Soundbites
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Chapter 5
Cognitive behavioral therapy is effective in misophonia: an open trial

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Abstract

Background
Misophonia is a psychiatric disorder in which ordinary human sounds like smacking or chewing provoke intense anger and disgust. Despite the high burden of this condition, to date there is no evidence-based treatment available. In this study we evaluated the efficacy of cognitive behavioral therapy (CBT) and investigated whether clinical or demographic characteristics predicted treatment response.

Methods
Ninety patients with misophonia received eight bi-weekly group CBT sessions. Treatment response was defined as a Clinical Global Impression – Improvement Scale (CGI-I) score at endpoint of 1 or 2 (very much or much improved) and a 30% or greater reduction on the Amsterdam Misophonia Scale (A-MISO-S), a measure of the severity of misophonia symptoms.

Results
Following treatment 48% (N=42) of the patients showed a significant reduction of misophonia symptoms. Severity of misophonia and the presence of disgust were positive predictors of treatment response. Limitations: The A-MISO-S is not a validated scale. Furthermore, this was an open-label study with a waiting list control condition.

Conclusions
This is the first treatment study for misophonia. Our results suggest that CBT is effective in half of the patients.
1. Introduction

Misophonia is a psychiatric disorder, characterized by intense anger and disgust, which are triggered when patients are confronted with particular human sounds such as smacking, chewing, loud breathing, or typing. These sounds provoke agitation and impulsive aggression, which causes patients to avoid situations with possible misophonic triggers. For instance, meals with other people, use of public transport or work related meetings are avoided. If situations cannot be evaded they are endured with intense suffering. The suffering and avoidance lead to major social and occupational impairment.

Misophonia is a new disorder and research into this field has only recently been emerging. The etiology of misophonia remains unknown. Patients with misophonia generally have normal hearing and misophonic reactions are not related to hearing thresholds. Therefore, misophonic reactions are thought to be due to increased connectivity between auditory and limbic brain regions. Furthermore, it has been associated with various psychiatric conditions, such as Tourette's syndrome and obsessive-compulsive personality disorder, suggesting a shared etiology.

Because of its novelty, misophonia incidence and prevalence rates are still speculative. In an online survey amongst students (N = 483) 20% reported significant misophonic symptoms, with the respondents primarily being comprised of female undergraduates and lacking psychiatric evaluation, therefore limiting generalizability. Based on data from an audiology clinic, it has been estimated that misophonia symptoms in the general population could be as high as 3.2 percent. However, the authors did not reveal how diagnosis was established, also reducing generalizability. Nevertheless, in just five years nearly 500 patients have been referred to our institute. This further suggests that misophonia is a hidden epidemic. Hence there is tremendous need for effective treatment.

Currently there is no evidence-based treatment available. Even though beneficial effects have been reported in patients treated at an audiology clinic, interpretation is limited due to an absence of a valid assessment method for diagnosis, symptom severity and improvement. Interestingly, positive results have been described in six cases, who were treated with cognitive behavioral therapy (CBT). CBT techniques were also applied in a pilot study at our institute. In this unpublished study seven patients showed promising improvement following bi-weekly group CBT. We therefore decided to determine the efficacy of group CBT in a larger study. Additionally, to add to our current knowledge on misophonia and the effect of CBT, we investigated if clinical and demographic factors predicted treatment response.
2. Methods

2.1 Subjects
Ninety patients (65 women, 25 men) referred because of misophonia were included. They visited the outpatient clinic at the department of psychiatry at the AMC between April 2012 and November 2013. Exclusion criteria were the presence of substance dependence, bipolar disorder, autism spectrum disorders or psychotic disorders. The study was carried out in accordance with the Declaration of Helsinki and was approved by the AMC medical ethics committee. All patients provided informed consent. Table 1 presents clinical and demographic characteristics.

2.2 Procedure
To ensure that patients met the diagnostic criteria for misophonia, psychiatrists experienced in obsessive-compulsive and related disorders screened all patients. Patients completed the Symptom Checklist-90 (SCL-90) before the interview at the outpatient clinic (T0). At the interview, the Amsterdam-Misophonia-Scale (A-MISO-S) was administered by a trained psychiatry resident. Because we consider anger and disgust the core emotions triggered in misophonia, we explicitly asked whether misophonic sounds elicited anger and/or disgust. Following the interview, patients were put on a waiting list before entering the group CBT program. Participation in the CBT program (T1) started at an average of 29.0 weeks (SD 15.5, range 5-79) after the interview. At T1 and again at the end of the group CBT (T2), the A-MISO-S was administered by the therapists. The Clinical Global Impression – Improvement Scale (CGI-I) was completed by the therapists at T2. Finally, after T2 patients filled out post-treatment evaluations forms.

