PERGAMON

Behaviour Research and Therapy 38 (2000) 1163–1181

BEHAVIOUR RESEARCH AND THERAPY

www.elsevier.com/locate/brat

Effects of distraction and guided threat reappraisal on fear reduction during exposure-based treatments for specific fears

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Abstract

To test predictions derived from the emotional processing theory of fear reduction, claustrophobics ($N = 58$) were randomized to one of four exposure conditions: (a) exposure with guided threat reappraisal, (b) exposure with a cognitive load distracter task, (c) exposure with both guided threat reappraisal and cognitive load distracter task and (d) exposure *without* guided threat reappraisal or cognitive load distracter task. We hypothesized that self-guided in vivo exposure would lead to less fear reduction if performed simultaneously with a cognitive load distracter task that severely taxes information processing resources. In contrast, we hypothesized that focusing on core threats during exposure would enhance fear reduction. The main findings were largely consistent with predictions. The cognitive load task (regardless of focus of available attention) had a detrimental effect on fear reduction, while guided threat reappraisal (regardless of cognitive load) had a facilitative effect. The greatest level of fear reduction and the lowest level of return of fear were observed in the exposure condition involving guided threat reappraisal without cognitive load. Clinical implications and directions for future research are discussed.

The experimental search for effective fear reduction techniques dates back to Watson and Rayner's (1920) paper on Little Albert and Mary Cover Jones' writings (1924) on fear extinction in children. Evidence accumulated over several decades and numerous domains of situationally bound fear has demonstrated the potency of exposure-based

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0005-7967/00/$ - see front matter
PII: S0005-7967(99)00147-3

methods in the treatment of phobic disorders (Barlow, 1988; Marks, 1978; Rachman & Wilson, 1980). Nevertheless, considerable debate still exists regarding the mechanisms governing the reduction of pathological fear. Rachman (1980) proposed a theoretical account of fear reduction based on emotional processing. He defined emotional processing as the decline of emotional disturbance to the extent that other experiences and behaviors proceed without disruption and as a process that was dependent upon direct experiencing of the emotional disturbance. Signs of incomplete processing include return of fear and disturbing dreams.

Based on Rachman's emotional processing theory and Lang's bioinformational theory of fear (Lang, Melamed & Hart, 1970), Foa and Kozak (1986) outlined an emotional processing account of fear reduction that proposed two necessary conditions for emotional processing. First, the fear structure must be activated. The fear structure is construed as a set of propositions about the stimulus, the response (including the physical, behavioral and cognitive response systems) and interpretive information about the meaning of the stimulus and the response. Activation of the fear structure is believed to occur by providing information that matches a part of the network, as would an accelerated heart-rate match the response proposition of fear. Through generalization of activation, the other sections of the network become activated, particularly in the cohesive networks representative of specific phobias.

According to Foa and Kozak (1986), a second necessary condition for emotional processing to occur is that information incompatible with elements of the fear structure must be made available and cognitively processed. Incompatible information is believed to emerge as a result of the experience of short-term, within-session physiological habituation. That is, reduction of arousal results in a disassociation between the stimulus and response propositions. As a result of repeated exposures, the perception of harm from the stimulus is lowered, as is the negative valence associated with the stimulus. These cognitive changes accruing from repeated disconfirmatory experience result in less drive for preparatory arousal, in turn resulting in between-session habituation.

Accordingly, factors which inhibit initial fear activation, or which interfere with physiological habituation and cognitive change, should retard fear reduction. The factors identified by Foa and Kozak resemble the features suggested by Rachman (1980) as potentially interfering with complete emotional processing. These include personality factors and stimulus factors that could impede emotional processing, with the latter category including concentration on a separate task and excessively brief presentations of the stimulus. To date, systematic investigations of these factors have been few and have focused primarily on the role of distraction.

Several investigators have suggested that distraction may inhibit fear-reduction. Borkovec and Grayson (1980) first noted the importance of "functional exposure" for effective extinction of the fear response: "Objective presentation of stimuli does not guarantee functional exposure to those stimuli... events which interfere with or facilitate the participants' awareness and/or processing of that information (the feared stimuli) will critically influence the effect of those procedures on a targeted emotional behavior". Rachman (1980) identified distraction as an inhibitor of complete emotional processing and Foa and Kozak (1986) asserted that distraction interferes with the activation of fear by disrupting the match between aspects of the stimulus

setting and the fear structure. Moreover, distraction may also serve to block the adequate processing of corrective disconfirmatory information thus preventing the modification of the fear structure.

Findings from investigations comparing the efficacy of distracted versus "focused" exposure to phobic stimuli have been inconclusive with some studies showing inhibitory effects of distraction on fear reduction (Grayson, Foa & Steketee, 1982) and others showing either short-term facilitative effects (Grayson, Foa & Steketee, 1986) or negligible short-term effects (Craske, Street & Barlow, 1989). In the only study to examine the effects of forced distraction on long-term fear reduction, Craske et al. (1989) found that distracted exposure led to significantly less fear reduction at a 6-month follow-up compared to a focused exposure condition.

The inconsistent findings are not surprising given the between-study differences in experimental design, procedures and participants (for an excellent review, see Rodriguez and Craske (1993)). Moreover, methodological shortcomings of the studies to date introduce interpretive ambiguity. These include: (a) failure to employ distraction tasks that sufficiently tax cognitive resources, (b) failure to assess the extent to which subjects' were actively engaged in the distraction task and (c) failure to assess the maintenance and generalization of fear reduction.

The present experiment sought to examine the independent and joint effects of distraction and threat focus with disconfirmation on fear reduction during exposure. To insure that our distracter task sufficiently taxed participants' information processing capacity, we employed a dual task cognitive load intended to keep the "central executive" (Baddeley, 1982) sufficiently busy so as to markedly reduce the opportunity for inferential processing. To assess adherence, attention to the distracter task was monitored by calculating participants' "hits" and "misses" in detecting critical number strings and (basic) additions[1].

