social functioning was associated with a worse treatment outcome on both CSR ( $B = -.94, SE = .23, p < .001$ ), and SR-Composite ( $B = -.54, SE = .13, p < .001$ ). A cluster C personality disorder was associated with a worse treatment outcome on CSR ( $B = .67, SE = .26, p = .010$ ), and SR-Composite ( $B = .50, SE = .14, p < .001$ ). Higher level of impairment from the anxiety disorder was associated with a worse treatment outcome on the SR-Composite ( $B = .39, SE = .13, p = .003$ ).
Hendriks, Kampman, Keijsers, Hoogduin, & Voshaar (2014)	Age	Significant main effects for time were found (all $P$ -values $< .001$ ), with moderate-to-large effect sizes (0.31–0.85). A significant time-by-age interaction was found for agoraphobic avoidance ( $F = 4.52, df = 1,134, P = .035$ ). Panic attack frequency decreased in the under-60s group from 2.01 ( $SD = 3.05$ ) to 0.55 ( $SD = 1.29$ ) and in the plus-60s group from 2.59 ( $SD = 4.40$ ) to 0.59 ( $SD = 1.09$ ).
Hoyer et al. (2016)	Age, sex, education, severity, comorbidity, personality, self-esteem, shame, attachment style	Socio-demographic variables were uncorrelated with social anxiety and outcome indicators. Indicators of comorbidity were at least slightly and significantly correlated with social anxiety and outcome. Symptom severity at the beginning of treatment (LSAS pre) was the only significant predictor of remission, explaining 15% of the variance. The degree of comorbidity remained a significant predictor of (more) symptom severity at the end. It also indicated a lower probability to achieve response, not remission. Personality variables explained nearly 6% of variance of end-state.

**Table 7 (continued)**

Author	Predictors	Results
Joesch et al. (2013)	Employment status, social support, marital status	In the cubic 4-group model, denoted (3,3,3,3), trajectory shape parameter estimates were significant for linear, quadratic, and cubic terms for three of the groups, but suggested a constant, or 0-order, trajectory for the remaining group. BIC values for the (3,3,3,0) group model were $-15,983.83$ ( $n = 482$ ) and $-16,005.75$ ( $n = 6,355$ ), both lower than the corresponding BIC values for the cubic 4-group model. Univariate estimates suggest being sicker at baseline was a risk factor associated with following the two less favorable trajectories (Groups 3 and 4). Not working at baseline was a risk factor associated with Group 4 membership.
Jonsson, Hougaard, & Bennedsen (2011)	Symptom severity	Pre-treatment scores on TAFS-Moral was the only belief measure that predicted poorer treatment outcome, both in predicting end-state ( $\hat{\gamma} = 0.308$ ; $t = 2.786$ , $p = 0.007$ ), and in predicting change ( $\hat{\gamma} = -0.318$ ; $t = -2.786$ , $p = 0.007$ ).
Kelly, Jakubovski, & Bloch (2015)	High school completion, employment status, income, insurance status, marital status, comorbid depression, severity	Several measures indicating poor socioeconomic status were strongly associated with poor treatment response, including unemployment, personal income, and current receipt of disability payment. Presence and severity of comorbid depressive symptoms were strongly associated with poorer outcomes of the anxiety disorder treatment (PHQ-9 baseline score with a threshold of 8) [ $\chi^2(1, N=876) = 56.9$ , $p < .001$ ].
Kyrios, Hordern, & Fassnacht (2015)	Gender, age, relationship status, years of education, symptom severity, comorbidity	Years of education explained an additional 6.9% in post-treatment severity scores, where more years spent in formal education were related to better outcomes in post-treatment severity [ $t(52) = -2.23$ , $p = .030$ , $\hat{\gamma} = -.27$ ]. Only pre-treatment symptom severity significantly predicted post-treatment outcome explaining 20.6% of the variance in post-treatment YBOCS scores [ $t(57) = 3.84$ , $p < .001$ , $\hat{\gamma} = .45$ ].
Lombardi, Button, & Westra (2014)	Motivational language	The motivational skill code (MISC) 1.1 was used to identify motivational language. Those who did not respond to treatment had significantly higher levels of CCT compared to responders ( $M$ nonresponders = 0.10, $SD = 0.05$ , $M$ responders = 0.06, $SD = 0.04$ ; $t(35) = 2.19$ , $p = .035$ ). For CT, no significant differences between responders and nonresponders were found ( $M$ nonresponders = 0.13, $SD = 0.04$ , $M$ responders = 0.14, $SD = 0.07$ ; $t(35) = 0.44$ , $p = .666$ ).
Masdrakis, et al. (2015)	Heartbeat perception accuracy	While no significant association emerged between baseline HBP-accuracy and post-CBT panic attacks' reduction ( $p = .27$ ), higher baseline HBP-accuracy was associated with larger therapeutic gains regarding agoraphobic behaviors and beliefs (ACQ).