2.3 Measures
Symptom severity was measured with the A-MISO-S, a concept scale based on our previous descriptive study of 42 misophonia patients. Quantitative scores - ranging from 0-24 - were used for clinical reference. Scores from 0–4 are considered subclinical misophonic symptoms, 5–9 mild, 10–14 moderate, 15–19 severe, 20–24 extreme.

Therapists filled out the CGI-I, a 7-point Likert scale that assesses how much the patient has clinically improved or worsened, after treatment (1=very much improved; 2=much improved; 3=minimally improved; 4=no change; 5=minimally worse; 6=much worse; or 7=very much worse).
General mental and physical dysfunctioning was assessed with the Dutch version of the SCL-90, a validated self-report questionnaire. The total score of the SCL-90 is considered a general index of psychopathology.

A quantitative measure of treatment response was defined by change in A-MISO-S scores from T1 (start of CBT) to T2 (end of CBT). A binary measure of treatment response was defined as obtaining both a CGI-I score of 1 or 2 (very much or much improved) and a 30 percent A-MISO-S score reduction after treatment (T2) in relation to the baseline A-MISO-S (T1) score. A 30% reduction is a commonly used definition of response in psychiatric treatment.

In addition to the aforementioned questionnaires, misophonia symptoms were categorized as follows: triggered emotion was dichotomized into “anger” and “anger with disgust” because not all patients experience disgust (with “anger” as the reference category); presence of irritability due to ambient sounds was also dichotomized into “yes” and “no”; duration of symptoms and age of onset were described in years.

Post-treatment evaluation forms included general questions about the therapy (directions, duration, frequency) and specific questions about the different CBT techniques (e.g. which technique was (not) helpful in decreasing symptoms and how it (not) helped them). Patients were encouraged to illustrate these with personal examples.
Table 1. Clinical and demographic characteristics (N = 90)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (N, %)</td>
<td>25 (28%)</td>
</tr>
<tr>
<td>Age at T0 (Mean, SD)</td>
<td>35.8 (12.2)</td>
</tr>
<tr>
<td>Age of onset (Mean, SD)</td>
<td>12.5 (4.8)</td>
</tr>
<tr>
<td>Duration of symptoms in years (Mean, SD)</td>
<td>23.2 (12.6)</td>
</tr>
<tr>
<td>Time until treatment in weeks (Mean, SD)</td>
<td>29.0 (15.5)</td>
</tr>
<tr>
<td>Comorbidity (N, %)</td>
<td></td>
</tr>
<tr>
<td>Skinpicking disorder</td>
<td>5 (5.5)</td>
</tr>
<tr>
<td>ADHD</td>
<td>4 (4.4)</td>
</tr>
<tr>
<td>Obsessive-compulsive disorder</td>
<td>3 (3.3)</td>
</tr>
<tr>
<td>Hypochondria</td>
<td>1 (1.1)</td>
</tr>
<tr>
<td>Boulimia/anorexia</td>
<td>3 (3.3)</td>
</tr>
<tr>
<td>Tourette syndrome</td>
<td>2 (2.2)</td>
</tr>
<tr>
<td>Body dysmorphic disorder</td>
<td>1 (1.1)</td>
</tr>
<tr>
<td>Bipolar II disorder</td>
<td>1 (1.1)</td>
</tr>
<tr>
<td>Dysthymic disorder</td>
<td>2 (2.2)</td>
</tr>
<tr>
<td>Depressive disorder</td>
<td>1 (1.1)</td>
</tr>
<tr>
<td>Misophonia symptom characteristics</td>
<td></td>
</tr>
<tr>
<td>Irritability by ambient sounds (N, %)</td>
<td>46 (51%)</td>
</tr>
<tr>
<td>Most triggering sound (N, %)</td>
<td></td>
</tr>
<tr>
<td>Eating sounds</td>
<td>69 (77%)</td>
</tr>
<tr>
<td>Triggered emotion (N, %)</td>
<td></td>
</tr>
<tr>
<td>Anger</td>
<td>57 (63%)</td>
</tr>
<tr>
<td>Anger + disgust</td>
<td>33 (37%)</td>
</tr>
<tr>
<td>Measures</td>
<td></td>
</tr>
<tr>
<td>A-MISO-S *T0 (Mean, SD)</td>
<td>13.6 (2.9)</td>
</tr>
<tr>
<td>SCL-90** T0 (Mean, SD)</td>
<td>163.4 (47.4)</td>
</tr>
<tr>
<td>A-MISO-S T2 (Mean, SD)</td>
<td>9.1 (3.9)</td>
</tr>
<tr>
<td>A-MISO-S change T0-T1 (Mean, SD)</td>
<td>0.0 (2.6)</td>
</tr>
<tr>
<td>A-MISO-S change T1-T2 (Mean, SD)</td>
<td>-4.5 (3.5)</td>
</tr>
<tr>
<td>Responder*** (N, %)</td>
<td>42 (48%)</td>
</tr>
</tbody>
</table>

