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Augmenting In Vivo Exposure With Fear Antagonistic Actions: A Preliminary Test

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The current study investigated the efficacy of an exposure augmentation strategy in which the phobic individual is encouraged to enact actions that are in direct opposition to the fear action tendencies associated with acrophobia. Participants (*N*=88) meeting *DSM-IV* criteria for specific phobia (acrophobia) were randomized to (a) exposure with oppositional actions (E+OA), (b) exposure only (EO), (c) a credible placebo consisting of pulsed audio-photic stimulation (APS), or (d) a waitlist control (WLC). Treatment consisted of six, 6-min exposure trials. Participants were assessed with questionnaire, behavioral, and physiologic measures at pre- and posttreatment, and at a 1-month follow-up session. Participants receiving E+OA showed significantly greater improvement on behavioral and questionnaire measures than those in the other 3 conditions at both posttreatment and follow-up. Further, whereas treatment improvement generalized to an untrained context for those receiving E+OA, such was not the case for EO- and APS-treated participants. Findings suggest augmenting exposure with oppositional actions may enhance treatment outcome and thus warrant additional investigation with clinical samples.

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ENCOURAGING PATIENTS to confront their fear-provoking targets is a common procedural element in most empirically supported treatments for anxiety disorders. Although efficacious across all four subtypes of specific phobias (e.g., Hellström & Öst, 1995; Öst, Hellström, & Kaver, 1992; Powers, Smits, & Telch, 2004; Rothbaum et al., 1995;), exposure treatments do not benefit everyone, and of those who do benefit, a significant proportion show a return of fear at follow-up (Rowe & Craske, 1998a; 1998b). This reality has spurred a growing interest in the experimental investigation of exposure augmentation strategies.

Attempts to enhance the outcome of exposure treatments through pharmacological augmentation have been numerous. Contrary to the widely held view that combining exposure treatment with these medications will lead to superior outcome (cf. Telch & Lucas, 1994), combinations of anxiolytics with exposure have not outperformed exposure alone (Otto, Smits, & Reese, 2005), and in some cases, have shown poorer long-term outcome (e.g., Barlow, Gorman, Shear, & Woods, 2000). In contrast, two small-scale studies investigating the augmentation of exposure therapy with the memory-enhancing drug D-cycloserine (DCS) have shown that DCS administered prior to each exposure session significantly enhanced the effects of exposure relative to pill placebo in samples of individuals with acrophobia (Ressler et al., 2004) and social phobia (Hofmann, Pollack, & Otto, 2006). These encouraging data converge with recent animal studies showing that memory-enhancing drugs administered during extinction training lead to superior fear extinction learning (Gonzalez-Lima & Bruchey, 2004; Ledgerwood, Richardson, & Cranney, 2005; Richardson, Ledgerwood, & Cranney, 2004; Walker, Ressler, & Lu, 2002).

Although these findings certainly make an important contribution, a behavioral approach to augmentation may be more viable for patients reluctant to take pharmacological agents. Moreover, a behavioral approach could potentially be delivered by a wider range of mental health professionals, or even taught as a self-directed exposure strategy and thus may be more cost-effective.

Efforts to identify nonpharmacological factors that might enhance the effects of exposure have been the focus of considerable experimental work. A number of procedural parameters have been examined with mixed success. These include dose (Öst et al., 1992), therapist involvement (Hellström & Öst, 1995), context (Mystkowski, Craske, & Echiverri, 2002; Mystkowski, Mineka, Vernon, & Zinbarg, 2003; Rodriguez, Craske, Mineka, & Hladek, 1999), spacing of exposure sessions (Foa, Jameson, Turner, & Payne, 1980; Rowe & Craske, 1998b; Tsao & Craske, 2000), attentional factors during exposure to the feared stimulus (Kamphuis & Telch, 2000; Telch et al., 2004), use of response induction aids (Williams, Dooseman, & Kleinfield, 1984), physiologic feedback during exposure (Telch, Valentiner, Ilai, Petruzzi, & Hehmsoth, 2000), and the use of safety aids (Powers et al., 2004; Sloan & Telch, 2002). Taken together, these studies provide a growing body of evidence suggesting that certain procedural elements may either enhance or disrupt the magnitude or durability of fear reduction during exposure (Telch, 2004).

For the past several years, we have attempted an approach to exposure augmentation in which the patient engages in actions during exposure that are in direct opposition to the action tendencies associated with the emotion of fear. Although approaching the feared target qualifies as an oppositional action tendency, patients often employ other nonoppositional actions while approaching the phobic target that may serve to undermine the therapeutic effects of exposure. These actions vary considerably depending on the nature of the phobic target and may involve (a) attentional strategies (e.g., focusing on the lighted numbers over the door of the elevator as it ascends to a higher floor); (b) motoric strategies (e.g., gripping the railing while looking over the edge of a high lookout); and (c) use of safety aids (e.g., carrying rescue medication or having a support person accompany one into the feared situation). There is mounting evidence that these safety strategies undermine the effects of exposure (Powers et al., 2004; Sloan & Telch, 2002; Telch, 2004) and that eliminating these strategies during exposure leads to a more favorable treatment outcome (Salkovskis, Clark, Hackmann, Wells, & Gelder, 1999; Wells et al., 1995).