**Table 7 (continued)**

Author	Predictors	Results
Niles, Mesri, Burklund, Lieberman, & Craske (2013)	Attentional bias, emotional reactivity	Simple effects tests revealed that slower response time to negative faces predicted fewer symptoms after both ACT and CBT ( $\beta=-.84$ , $CI=-.30$ to $-1.38$ , $p=.002$ ), but the relationship was marginally stronger in the CBT group ( $p=.066$ ). Neither negative affect while viewing neutral images ( $ps > .088$ ), nor positive affect while viewing positive images ( $ps > .126$ ) did significantly moderate or predict outcome.
Ociskova, Prasko, Latalova, Kamaradova, & Grambal (2016)	Age of onset, duration, severity, comorbidity with depression, personality disorder, self-stigma, self-directedness, Hope	The relative change in psychopathology did not significantly correlate with age of onset, duration, number of previous hospitalizations, indices of psychopharmaceuticals, and the pretreatment severity. However, patients without a comorbid personality disorder improved significantly more than participants with a comorbid personality disorder. The magnitude of this difference was medium ( $d=0.66$ ). The relative change in anxiety according to subjective BAI score did not significantly correlate with any factor but the initial level of self-stigma (Spearman's $\rho=0.26$ , $P,0.01$ ). The objective change in psychopathology measured by the relative-change $CGI_{Obj}$ significantly correlated with hope (ADHS) along with starting levels of self-stigma (ISMI), harm avoidance (TCI-R), and self-directedness (TCI-R). After the backward-stepwise multiple regression analysis, the subsequent model explained 16.1% of the dependent variable ( $P,0.001$ ). After the Bonferroni correction, the adjusted P-value was 0.0063. Therefore, self-stigma remained as the only significant predictor of relative change measured by the physician during the treatment.

**Table 7 (continued)**

Author	Predictors	Results
Prasko et al. (2015)	Marital status, employment, gender, age, severity of anxiety and depression, comorbidity	Marital status showed statistically significant difference between responders and non-responders in BAI (chi-square: $p < 0.05$ ). No significant gender differences were found in the comparison of patients improved or remitted. Response rate (BAI decrease of 30% or more) occurred in 47.2% males and 52.8% females (Fisher's exact test: n.s.), and CGI 1 or 2 was achieved in 37.7% males and 50.0% females, Fisher's exact test: n.s.). The mean age of responders and non-responders also did not differ significantly (unpair t-test: $t = 1.557$ $df = 174$ ; n.s.). There were no differences in respond rate (chi-square: n.s.) and in remission rate (chi-square: n.s.) regarding employment status. Patients with initial mean BAI scores lower than 25 reached clinical remission more frequently than patients with higher initial BAI scores (Fisher's exact test: $p < 0.01$ ). Patients with initial BDI scores lower than 20 achieved response (Fisher's exact test: $p < 0.0001$ ) and remission (Fisher's exact test: $p < 0.0005$ ) more frequently than patients with higher BDI scores. Patients with a comorbid mild depression achieved response less frequently ( $n = 14$ ) than patients without comorbid mild depression ( $n = 76$ ) (Fisher's exact test: $p < 0.05$ ) and also reached remission less often ( $n = 12$ ) than the no depression group ( $n = 68$ ) (Fisher's exact test: $p < 0.05$ ). There was no statistically significant impact of anxiety disorder comorbidity on response or remission rate (both Fisher's exact tests: n.s.). Patients with comorbid personality disorder did not achieve both response (30/80 vs 76/111: Fisher's exact test: $p < 0.005$ ) and remission (24/80 vs 63/111: Fisher's exact test: $p < 0.0005$ ) as frequently as patients without comorbid personality disorder.
Price, Tone, & Anderson (2011)	Attention bias	Only for the group with vigilant biases, bias scores predicted outcome such that greater vigilance bias was associated with greater post-treatment social anxiety ( $\beta = .52$ , $P < .05$ , $R^2_{\Delta} = .27$ ). No such association was found for avoidant biases ( $\beta = -.22$ , $P = .41$ , $R^2_{\Delta} = .04$ ). Patients with an avoidant bias did not benefit from treatment ( $M_{\Delta} = 10.85$ ) as much as those with a vigilant bias ( $M_{\Delta} = 23.04$ ).
Reinecke, Rinck, Becker, & Hoyer (2013)	Generalization bias	Linear regression analyses were run. Although no such association was found for the PSWQ, $R^2 = .12$ , $\beta_1 = .04$ , $t = 1.44$ , $p = .170$ , pre-treatment bias predicted the extent of symptom improvement measured with the WBSI during the 6 months following treatment, $R^2 = .23$ , $\beta_1 = .06$ , $t = 2.14$ , $p < .05$ .
Renaud, Russel, & Myhr (2014)	Capacity for participation	Higher scores on the Capacity for Participation in the CBT Process were negatively correlated with posttreatment CGI scores ( $r = -.27$ ; $p = .00$ ).
Voderholzer et al. (2013)	Age, sex, duration, personality disorder	Neither sex ( $P = 0.37$ ), nor age ( $P = 0.54$ ), nor duration of OCD in years ( $P = 0.60$ ) or presence of a personality disorder ( $P = 0.40$ ) showed a significant correlation with the therapy outcome.