*A-MISO-S = Amsterdam Misophonia Scale
**SCL-90 = Symptom Checklist-90 (N = 86)
***Responder was defined as a Clinical Global Impression-Improvement (CGI-I) score of 1 or 2 and A-MISO-S decrease ≥ 30%; CGI-I (N = 88)
2.4 Treatment
In our misophonia model the core symptoms consist of both a hyper focus on human sounds and an immediately triggered negative affective reaction. The increased focus on misophonic triggers could be due to impaired attentional control, while the immediate negative affective reaction could be related to increased irritability levels. Importantly, in the development of the unpublished pilot study we noticed that mere exposure to misophonic triggers did not decrease symptoms. Mostly, it even increased misophonia symptoms. Therefore, in the current treatment protocol we addressed the two core symptoms with four different techniques that were also used in the pilot study: task concentration exercises, counterconditioning, stimulus manipulation, and relaxation exercises.

Task concentration exercises can be used to improve attentional shifting addressing the core symptom of attentional bias. Attentional bias implies that a stimulus that is emotionally salient to a person, e.g. the sound of someone eating, draws his or her attention. With these exercises patients learn to focus their attention on different sensory input and practice these first in a neutral setting, then progressively in more misophonic settings, e.g. family dinner.

To address the uncontrollable, intense anger and disgust we added counterconditioning, stimulus manipulation, and relaxation exercises. Counterconditioning can be used when neutral or pleasant situations or events have been connected to intrinsic negative emotions. It is an effective technique in both fear and disgust related disorders, notably obsessive-compulsive disorder and post-traumatic stress disorder, and was used in a case report of misophonia. We expected that counterconditioning could be useful in misophonia as well. To initiate positive associations with misophonia triggers, an intense pleasant unconditioned stimulus, e.g. a positive image or video, would repeatedly be paired with a conditioned stimulus, such as a video clip of someone chewing. Additionally, we included stimulus manipulation. Misophonic sounds are often repetitive, e.g. eating sounds, typing sounds, but not continuous. This unpredictability could induce a sense of uncontrollability in patients. By offering possibilities to change the misophonic trigger sounds and images in vitro – on a computer at home – we assumed that this could initiate a sense of control over their personal misophonic triggers. Finally, irritability can be related to increased general physical arousal. We hypothesized that this could be decreased with relaxation techniques, which are commonly used in anger management protocols and post-traumatic stress disorder (PTSD). With various exercises patients learn to mentally and

Chapter 5 / Cognitive behavioral therapy
physically soothe themselves when they are exposed to symptom-provoking situations.

The four techniques were combined in a group CBT format. Group therapy has several advantages over individual treatment. First, social situations can be more easily simulated. Second, group members might provide each other with mutual support and can learn problem-solving techniques from other members. Third, group therapy is more cost-effective.

Therapists for group CBT were licensed clinical psychologists with extensive experience in CBT for obsessive-compulsive and related disorders. Co-therapists were licensed clinical psychologists, psychology interns, and nurses and psychomotor therapists with CBT training. Group therapy was conducted in a closed group of 6-9 patients. Group sessions were weekly or every other week, for a total of 8 sessions. For logistical reasons 3 groups (24 participants) had a total of 7 sessions. Each therapy day offered the patients a four-hour program of CBT and PMT. Table 2 gives a detailed description of the treatment protocol.