Having phobic sufferers engage in responses antagonistic to fear as part of treatment dates back to 1924 when Mary Cover Jones treated phobias in children by feeding them in the presence of the feared object. In several early experiments, Masserman (1943) demonstrated that experimentally induced neuroses in cats could be overcome by feeding them in the cage in which the neurosis was induced. Wolpe (1952) replicated Masserman's findings with cats and developed his theory of reciprocal inhibition in which he stated, "If a response inhibitory to anxiety can be made to occur in the presence of anxiety-evoking stimuli it will weaken the bond between these stimuli and anxiety" (Wolpe & Lazarus, 1966, p. 12). Wolpe asserted that the antagonistic response facilitating anxiety inhibition should be one that is physiologically incompatible with anxiety. However, several empirical tests of this tenet suggested that relaxation was not necessary for systematic desensitization to be effective (see Kazdin & Wilcoxon, 1976) and served as a blow to Wolpe's theory and led to a deemphasis in using relaxation during exposure treatments.

The theoretical framework governing our clinical experimentation with incorporating antagonistic responses during exposure treatments for anxiety disorders differs significantly from that of Wolpe's. Rather than focus on the use of responses that are physiologically antagonistic to anxiety, the current formulation stresses the importance of incorporating responses that are antagonistic with respect to threat-relevant action tendencies. For example, having the height phobic place her hands behind her back while she looks out over the railing of a balcony during exposure treatment would qualify as an antagonistic response even though doing so is likely to increase subjective and physiologic indices of fear initially. Our working hypothesis is that these oppositional actions—despite their fear activation effects—enhance fear reduction by making threat-disconfirming information more available during treatment. This is in direct contrast to Wolpe's stated position (Wolpe, 1958), "… desensitization effects are rarely obtainable with levels in excess of 25 SUDS; and in some individuals a zero level is a *sine qua non*" (Wolpe & Lazarus, 1966; p. 78). It should be noted that this exposure augmentation strategy differs from the fear-reduction technique of flooding. Unlike in flooding, in which the patient confronts a "high dose" of the phobic target right from the start (e.g., taking a person with acrophobia to the top of a 20-story building), the technique of enacting oppositional actions (e.g., placing one's hands behind one's back as one looks over the railing of a balcony) is

introduced while the patient confronts a "low dose" of the phobic target (e.g., second floor balcony). As patients become more comfortable, they gradually confront more difficult items on their fear hierarchy, employing the technique of enacting oppositional actions at each progressively more difficult step.

The principal aim of the current study was to investigate the hypothesized facilitative effects of having acrophobic individuals engage in actions (i.e., running toward the rail of a balcony, spinning in place in the phobic situation to induce dizziness, holding one's hands behind one's back while looking over the edge of a railing) that are in direct opposition to their threat-relevant fear action tendencies. Non-treatment-seeking volunteers meeting *DSM-IV* criteria for specific phobia, natural environment type, with acrophobic concerns, were randomly assigned to one of four treatment conditions: (a) exposure augmented with oppositional actions (E + OA), (b) in vivo exposure only (EO); (c) a credible placebo control consisting of pulsed audio-photic stimulation (APS); or (d) a wait-list control (WLC). We hypothesized that participants receiving E + OA would show significantly greater fear reduction at both posttreatment and follow-up relative to participants receiving EO and that both exposure-treated groups would show greater improvement than participants assigned to either the placebo or wait-list condition. Moreover, we predicted that the enhanced outcome observed among those receiving E + OA would be governed by greater changes in between-landing habituation during the course of treatment.

Method

PARTICIPANTS

Participants ($N = 88$) displaying acrophobic fear took part in the study. To be eligible for participation, participants were required to: (a) meet *DSM-IV* criteria for specific phobia (acrophobia) based on the Composite International Diagnostic Interview (CIDI-Auto; World Health Organization, 1997); (b) display at least moderate fear (50 or higher on a 0 = *no fear* to 100 = *extreme fear* rating scale) on two consecutive behavioral approach tests; and (c) report moderate fear or avoidance on a modified version of the Acrophobia Questionnaire (Cohen, 1977). Participants were excluded if they presented with a history of seizures due to the slight increased risk of seizure for those participants randomized to the pulsed audio-photic stimulation placebo treatment (see below) or if they presented with a medical condition that precluded them from safely climbing stairs. The final sample was predominantly female (69%), ranging in age from 18 to 64 ($M = 20.08$). Seventy-two participants (82%) were university students and 16 (18%) were community volunteers. The ethnic breakdown of the sample was: 49% Caucasians, 15% Hispanic/Latino, 12.5% African-American, 18% Asian-American, 3% Native American, and 2% multi-racial or other race. Participants were not financially compensated for their participation in the study, but university students in an introductory psychology class received class credit.