The design of our focus condition was strongly influenced by emotional processing theory. Specifically, the aim was to develop a procedure that would enhance threat disconfirmation thereby leading to greater modification of the fear structure. Previous efforts to examine the effects of threat focus have directed subjects to attend to properties of the fear stimulus and fear response. To our knowledge, no study has attempted to match subjects' attentional focus to their "core threat". We attempted to accomplish this by employing a guided threat reappraisal procedure that consisted of: (a) identification of the participants' core threat

[1] A modified computer-administered Stroop task was introduced to simulate basic processing that participants might engage in while in the enclosed space: the rationale is that the interference on the Stroop task would translate to interference in anxiety-related processing efforts. 12 Participants were pretested and their responses to the computer task slowed down from an average response time of about 500–1250 ms. Distracted and nondistracted participants share a reaction- and motor time component (estimated between 300 and 400 ms, based on random response times) for the Stroop task, which suggests that the average effect size of 750 ms reflects differences in speed of decision-making. This is a sizeable and significant difference. There was some evidence that participants learned to combine the tasks better over time, although significant interference remained. Most distracted participants reported that the tasks were quite challenging to perform simultaneously. In fact, one participant did not complete the procedures, as it proved too demanding for her. In sum, the results indicated significant impairment in participants' abilities to make simple inferential decisions and suggested that the distraction task was an effective operationalization of a heavy cognitive load task.

associated with entering the phobic situation (e.g. "I will run out of air"), (b) instructing participants to focus all available attention on their core threat during each exposure trial and (c) instructing participants to actively test the accuracy of their core threat during exposure, thus promoting critical threat reappraisal.

Participants were randomly assigned to one of four exposure conditions. One group of participants received exposure while actively engaged in a demanding cognitive load distracter task. A second group received the same amount of exposure with emphasis on focusing their attention on the perceived threat and its disconfirmation. A third group received threat disconfirmation instructions in combination with the demanding cognitive load distracter task. Finally, a fourth group received exposure without either the cognitive load distracter task or threat disconfirmation (exposure only control). To test for generalization, we assessed participants' fear reduction to a nontreated claustrophobic test chamber. Maintenance of fear reduction and return of fear were assessed after a brief 2-week follow-up interval. Finally, process analyses of initial fear elicitation, within-trial habituation and between-trial habituation were conducted.

Based on predictions from emotional processing theory, we hypothesized that: (a) participants who received guided threat reappraisal during exposure would display greater fear reduction and less return of fear due to enhanced threat disconfirmation; (b) participants given exposure while actively engaged in a demanding cognitive load distracter task would display less fear reduction and greater return of fear due to their limited capacity to cognitively process disconfirming information; (c) the facilitative effects of guided threat appraisal on fear reduction would depend on the participants' available information processing capacity. Hence, we predicted that guided threat reappraisal would enhance fear reduction to a significantly greater extent when participants were *not* engaged in the cognitive load distracter task; (d) with regard to the process of fear reduction, we predicted that the four exposure conditions would differ on indices of between-trial habituation but not on indices of within-trial habituation. This hypothesis was based on the assumption that between-trial habituation is largely governed by "controlled" cognitive processing whereas within-trial habituation is largely governed by automatic physiological habituation processes.

1. Method

1.1. Participants

Participants ($N = 58$) were recruited from a large pool of over 3000 University of Texas introductory psychology students who underwent a stringent two-stage screening procedure. The final sample was predominantly female (86.2%), white (94%) and ranged in age from 17 to 22 years of age ($M = 18.6$, S.D. $= 0.84$). Students received partial course credit for their participation.

1.2. Experimental design

A $2 \times 2 \times 3$ mixed model factorial design was employed. Guided threat reappraisal (yes or

no) and cognitive load distraction task (yes or no) served as the two between-group factors and assessment occasion (pre, post and 2-week follow-up) served as the within-group factor. Participants were randomly assigned to one of four experimental conditions: (a) exposure with guided threat reappraisal (GTR), (b) exposure with cognitive load distraction task (CLDT), (c) combined (GTR + CLDT) and (d) exposure only control (CTRL). Tripartite outcome assessments consisting of self-report, behavioral and psychophysiological indices were completed at pre, post and 2-week follow-up. Process measures consisting of subjective fear, coping self-efficacy and anticipated threat were collected during each 5-min treatment trial.

1.3. Procedure

The experimental protocol involved participant selection procedures, a pretreatment assessment, 30 min of self-guided in vivo exposure and a posttreatment and 2-week follow-up assessment.

1.3.1. Screening

Participant screening was conducted in two stages. First, 3010 introductory psychology students were administered a 16-item screening questionnaire that asked students to rate their subjective fear associated with enclosed spaces on a five-point Likert scale (0 = no fear, 1 = mild fear, 2 = moderate fear, 3 = severe fear and 4 = extreme fear). In addition, participants rated on the same 0–4 scale their anticipated anxiety to enter and remain for 2 min in a small dark narrow chamber with the door closed. Those ($N = 200$) who reported a 2 (moderate fear) or higher on both of the above items were contacted by phone and invited to take part in the second stage of screening.

During the second stage of screening, potential participants were administered two consecutive behavioral approach tests (see below). Those who reported a subjective fear rating of 50 (moderate fear) or higher on two consecutive BATs were deemed sufficiently phobic and were invited to participate in the experiment. Those who reported a subjective fear rating less than 50 on either of the two screening BATs were given experimental credit and debriefed. Of the 131 who completed this second stage of screening, 73 participants satisfied criteria for eligibility, of which 13 declined participation and two were not available for further contact.

1.3.2. Behavior approach tests (BATs)

Two separate BATs were administered at each of the three major outcome assessments (pre, post and follow-up). The major aim of the BATs was to assess participants' subjective, behavioral and psychophysiological reactions while exposed to two different enclosed test sites — a long narrow corridor (BAT 1) and a filing cabinet (BAT 2).

1.3.2.1. BAT 1. Participants were instructed to enter a long, dark, observation corridor measuring 11.40 m (length), 0.57 m (width) and 2.29 m (height). At one end of the corridor was an unlocked closed door. At the other end was a brick wall illuminated by a small flashlight. A 5 × 7.5 cm rectangle painted with a "glow-in-the-dark" paint was placed on the exit door next to the handle to assist the subject in exiting the chamber.