Table 2. Description of treatment protocol

<table>
<thead>
<tr>
<th>Session</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction of misophonia model and rationale (cognitive intervention). Discussion of treatment goals.</td>
</tr>
<tr>
<td>2</td>
<td>Discussion of personal misophonia histories and personal moral values related to misophonic triggers (cognitive intervention). Instruction for Audacity, a free audio editor and recorder, to create audio and video clips on the computer. Clips consisted of their personal misophonic triggers. Alternatively, creation of mood boards, reflecting their own misophonia experiences. Start of psychomotor therapy (PMT) to practice task concentration and relaxation exercises.</td>
</tr>
<tr>
<td>3</td>
<td>Introduction of stimulus manipulation and counterconditioning (behavioral interventions). Instruction to manipulate their personal misophonic triggers on the computer — e.g., changing the pitch or interval of the audio clips — and to combine these with pleasant stimuli. Discussion of various avoidant coping strategies — e.g., use of earplugs or having dinner with the radio on. Instruction to gradually decrease these strategies. Emphasis to continue to practice at home (behavioral interventions).</td>
</tr>
<tr>
<td>4-8</td>
<td>Continuation of practice. Use of motivational conversations.</td>
</tr>
</tbody>
</table>
2.5 Data analysis

Statistical analysis was carried out using IBM SPSS version 20. Descriptive statistics were calculated for demographic and clinical variables. Changes in A-MISO-S scores over time were calculated for T0 minus T1 (waiting list effect) and for T1 minus T2 (treatment effect). One-sample t-tests were performed to investigate whether these change scores were significantly different from zero.

To test for possible associations between treatment response and clinical and demographic variables, we considered seven variables as potential predictors of treatment response: baseline A-MISO-S scores (T0), sex, duration of symptoms, age of onset, presence of irritability due to ambient sounds, triggered emotion, baseline SCL-90 scores (T0).

To investigate associations with a quantitative change in A-MISO-S score, Pearson's correlations were calculated for baseline A-MISO-S scores and age of onset and Spearman's correlations for duration of symptoms and baseline SCL-90 scores. Independent samples t-tests were conducted for binary variables sex, triggered emotion and presence of ambient sounds.

To investigate associations with a binary measure of treatment response, χ²-tests were performed for sex, triggered emotion, and irritability due to ambient sounds. Independent samples t-tests were used for associations between treatment response and age of onset, duration of symptoms and baseline A-MISO-S and SCL-90 scores.

For the subsequent regression analyses we included variables associated at p < .20 as predictors.32 Because of the limited literature on misophonia, it was not possible to make a priori choices for a hierarchical regression analysis. Hence a stepwise method was applied.33 Linear regression was used to explore which predictors contributed significantly to quantitative change in A-MISO-S scores. Logistic regression was carried out with the binary measure of treatment response as dependent variable. Variables were included when P_{in} < .05 and were excluded when P_{out} > .10.

3. Results

Patients were between 18 and 64 years of age (mean 35.8, SD 12.2) with a mean baseline A-MISO-S score of 13.6 (SD 2.9, range 7-23), corresponding with moderate misophonia (Table 1). Moderate symptoms were characterized by disturbing anger or disgust with definite interference with social and occupational performance. Sufferers were occasionally able to stop or divert their thoughts about misophonic sounds but frequently avoided these triggers. For example, sufferers usually did not have meals
with other people or stayed away from meetings with colleagues.

All 90 patients completed the treatment, of which 58% (N=52) had a CGI-I score of 1 or 2 after treatment. Forty-eight percent (N = 42) had both a CGI-I score of 1 or 2 after treatment and at least a 30 percent reduction on the A-MISO-S. Nine percent (N = 8) achieved symptom remission. The mean A-MISO-S scores at T0, T1, and T2 are shown in Figure 1. Mean reduction in A-MISO-S scores following treatment (T1-T2) was -4.5 (SD 3.5, range 6-15) ($t = -12.198$, df = 89, $p < .001$), corresponding with an improvement to mild misophonia. Mild misophonia were symptoms that did not interfere anymore with social and occupational activities and were not considered disturbing. Sufferers were usually able to stop or divert thoughts about misophonic sounds. In misophonic situations they could focus on other activities and avoidance was minimal.