EXPERIMENTAL DESIGN

Participants were randomized to one of the following four treatment conditions: (a) in vivo exposure augmented with oppositional actions (E + OA); (b) in vivo exposure only (EO); (c) placebo control, consisting of pulsed audio-photic stimulation (APS), or (d) a wait-list control (WLC). Treatment integrity was carefully monitored over the course of six 6-min trials of therapist supervised in vivo exposure. Treatment process data were collected during treatment for each participant in the two exposure conditions to shed light on the change mechanisms governing the effects of the treatments. Tripartite assessments consisting of subjective, behavioral, and physiologic fear indices were collected at baseline, posttreatment, and 4-week follow-up in a generalization (untrained) context. WLC participants were offered treatment after the posttreatment assessment and were thus not assessed at follow-up. Sample size was determined based on a power analysis for detecting a moderate effects size with alpha = .05 and power = .70.

ASSESSMENT PROCEDURE

Screening. In the first stage of screening, potential participants from introductory psychology classes at a large southwestern university completed the Acrophobia Questionnaire (AQ; Cohen, 1977) through an on-line computer system. Potential participants in the community who contacted the laboratory and indicated interest in the study completed the AQ during a telephone screening. Community participants were recruited by posting flyers and announcing the study on our laboratory website. Those ($N = 291$) whose scores indicated at least a moderate fear of heights were invited for a pretreatment assessment consisting of (a) informed consent procedures; (b) diagnostic assessment interview using the CIDI (see below); (c) the AQ; and (d) two behavioral approach tests (BAT; see below). One hundred forty-eight potential participants completed the pretreatment assessment. Of those completing the assessment, 103 met eligibility criteria (see above). Of those 45 participants who

were ineligible, 25 were excluded based on BAT scores, 15 did not meet criteria for specific phobia, and 5 did not meet criteria on the BATs or the diagnostic interview. Of those meeting criteria for treatment, 89 participants were randomized to one of the four treatment conditions (14 participants declined to participate in the treatment phase of the study). One participant dropped out during treatment. Thus, 88 participants completed treatment, which was conducted one week after the pretreatment assessment.

BATs. All study participants underwent two different BATs at each of the three assessment periods (pre, post, and follow-up). These two height challenges were equivalent with respect to difficulty level (each structure comprised a ground floor plus four additional floors, and both staircases included standard-sized railings) and would be best described as being only modestly difficult. BAT-1 (see below) was used for eligibility screening and also served as the training context for the two exposure therapy conditions. BAT-2 (see below) was also used for eligibility screening, but was *not* used as a site for conducting the exposure treatments. Hence, peak fear during BAT-2 was selected as one of the primary outcome indices since it was not confounded with performance training during treatment.

BAT-1. BAT-1 comprised a five-story, semi-enclosed, outdoor parking garage adjacent to the university's psychology building. Four of the landings had metal railings, and the other five had a cement half-wall. The garage contained nine landings (excluding the ground floor). Landings were numbered in chalk 12 cm from the railing and connected by a staircase consisting of seven to ten stairs, for a total of 79 stairs. Each consecutive stair was numbered in chalk 12 cm from the railing.

Participants started at the ground floor ("landing zero") and were instructed to ascend the stairs as high as they could go, keeping their feet directly in line with the numbers to ensure that all participants were equally close to the railing. The experimenter stood at the bottom of the stairwell so that the participant had to ascend without support. As the participants reached each landing, they were asked to stand on the chalked area of the landing, to look over the edge, and to record their fear on a scale from 0 (*no fear*) to 100 (*extreme fear*) upon which they were instructed to move up to the next landing and repeat the procedure. Participants were instructed to place a coin on the highest stair they were able to reach. After participants returned to the bottom floor, the experimenter collected the coin to determine how many steps the participant had ascended.

BAT-2. BAT-2 was conducted on the indoor stairwell of the university's psychology building, a five-story building consisting of five floors with 12 landings and a total of 104 stairs. Stairs were attached to each other by thin aluminum, consisting of two rows of circles cut out such that one could see through the holes in the stairs to the floor below. This indoor stairwell also contained a large floor-to-ceiling corner window, in which participants could see outdoors from certain angles. The protocol for BAT-2 was identical to that of the BAT-1.