Prior to BAT 1, participants completed a prediction survey that included expected anxiety,

suffocation and entrapment concerns and ratings of coping self-efficacy. A same-sex undergraduate research assistant then fit the participant with a heart-rate monitor. The ambulatory heart-rate monitor (UNIQ heartwatch model 8799, Computer Instruments Corp.) consists of an electrode belt worn around the chest. This monitor transmits heart-rate signals to a wrist receiver that depicts and stores the participant's heart-rate data. The unit also has a built-in event marker to record when participants entered and exited the BAT chamber.

To start BAT 1, the door of the chamber was partially opened (approximately 30°) and the participant was instructed to look inside for 5 s. The participant was then told that they would be asked to enter the chamber and walk to the end of the narrow corridor and remain there. They were informed that the door would remain unlocked and they would be free to leave the chamber at any time, however they were encouraged to remain in the chamber for as long as possible.

Instructions outlining specific exit procedures were provided. Participants were told that once they left the designated location within the chamber, they were to continue without stopping to the exit door and leave, even if upon approaching the exit door their discomfort/anxiety was reduced to a manageable level. Moreover, participants were reminded that the experimenter would open the door to signal the end of the trial. However, specific information on the duration of the exposure trial was not provided.

The participant was then instructed to enter the chamber and to walk to the end without stopping or looking back. As the participant walked into the chamber, the experimenter pressed the marker button on the heart-rate unit to record the beginning of the trial. Upon reaching the end of the corridor, the participant was instructed to remain standing there for as long as possible and was reminded that the exit door was unlocked.

If the participant remained in the chamber for the full 2 min, the experimenter opened the door and instructed the participant to exit. When the participant exited the chamber, the experimenter depressed the marker button on the heart-rate monitor and recorded the time of exposure (in s). Immediately upon exiting, the participant rated their peak subjective fear during the trial.

1.3.2.2. BAT 2. The procedure for BAT 2 was similar to that for BAT 1. Participants were first instructed to look inside a filing cabinet measuring $0.91 \times 0.43 \times 1.98$ m for 5 s, after which they completed a prediction questionnaire similar to that used for BAT 1. Next, participants were instructed to squeeze inside the cabinet and remain standing inside with the door closed. Heart-rate and length of time in the cabinet were again monitored. The maximum duration of BAT 2 was 2 min, although participants were not informed of this. If the participant remained in the cabinet for the full 2 min, the experimenter opened the door and instructed the participant to exit. Upon exiting, the participant completed a postexposure questionnaire similar to that for BAT 1. Recovery HR data were collected for 5 min while the participant sat in an adjacent room facing a public hallway with the door open.

1.4. Treatment procedures common to all conditions

Participants were given treatment instructions specific to their assigned condition (see below). Following these instructions, participants completed a prediction questionnaire in which they

rated their expected fear, perceived danger and coping self-efficacy for the upcoming treatment trial. Upon completing the questionnaire, participants were asked to enter the chamber (same chamber used in BAT 1) and to walk to the end of the corridor without stopping or looking back. Participants were instructed to remain there for as long as possible. They were reminded that the exit door would remain unlocked and that the experimenter would open the door to signal the end of the trial. No specific information was given as to the duration of the trial. If a participant remained in the chamber for the full 5 min, the experimenter opened the door and instructed the participant to exit. Immediately upon exiting, participants completed a postexposure questionnaire in which they rated their peak fear during the trial as well as their fear at the beginning and end of the trial. These procedures were repeated until the participant had accumulated 30 min of exposure. (Note: for almost all participants this procedure resulted in six trials of 5 min).

1.4.1. Experimental conditions

1.4.1.1. Exposure with guided threat reappraisal (GTR). Participants were instructed to attend to any available information pertinent to their identified core threat. More specifically, participants assigned to this condition were instructed to identify at least one perceived threat associated with entering and remaining in the chamber for 5 min. Responses on the Claustrophobic Concerns Questionnaire (see below) were used to assist participants in identifying their most salient perceived threats. Prior to entering the chamber, participants were informed that fear responses are fueled by specific beliefs of danger or threat connected to the feared situation. Furthermore, participants were informed that focusing on the specific threat(s) and on the available evidence pertaining to them is an effective method for eliminating unrealistic fears. Participants were told that once inside the chamber they were to focus all their attention on their particular threat and test the extent to which the threat occurred. Participants were reminded to focus not only on the occurrence or nonoccurrence of the threat, but also on any relevant information pertaining to the threat including safety information (e.g. ''I know I am not trapped because the door is unlocked''). Upon exiting the chamber the experimenter queried the participant as to whether they were able to maintain focus on the threat and the relevant information to test the validity of the threat.

1.4.1.2. Exposure with cognitive load distraction task (CLDT). Participants in this condition were instructed to engage in a demanding dual process cognitive load distraction task during each of the six 5-min exposure trials. Participants were informed that while in the chamber they would be performing a distraction task involving listening to and responding to strings of numbers presented through headphones. They were told that there would be required to perform two separate tasks while attending to the numbers. First, they were to depress a button each time three consecutive even or odd numbers occurred. They were also informed that while attending to the numbers they would sometimes here a distinct clicking noise, whereby they were to add the sum of the last two numbers before the click and state the answer aloud into the tape recorder. A 90-s practice trial was conducted to ensure understanding of the task instructions. This task required participants to continually attend to incoming information while keeping constantly changing information in their short-term memory (i.e. strings of num-

bers) to make basic inferential decisions (i.e. make additions, decide on odd vs. even). The dual nature of the task was designed to keep the "central executive", as described by Baddeley (1982), busy to a degree that insufficient processing resources would be available for additional consciously controlled processing.

Three hundred and twenty randomly selected numbers were digitally recorded at 750 ms each (using Soundlab software) and separated by 500 ms pauses; this 6-min string of digits was repeatedly recorded on to an audiotape, to total 36 min of numbers. Each 5-min trial consisted of 240 numbers and 49 cues, 35 critical strings and 14 additions. The efficacy of this task in taxing cognitive resources was pretested on a sample of normal college students[1].

1.4.1.3. Exposure with GTR+CLDT. This group was asked to perform the task as described for the CLDT condition and to devote their remaining attention to the instructions as outlined for the GTR condition. It was emphasized to the participants that their primary focus had to be the distraction task.