During the waiting list condition no significant reduction of A-MISO-S scores occurred. ($t = -0.123$, df = 89, $p = .902$). There was no difference in reduction of A-MISO-S scores between patients in the seven-session groups (N = 24) and the eight-session groups ($p = .63$).

Univariate association analysis revealed associations at $p < 0.20$ between the quantitative change in A-MISO-S scores and baseline A-MISO-S (Pearson’s $r = -0.282$, $p = .007$), age of onset (Pearson’s $r = 0.226$, $p = .033$), duration of symptoms (Spearman’s $r = -0.191$, $p = .071$), irritability due to ambient sounds ($t = -1.477$, df = 88, $p = 0.143$) and triggered emotion ($t = 1.397$, df = 88, $p = .166$). Subsequent regression analysis showed that higher baseline A-MISO-S scores were significantly predictive of reduction in A-MISO-S scores ($\beta = -0.282$, 95% CI: -0.593 - -0.096, $p = .007$, adjusted $R^2 = .069$).

For the binary measure of treatment response, only one candidate predictor reached the .20 threshold: triggered emotion ($\chi^2(1) = 3.517$, $p = .061$). The logistic regression analysis demonstrated that the presence of disgust was significantly prognostic of treatment response (OR = 2.576, 95% CI: 1.053 - 6.299, $p = .038$, $B = 0.946$, Nagelkerke $R^2 = .066$).

After T2 a total of 40 patients returned the treatment evaluation forms.
4. Discussion

This is the first large study to investigate treatment for misophonia and to explore predictive factors of treatment response. Our study shows that group CBT reduced misophonia symptoms in nearly half of the patients. In addition, we found that high baseline A-MISO-S scores and the presence of disgust were positive predictors of treatment response. This indicates that patients with more severe misophonia and those who also experienced disgust when confronted with misophonic triggers were more likely to respond to treatment.

In order to maximize possible treatment effects, we combined four therapeutic techniques. These techniques targeted different aspects of misophonia symptoms, based on our misophonia model. Even though this model is still hypothetical, patients’ feedback in evaluation forms further supports it.

The first aspect was the attentional bias toward misophonic triggers. This attentional bias was addressed with task concentration exercises, which are also
effective in the treatment of social anxiety disorder. In the evaluation forms, patients reported that these exercises helped to shift attention to other sensory input when confronted with a misophonic trigger, e.g. when sitting in the bus with another passenger eating a sandwich, they would be able to focus on a conversation instead.

The intense anger and disgust were addressed with counterconditioning, stimulus manipulation and relaxation exercises. Counterconditioning decreases symptoms in fear and disgust related disorders and was also effective in one case of misophonia treatment. In our study it enabled patients to associate the misophonic sound with an image that evoked a positive emotion. For example, one patient, who was a regular runner, had found the sound of eating chips similar to the pleasant crunching sound of running in the snow and had been able to use this positive image when hearing someone eat chips. Interestingly, this effect is in line with studies on strategies of reappraisal of displaced aggression, in which an increase of positive reappraisal of aggressive situations was associated with a decrease in vengeance and interpersonal aggression.

Stimulus manipulation helped to decrease the uncontrollability over misophonic triggers. Patients reported that the exercise itself resulted in feeling less overwhelmed by misophonic sounds. Some even enjoyed manipulating triggers on a computer. To the best of our knowledge, stimulus manipulation has not been used in CBT studies before.

Relaxation exercises decreased irritability and improved toleration of misophonic situations. It is known that such exercises can lower physiological arousal in patients with anger control problems and reduce aggression especially when combined with cognitive self-control techniques.

An additional positive factor was the use of the group therapy format. Patients reported that recognition and support alone were useful in decreasing misophonia symptoms.

The second goal of our study was to investigate if clinical or demographical factors predicted treatment response. We only found that higher baseline A-MISO-S scores, earlier age of onset and the presence of disgust were positive predictors. The former may be related to the phenomenon of regression to the mean or to the fact that there is greater room for improvement in those with initially high A-MISO-S scores. Earlier age of onset could then imply more chronic and severe misophonia. However, this factor was eliminated in the regression analysis. Why the presence of disgust might be a positive predictor remains unclear. Possibly disgust occurs more frequently with
eating related sounds than e.g. with sounds from typing. Because of the low number of targeted typing sounds comparison between the two could not be made.