**Table 7 (continued)**

Author	Predictors	Results
Westra (2011)	Motivation for change, in-session resistance	Higher scores on the CQ predicted greater worry reduction, accounting for 16-17% of the variance in outcome. When adopting linear regressions and controlling for baseline client worry severity, only observed resistance at session 1 remained significantly predictive of poorer outcome, $t = 3.67, p = .002$ , $\beta = .48$ .
Wolitzky-Taylor, Arch, Rosenfield, & Craske (2012)	Race/ethnicity, gender, age, comorbid mood disorder, severity, neuroticism, anxiety sensitivity	Gender, age, and race/ethnicity did not significantly influence outcomes on the MASQ-GA, neither as a predictor of outcome in general across groups ( $ps > .07$ ) nor as a moderator ( $ps > .08$ ). In terms of within-group effects, those with a mood disorder at baseline had higher MASQ-GA scores at posttreatment and after 12 months than those without a mood disorder, $F(1, 61) = 5.93, p < .05$ , and $F(1, 34) = 12.95, p = .001$ , respectively. Anxiety disorder comorbidity was not significantly related to MASQ-GA, either as a predictor ( $ps > .39$ ) or as a moderator ( $ps > .50$ ). Baseline severity (i.e., baseline CSR of principal diagnosis) did not predict outcome ( $ps > .27$ ). Higher levels of neuroticism were predictive of higher levels of anxiety ( $b = 1.74$ ) across groups and across assessment time points. Simple effects tests showed a significant quadratic anxiety sensitivity index (ASI) effect, $F(1, 45) = 8.28, p < .01$ , such that ASI scores near the mean were associated with lower MASQ-GA scores, but high and low ASI scores were associated with higher MASQ-GA scores.
Wolitzky-Taylor, et. al (2015)	Alcohol use problems	The potential predictor was assessed using the Alcohol Use Disorders Identification Test (AUDIT). The presence of an alcohol problem did not affect BSI outcomes ( $p = .60$ ). There was no effect of AUDIT score on ASI outcomes ( $p = .78$ ).
Wu, Li, & Cho (2014)	Severity	A post hoc test found that the SHP participants with a positive treatment response had a lower pretreatment HADS total score ( $M = 18.75, SD = 4.49$ ) than the participants with a negative treatment response ( $M = 23.78, SD = 5.49$ ), $F(1, 24) = 6.15, p = 0.02, g = 0.92$ .
Yoshinaga et al. (2013)	Gender, age, employment status, marital status, Comorbidity, subtype, age of onset, duration	The CBT intervention led to significant reductions in all outcome measures at the middle stage of treatment (pre-mid-CBT; $p < .05$ ) and a further significant reduction after treatment completion (mid-post-CBT; $p < .05$ ). None of the variables (gender, age, SAD subtype, presence of comorbid major depressive disorder, presence of another comorbid anxiety disorder, presence of avoidant personality disorder, age of onset, duration of SAD, employment status, marital status, educational status, use of medication, and presence of resistance to antidepressants) were significant predictors.

*Note.* PTSD: post-traumatic stress disorder, GAD: generalized anxiety disorder, PD: panic disorder with or without agoraphobia, SAD: social anxiety disorder, SP: specific phobia.