1.4.1.4. Exposure only control (CTRL). Participants received no instructions regarding focus of attention during the exposure trials. They were instructed to enter the treatment chamber (BAT 1) and to remain there until the end of the trial or until they became too uncomfortable to remain in the chamber.

1.5. Assessments

Throughout treatment, participants were required to rate their predictions and actual performance in terms of fear, panic, approach behavior, perceived threats and self-efficacy. In addition, participants were assessed before and after treatment and after a 1–2 week follow-up period. Moreover, to test for generalization, BATs were conducted in both the treatment chamber and in the filing cabinet (BAT 2). During the treatment phase, most self-report measures were administered on an Apple Macintosh computer.

1.5.1. Outcome indices

1.5.1.1. Subjective fear indices. Immediately following each BAT, participants were asked to rate their maximum, beginning and end level of fear while in the chamber.

1.5.1.2. High end-state functioning (HEF). Participants were classified as attaining HEF at the posttreatment and follow-up assessments if they were able to remain in the test chamber for the full 2 min with a peak fear level less than 50. (Note: failure to meet this criterion established participants' eligibility for the study.)

1.5.1.3. Return of fear (ROF). To assess maintenance of fear reduction, a categorical index of return of fear (ROF) was constructed. A participant was classified as showing ROF if they met criteria for HEF at posttreatment but not at follow-up.

1.5.1.4. Heart-rate reactivity. An ambulatory heart-rate monitor (UNIQ heartwatch model 8799, Computer Instruments Corp.) monitored participants' heart-rate continuously. The unit consists of an electrode belt worn around the chest which transmits heart-rate signals to a wrist receiver, where the data are stored during each exposure trial. HR was sampled every 15 s and averaged to obtain a single overall index for the trial. HR reactivity was defined as the residualized HR after partialling out resting HR.

1.5.2. Process indices

Treatment process data were collected throughout the 30-min treatment phase. Three process indices were constructed from these data: (a) fear activation — defined as the peak subjective fear during the first treatment trial, (b) within-trial habituation — defined as peak fear minus ending fear for each exposure trial and (c) between-trial habituation — defined as the decrement in initial fear response across the six exposure trials.

1.5.2.1. Claustrophobic Concerns Questionnaire (CCQ). The CCQ (Valentiner & Telch, 1996) is an empirically-derived two-factor scale assessing danger expectancies associated with claustrophobia. Items (e.g. "I might be trapped, I might run out of air") are rated on a Likert scale ranging from 0 (no concern) to 100 (extreme concern). Each of the two subscales (entrapment and suffocation) has shown high internal consistency and test–retest reliability (Valentiner & Telch; 1994).

1.6. Statistical analyses

To confirm treatment group equivalence, between-groups ANOVAs were conducted on fear-related measures at baseline. The main effects and interaction of guided threat reappraisal and the cognitive load distraction task on fear reduction indices were tested using 2×2 MANCOVAs. Beginning, peak and end subjective fear ratings during the outcome exposure trials served as the dependent variables and the corresponding baseline levels were used as covariates. Significant effects were followed up with univariate tests. Where indicated, significant interactions were followed up with simple main effects analyses. Exploratory post hoc multiple comparisons were conducted to further assess the pattern of group differences. A similar strategy was used for the categorical χ^2 analyses for HEF and ROF. Categorical χ^2 analyses were conducted to test for group differences in high end-state (HEF) functioning and return of fear (ROF).

1.6.1. Analyses of treatment process

Individual growth (decline) curve modeling was used to test group differences on fear activation, within-trial habituation and between-trial habituation. Individual growth modeling is a two-step procedure (Francis, Fletcher, Stuebing, Davidson & Thompson, 1991; Willett, Ayoub & Robinson, 1991). First, a (linear) regression decay (note: fear reduction) equation was calculated for each participant using subjective fear as the dependent variable and exposure trial as the independent variable. These analyses generated two curve parameters for each participant: (a) the intercept, equivalent to the initial fear level and (b) the slope, equivalent to an index of the fear change per trial. The second step of the decline modeling

approach uses the within-subject parameters as dependent variables in traditional between-subjects analyses. To test for group differences in fear activation, initial fear levels (i.e. intercept estimates) were entered as the dependent variable of an ANOVA, using the same comparison strategy as outlined for the treatment outcome analyses. Similarly, to test for group differences in between-trial habituation, fear change parameters (i.e. slope estimates) were entered as the dependent variable of an ANOVA. The same general procedure was used to test for between-group differences in within-trial habituation.

2. Results

2.1. Treatment group equivalence

There were no significant differences between the treatment groups on pretreatment fear-related indices. These findings indicate that the four exposure conditions were equivalent at baseline.

2.2. Manipulation check

Participants rated their degree of attentional focus using a 0 (not at all) to 100 (completely) Likert scale. A composite index was obtained by averaging across the six treatment trials. The resulting indices of attentional focus were: (a) GTR ($M = 90.8$, S.D. $= 7.4$), (b) CLDT ($M = 81.2$, S.D. $= 12.5$), (c) GTR + CLDT (for distraction task: $M = 84.4$, S.D. $= 8.6$), (for threat focus: $M = 21.3$, S.D. $= 16.0$), (d) CTRL (self-guided distraction: $M = 74.2$, S.D. $= 26.8$; self-guided threat focus: $M = 37.5$, S.D. $= 27.7$). In addition, error percentages for the distraction task were calculated for the CLDT and GTR + CLDT conditions. CLDT participants missed 15.7% of all presented cues and participants in the GTR + CLDT condition missed 9%.

2.3. Treatment outcome

2.3.1. Within-group changes from pre to posttreatment

Highly significant reductions in subjective fear from pre- to posttreatment were observed for each of the four exposure conditions across BAT 1 and BAT 2 (all p's < 0.001). None of the four groups showed significant reductions in HR reactivity from pre to posttreatment.

2.3.2. Effects of treatment condition on fear reduction

Means and standard deviations of subjective fear indices and heart-rate reactivity at pre, post and follow-up for the four treatment conditions are presented in Table 1. Fig. 1 illustrates the pre, post and follow-up levels of subjective peak fear across the treatment conditions for BAT 1.