Although this is the first large treatment study, there have been positive reports for effective misophonia treatment in audiology literature. In this treatment techniques were derived from tinnitus retraining therapy (TRT), a therapy for tinnitus and hyperacusis, which frequently co-occur with misophonia. The principal difference with our protocol is that in TRT relaxation exercises and attention training, to decrease hyper focus, are absent. Moreover, in TRT sounds are applied to mask the trigger sound, which could further increase the hyper focus. Interpretation of these positive reports is equivocal because of an absence of thorough assessment of mental status, symptom severity and improvement. Hence, it cannot be excluded that these individuals suffered from subclinical symptoms or that improvement was minimal.

Even though the treatment response in our study is comparable to psychotherapies for the most common psychiatric disorders, why did one half of our participants not improve? There are various possible explanations for this. Firstly, the number of treatment sessions was too small for an amelioration to occur: Misophonia is a chronic condition, which might require longer and more frequent treatment. There is growing evidence that psychotherapy session frequency influences treatment effect in various disorders. Thus, more frequent therapy could potentially improve our response rate. Secondly, there is a great diversity of misophonia triggers in patients. Possibly, because of the relatively small sample size, predictor analysis did not reveal any specific sounds as predictive of treatment response. Furthermore, in our analysis we did not assess the number of triggering sounds per participant. Hence, it cannot be excluded that the type or amount of misophonic triggers played a negative role in treatment response. Lastly, we did not assess personality features. Research indicates that obsessive-compulsive and borderline personality disorders are associated with poorer treatment outcomes. Therefore, we do not know to what extent these personality characteristics were correlated with treatment response in our sample.

There are several limitations to our study. A first limitation is the use of the A-MISO-S as an outcome measure. The A-MISO-S is still a concept scale and has not been validated yet. Nevertheless, at the moment we consider this a scale with sufficient face validity and the most useful scale for misophonia symptoms available. Furthermore, in our study we did not use self-report measures. Possibly, a self-report measure might blunt a positive treatment effect. Even so, a more stringent cut-off than the 30 percent A-MISO-S reduction might yield lower response rates. Nevertheless, because
the A-MISO-S is scored by interviewing the patient we do not expect that a different assessment of treatment effect would have changed the response rates significantly. A second limitation is that we didn’t have an independent evaluator to assess symptom severity. This could have biased scoring. A third limitation is our study design, which was an open-label study with a waiting list control condition. A randomized controlled trial (RCT) is needed for more definite conclusions on efficacy. A fourth limitation is that our study design lacked a follow-up assessment point, so we cannot make any statements on long-term treatment benefits. A fifth limitation is the absence of a measure of functioning. Such measure could support psychiatric assessment and treatment evaluation. A final limitation is the use of qualitative feedback forms. Hence, any conclusions are still conjecture.

This study has several strengths. Firstly, this is the largest sample of misophonia subjects in a treatment study ever. Secondly, the amount of missing data was limited. Thirdly, to more accurately assess symptom change we employed two different scales, the CGI-I and the A-MISO-S. Finally, based on the constructed misophonia model we applied a combination of therapeutic techniques to target different aspects of misophonia symptoms, to increase possible treatment effect and future applicability in a large misophonia population.

5. Conclusion
Our study demonstrated that misophonia can be treated with CBT. Task concentration exercises, counterconditioning, stimulus manipulation, and relaxation exercises decreased misophonia symptoms in one half of the patients. The results of our study are particularly encouraging because many of the patients at our hospital had suffered from misophonia for many years and had not responded to various treatments they had previously received.

Since our primary aim was to investigate if CBT was effective, we did not employ a randomized controlled design. The results should therefore be interpreted with caution. A subsequent RCT could further confirm our findings. Preferably, such a study could differentiate which specific therapeutic interventions would be effective. A follow-up study would also be needed to evaluate lasting treatment effects.
References


An effective technique for changing conditioned preferences. Exp Psychol, 58, 31-38


Chapter 5 / Cognitive behavioral therapy


45. Clarke SB, Rizvi SL, & Resick PA (2008). Borderline Personality Characteristics and
Treatment Outcome in Cognitive-Behavioral Treatments for PTSD in Female Rape Victims. *Behav Ther* 39, 72–78.