Results of the MANCOVA revealed significantly greater fear reduction among those receiving guided threat reappraisal relative to those who did not ($F(3, 48) = 5.13$, $p < 0.01$). Conversely, those receiving the cognitive load distraction task showed significantly less fear

reduction than those who did not ($F(3, 48) = 6.08$, $p < 0.01$). The interaction effect was close to significant and follow-up simple main effects showed that GTR resulted in less post fear than CTRL and GTR + CLDT ($p < 0.01$) and CLDT resulting in more post fear than CTRL and GTR + CLDT ($p < 0.10$). None of the planned comparisons were significant for the effects on heart-rate reactivity. Fig. 2 depicts the number of participants attaining high end-state functioning in the BAT 1 chamber for each treatment condition at posttreatment and follow-up.

2.3.3. Generalization of fear reduction

For the generalization probe (BAT 2), the pattern of mean fear responses was consistent with expectation, with GTR obtaining most — and CLDT obtaining the least fear reduction on all subjective fear indices. However, none of the between-condition differences in BAT 2 were statistically significant (see Table 1 and Fig. 1). Comparisons of HEF across the four treatment groups revealed a similar pattern of scores as observed for the BAT 1 chamber. However, these differences were not significant (see Fig. 2).

2.3.4. Maintenance of fear reduction and return of fear (ROF) within treatment effects

From pre to follow-up, all four conditions displayed significant reductions in peak fear on

Table 1
Means and standard deviations of maximum fear and heart-rate reactivity during two behavioral approach tests at pre, post and follow-up[a]

Measure	Exposure condition							
	GTR		CLDT		GTR + CLDT		CTRL	
	M	SD	M	SD	M	SD	M	SD
BAT 1 max fear								
Pre	71.3	16.0	72.1	15.8	70.0	14.6	75.7	12.8
Post	1.3	3.52	25.7	18.3	15.3	18.1	15.0	22.5
Follow-up	16.15	17.1	35.4	21.5	35.0	29.6	28.6	31.1
BAT 2 max fear								
Pre	64.7	23.6	75.7	19.9	70.7	16.9	69.3	13.9
Post	25.3	25.6	37.1	26.7	38.0	31.7	28.6	28.8
Follow-up	24.6	20.3	45.4	22.2	38.6	28.8	30.0	30.4
BAT 1 HR reactivity								
Pre	1.0	7.5	−0.6	7.9	−0.6	11.8	0.1	10.0
Post	−2.1	8.7	3.3	9.3	−2.3	9.6	1.0	12.3
Follow-up	1.3	11.7	3.3	8.7	−4.7	11.5	.4	13.5
BAT 2 HR reactivity								
Pre	1.5	5.4	−0.1	6.1	1.6	6.7	−3.0	6.7
Post	−1.4	9.0	4.7	8.7	−2.0	9.6	−1.0	15.0
Follow-up	2.2	13.2	3.4	9.6	−4.6	10.1	−0.6	15.5

[a] GTR: guided threat reappraisal; CLDT: cognitive load distraction task; GTR + CLDT: guided threat reappraisal plus cognitive load distraction task; CTRL: exposure control.

both BAT 1 (all p's < 0.001) and BAT 2 (al p's < 0.01). All four groups showed some return of fear from posttreatment to follow-up for BAT 1, which was significant for the CTRL ($t = -2.79$, $p < 0.01$), GTR ($t = -3.33$, $p < 0.01$) and GTR + CLDT ($t = -2.64$, $p < 0.05$) groups. None of the four groups showed significant return of fear for BAT 2.

2.3.5. Effects of treatment condition on fear reduction at follow-up

As can be seen from Table 1 and Fig. 1, the pattern of mean fear responses was consistent with expectation. On peak fear, participants receiving distraction (i.e. CLDT and GTR + CLDT) scored higher than those not receiving distraction ($F(1, 48) = 3.51$; $p < 0.10$). There were no significant treatment effects for HR reactivity. For BAT 2, the interaction effect

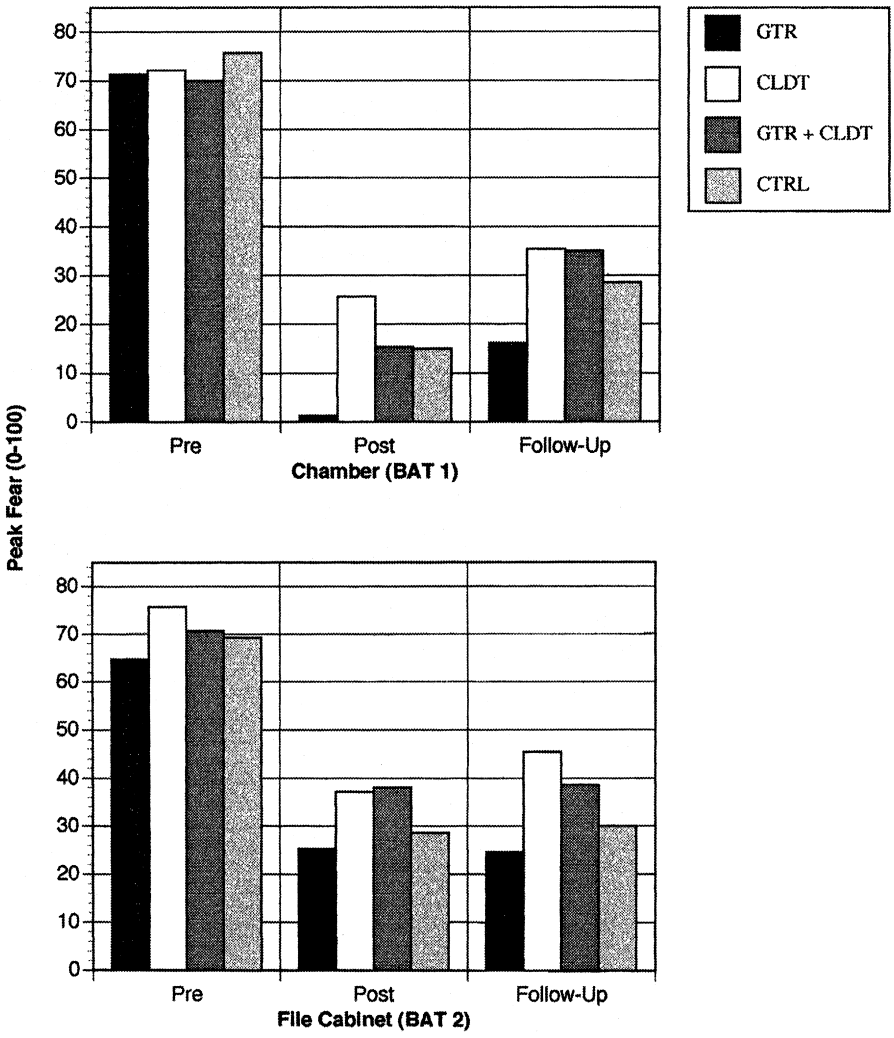

Fig. 1. Peak fear at pre, post and follow-up assessments during two behavioral approach tests across the four exposure conditions.

was significant, with CLDT showing more fear than either CTRL ($F(3, 44) = 4.11$; $p < 0.05$) or GTR + CLDT ($F(3, 44) = 4.45$; $p < 0.01$).

The percentage of participants displaying ROF by condition is presented in Fig. 3. There was a nonsignificant trend (χ^2 (1) = 2.02, $p < 0.10$; one-tailed) for those in the two cognitive load groups to show higher ROF. In contrast, those in the GTR group (without CLDT) had lower ROF than the three other groups combined (χ^2 (1) = 2.88, $p < 0.05$; one-tailed).

2.4. Treatment process

Means and standard deviations of subjective fear indices at each of the six treatment trials for four groups are presented in Table 2.

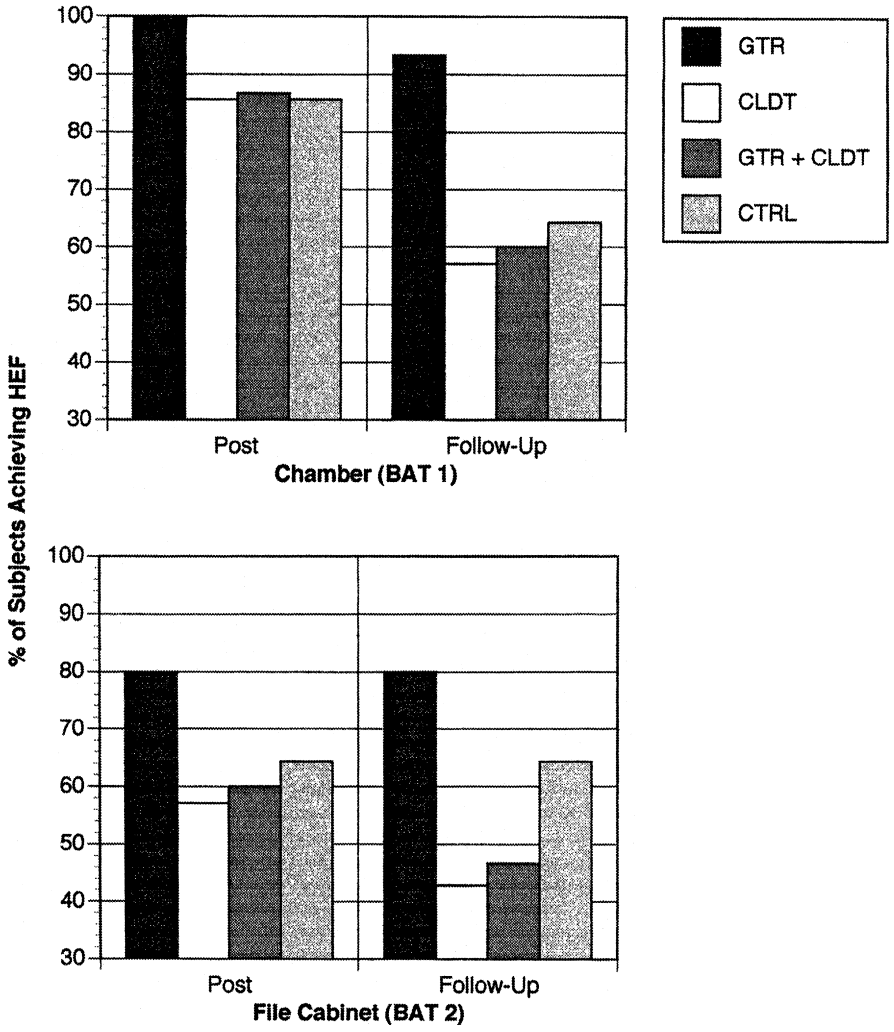

Fig. 2. High end-state functioning (HEF) for two behavioral approach tests across the four exposure conditions.

2.4.1. Within-trial habituation

The three groups showed equivalent levels of within-trial fear reduction across the six 5 min treatment trials.

2.4.2. Fear activation

A significant main effect of cognitive load was observed on initial fear activation ($F(1, 55) = 4.04$, $p < 0.05$). Participants receiving the CLDT task either alone or in combination with GTR displayed lower initial fear activation during the first 5-min of treatment relative to those who did not receive CLDT. However, the main effects of CLDT on fear activation were qualified by a significant CLDT by GTR interaction. Multiple comparisons revealed that the CLDT group showed significantly lower initial fear than both the CTRL ($F(1, 55) = 7.24$, $p < 0.01$) or GTR + CLDT ($F(1, 55) = 5.74$, $p < 0.05$) groups. However, arguing against a fear activation effect, were the positive (albeit insignificant) correlations obtained between initial fear level and posttreatment fear.

2.4.3. Between-trial habituation

Fig. 4 presents the fear decay slopes for each of the four conditions. The GTR and CLDT + GTR conditions showed greater between-trial fear change than the CLDT and CTRL conditions ($F(1, 55) = 9.8$, $p < 0.01$; one-tailed). The interaction effect was not significant, but follow-up simple main effects showed higher between-trial habitation for GTR as compared to CTRL ($F(1, 55) = 7.21$, $p < 0.01$) and, in turn, higher between-trial fear reduction for GTR + CLDT than for CLDT alone ($F(1, 55) = 2.98$, $p < 0.05$). In addition, a post hoc comparison revealed that the GTR condition led to significantly faster between-trial fear reduction than the CLDT group ($F(1, 55) = 9.61$, $p < 0.01$).

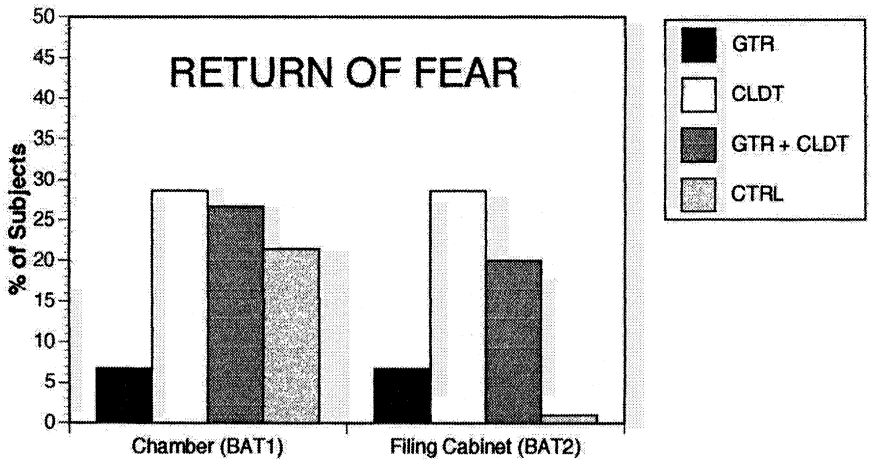

Fig. 3. Return of fear (ROF) for two behavioral approach tests across the four exposure conditions.

Table 2
Means, standard deviations and growth curve parameters of maximum fear, starting fear and fear change parameters for the four exposure conditions during treatment

Exposure condition	Exposure trials						Fear change parameters	
	1 (*M* (S.D.))	2 (*M* (S.D.))	3 (*M* (S.D.))	4 (*M* (S.D.))	5 (*M* (S.D.))	6 (*M* (S.D.))	Initial estimate	Change estimate
Max fear								
GTR	54.3 (21.6)	46.0 (25.9)	25.3 (20.0)	13.0 (11.9)	6.0 (8.28)	4.29 (6.46)	56.2 (5.7)	−12.0 (1.3)
CLDT	56.7 (17.2)	47.0 (23.1)	34.3 (22.3)	25.3 (20.0)	20.3 (19.6)	14.5 (17.1)	54.6 (5.7)	−9.3 (1.3)
GTR + CLDT	60.4 (21.3)	42.1 (25.8)	27.9 (20.5)	19.3 (16.4)	15.0 (14.5)	10.7 (13.3)	53.7 (5.5)	−9.2 (1.3)
CTRL	60.7 (18.7)	51.4 (22.8)	42.9 (28.1)	32.1 (28.8)	25.0 (27.7)	22.1 (26.4)	59.3 (5.7)	−8.1 (1.3)
Start fear								
GTR	45.3 (20.7)	38.0 (22.1)	23.9 (18.4)	11.7 (11.0)	5.3 (8.3)	3.6 (6.3)	47.0 (4.7)	−9.9 (1.0)
CLDT	32.7 (11.6)	28.0 (20.7)	23.0 (22.3)	14.0 (14.0)	10.9 (14.6)	9.9 (14.6)	30.7 (4.7)	−5.3 (1.0)
GTR + CLDT	50.4 (18.5)	37.1 (20.2)	25.7 (19.9)	16.4 (13.9)	11.4 (12.9)	10.0 (13.6)	46.3 (4.5)	−7.8 (1.0)
CTRL	46.8 (23.7)	40.7 (22.7)	32.9 (26.4)	27.1 (26.4)	22.9 (25.3)	20.7 (27.3)	48.9 (4.9)	−5.8 (1.1)
Within trial fear change								
GTR	14.7 (13.0)	11.7 (10.3)	10.3 (12.6)	5.7 (9.8)	1.33 (3.52)	.71 (2.67)	16.1 (2.7)	−3.3 (.7)
CLDT	8.3 (12.5)	6.7 (9.0)	10.0 (13.2)	5.3 (6.1)	3.9 (4.7)	2.9 (4.7)	8.7 (2.7)	−1.0 (.7)
GTR + CLDT	17.7 (16.4)	15.0 (12.9)	8.6 (9.5)	4.3 (6.5)	3.6 (5.0)	1.4 (3.6)	16.9 (2.6)	−3.4 (.6)
CTRL	8.6 (12.9)	10.0 (8.8)	4.3 (6.5)	3.6 (6.3)	2.1 (4.3)	4.3 (8.5)	8.7 (2.7)	−1.3 (.7)

3. Discussion

Findings from the present study provide evidence that fear reduction during exposure to feared situations is influenced by cognitive factors. Although equated for total duration of exposure, the four exposure conditions differed with respect to short-term outcome, return of fear and several indices of treatment process. In general, the pattern of findings was consistent with predictions from emotional processing theory. Consistent with prediction, fear reduction was hampered by having participants engage in a cognitively demanding distraction task.

The deleterious effects of distraction were seen on multiple outcome indices of subjective fear including end-state functioning and several treatment process measures. Participants' subjective ratings of attentional focus as well as objective indices of performance accuracy on the distraction task support the integrity of our distraction manipulation. In contrast, fear reduction was enhanced when participants were encouraged to focus on relevant threats during exposure and examine evidence related to the threats during and between treatment trials.

Our findings showed that a significantly higher proportion of participants in the guided threat reappraisal group achieved clinically meaningful change as defined by no longer meeting entry criteria for the study. Compared to the other three groups, the GTR group retained its superiority on subjective fear indices at follow-up and also had the lowest percentage of participants with return of fear. The other between-group comparisons showed the same pattern of findings as those observed at posttreatment, however, they were no longer statistically significant.

Contrary to expectation, our generalization probe revealed an overall lack of between-group differences. Although all conditions showed transfer of treatment gains to the untreated test chamber, no between-group differences were found for BAT 2. One possible explanation for this finding might be the major difference in the physical dimensions of the BATs and the resulting dissimilarity in triggered concerns. The treatment chamber (BAT 1) was long, dark

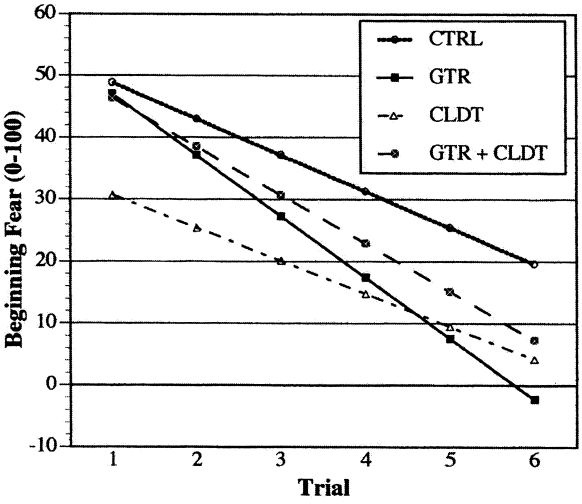

Fig. 4. Between-trial habituation during six 5-min treatment trials across the four exposure conditions.

and narrow and was quite successful in activating participants' entrapment concerns. In contrast, the test chamber for assessing generalization of change (BAT 2) consisted of a standard filing cabinet that provided barely enough room to stand. For BAT 1, the significant distance from the door (escape) elicited entrapment fears, whereas for BAT 2, bodily constriction appeared to be the most salient threatening feature. Consequently, the corrective information derived from exposure to BAT 1 was lacking in relevance to the perceived threats associated with BAT 2.

Our analyses provide some clues as to the theory relevant process changes that occur during treatment. First, similar rates of within-trial habituation were observed across treatment conditions. Emotional processing theory conceptualizes within-trial fear reduction as a distinct process from between-trial fear reduction. While the latter is thought to be an index of modification of memory representations, the former is considered a more or less automatic process (similar to basic habituation) that does not lead to stable change. As expected, our experimental manipulations of threat focus and cognitive load had no differential impact on this process. Foa and Kozak (1986) propose that activation of the fear structure is a necessary condition for emotional processing to occur. Our findings suggest that each of the four exposure conditions were able to activate participants' fears. To test whether greater fear activation during treatment was associated with greater fear reduction (fear activation hypothesis), we examined the relationship between initial subjective fear and treatment outcome. Although participants in the CLDT condition reported significantly lower initial fear levels, higher fear activation during the first 5 min of treatment was associated with a poorer outcome across all groups as indexed by higher levels of posttreatment fear. This finding mirrors those reported in an earlier investigation (Telch, Valentiner, Ilai, Petruzzi & Hehmsoth, 1999). Treatment process analyses examining between-group differences in subjective fear across treatment trials revealed a pattern of findings suggesting superior between-trial fear reduction for participants receiving exposure with guided threat reappraisal without cognitive load. These data suggest that fear reduction may be facilitated when individuals have attentional resources available and allocated to the perceived threat. In contrast, between-trial fear change was significantly lower when participants were confronting the phobic threat under cognitive load. One possibility is that focusing on one's perceived threat during exposure provides evidence disconfirming that the enclosed space poses a threat. To the extent that this disconfirming information is cognitively processed, one would expect greater between-trial habituation. Disrupting the effective processing of this disconfirming information through our cognitive load manipulation had the predicted effects of attenuating between-trial fear reduction.

Several limitations of the present study should be noted. First, our use of a nonclinical sample raises the familiar question: to what extent are these findings generalizeable to a clinical sample? Although stringent screening procedures were used to ensure that our research participants displayed marked phobicity (our sample represents the top 0.5% on indices of claustrophobic fear and avoidance), most are able to avoid enclosed spaces with little or no impairment and hence do not satisfy criterion E of DSM-IV. Although our belief is that mechanisms of fear change cut across arbitrary diagnostic taxonomies, the issue remains an empirical one and awaits replication with a treatment-seeking clinical sample.

Our findings with respect to return of fear are limited greatly by the brief follow-up period. It is quite possible that a longer follow-up would reveal a different pattern of ROF. Nevertheless, the marked differences in ROF over such a brief follow-up period are interesting

in their own right and speak to the potency of the treatment effects on the short-term durability of fear reduction. Clearly, a longer follow-up interval is needed to determine whether the beneficial effects of guided threat reappraisal on return of fear maintain over time.

Several clinical implications of these findings deserve comment. First, our findings are in accord with those from the Oxford group (Salkovskis, Clark, Hackman, Wells & Gelder, in press; Wells et al., 1995) and a recently completed investigation in our laboratory (Sloan & Telch, 1999) suggesting that making safety aids available to patients may actually undermine the efficacy of exposure-based treatments. Although short-term relief may be achieved due to lower fear activation, this short-term relief may be at the expense of disrupting both between-trial habituation and threat disconfirmation. Consequently, clinicians should pay particular attention to the types of safety strategies used by patients during exposure to feared activities and to encourage and assist them in discarding these safety behaviors.

Our findings also point to the potential utility of cognitive strategies to facilitate fear reduction during exposure. Our results are at odds with the view that cognitive strategies add little to the effectiveness of exposure-based treatments (Beidel & Turner, 1986). Rather, our treatment outcome and treatment process analyses suggest that greater fear reduction occurs when patients are encouraged to focus on their perceived threats during exposure and assisted in reevaluating the significance of the threat after each exposure trial. Unlike traditional Beckian cognitive therapy, which requires extensive training and supervision, the guided threat reappraisal strategy can be administered in a reliable and competent fashion by undergraduates with just a few hours of training.

Controlled laboratory-based research is sometimes criticized for its lack of clinical relevance. Its defenders have provided numerous arguments supporting its utility (Bandura, 1978; Borkovec, 1997). However, at a time when greater emphasis is being placed on health service research and treatment effectiveness studies (Seligman, 1995), those of us engaged in laboratory-based clinical research need to pay greater attention to the question, "Do our research findings offer clinicians anything useful that may assist them in working with patents in the real world?" The investigation of theory-driven change mechanisms and their mapping to procedural variations in treatment practice offer a potentially important direction for clinical research.

Acknowledgements

We would like to thank Dr. Larry Jacoby, Dr. Patrick Carroll and Dr. Clarke Burnham for their assistance in the design of the cognitive load distracter task. We also wish to thank Bree Bernat, Shana Tipton, Alelhie Valencia, Bill Nelson, Noe Perez, Heather Billington, Nancy McConnell, Marisa da Silva, Dörte Ahlers and Lora Reynolds for their much appreciated work as research assistants.

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