MEASURES

Diagnosis. Composite International Diagnostic Interview (CIDI-Auto). Assessment of *DSM-IV* diagnoses of specific phobia was conducted using the specific phobia module of the computerized version of the CIDI-Auto (World Health Organization, 1997). The CIDI-Auto has been widely used for the assessment of *DSM-IV* diagnoses. The anxiety disorder module has demonstrated good psychometric properties including good sensitivity (.86) and acceptable specificity (.52). The CIDI has been used in several anxiety disorder clinical trials (e.g. Powers et al., 2004; Roy-Byrne, Katon, Cowley, & Russo, 2001; Roy-Byrne et al., 2005; Smits, Powers, Buxcamper, & Telch, 2006).

Measures of treatment credibility and manipulation check. Credibility Expectancy Questionnaire (CEQ; Devilly & Borkovec, 2000). The CEQ is a widely used scale for assessing the perceived credibility of treatments. Items include: "At this point, how logical does the therapy offered to you seem?" "At this point, how successful do you think the treatment will be in reducing your fear of heights?" "How confident would you be in recommending this treatment to a friend who experiences similar problems?" and "By the end of the therapy period, how much improvement in your fear of heights do you think will occur?" Although Devilly and Borkovec (2000) use a 1–9 rating for the first three items and 0–100 for the fourth item, we modified the scale so that all four items were rated on a 0–100 scale. The four CEQ items used in this measure were averaged to create one index of treatment credibility.

Behavior utilization observational recording. To assess the integrity of the implementation of the two exposure conditions, observer ratings were collected on participants' use of oppositional actions during treatment. During each treatment trial, a trained undergraduate research assistant blind to the study hypotheses coded the presence or absence of nine possible oppositional actions. A subset of the treatment sessions (15%) was rated independently by a second trained observer. These ratings

were conducted live; thus, raters were aware of which sessions were part of the fidelity check. Interrater reliability was determined by assessing differences between raters' ratings at each minute of treatment, creating a composite score for each rater, and then calculating the intraclass correlation coefficient (ICC). ICC was .99, $p < .001$.

Measures collected during the BATs. Behavioral approach. The index of behavioral approach for each BAT was operationalized as the percentage of total stairs ascended. This was calculated by dividing the number of stairs ascended by the total number of stairs and multiplying that fraction by 100. BAT-1 had 79 stairs, and BAT-2 had 104 stairs. Because of the modest difficulty level of the two BATs, most participants (82%) were able to ascend to the highest landing at the pretreatment assessment. Because of this ceiling effect, behavioral approach could not be included as a behavioral index of treatment outcome.

Peak fear. Participants rated their fear at each landing on a scale ranging from 0 (*no fear*) to 100 (*extreme fear*). The highest level of fear (irrespective of landing) reported during BAT-2 was used as the primary outcome measure.

Heart Rate Reactivity (HRR). Participants' heart rates were continuously monitored during the BAT using a Polar Heart Rate Monitor-Model S410. Participants wore electrode belts around their chests, which transmitted heart rate signals to a wrist receiver. The wrist receiver stored the heart rate data. Heart rate (beats per min), averaged every 3 sec, was recorded at each landing. To control for exercise effects, a separate index of participants' heart rate (HR) while climbing stairs was derived by having participants climb a small staircase consisting of seven stairs for 2 minutes, at a pace similar to that for the actual BAT. HRR was derived by regressing average stair-climbing HR onto peak BAT HR. The residualized change scores from these regression analyses were used in subsequent statistical analyses of treatment outcome.

AQ. A modified 20-item version of the AQ was administered at screening, pretreatment, posttreatment, and follow-up. In the original AQ (Cohen, 1977), participants rated their anxiety for 20 height-related scenarios on a 7-point Likert-type scale and rated their avoidance of the same 20 situations on a 4-point Likert-type scale. The modified version consolidated anxiety and avoidance ratings into one 20-item scale, using a 7-point Likert-type scale. More specifically, participants rated their combined anxiety and avoidance of 20 height-related situations (e.g., looking down a circular stairway from several flights up) on a 7-point Likert-type scale ranging from no anxiety/avoidance to extreme anxiety/avoidance. These modifications were made after determining that the original subscales were highly correlated ($r = .72$, $p < .01$) and that the modified 20-item version of the AQ correlated highly ($r = .87$, $p < .001$) with the original 40-item version. The consolidated version was administered in order to reduce the time needed to complete the instrument. To assess test-retest reliability, participants completed the AQ at pretreatment and again as soon as they arrived for their treatment session (before treatment was delivered). The modified AQ showed excellent test-retest reliability over a 2-week period ($r = .87$), as well as excellent internal consistency (Cronbach's alpha = .85).

Treatment process measures. Safety Behavior Utilization (SBU). During each treatment trial, the observer coded the presence of eight possible safety behaviors. These safety behaviors included: (a) standing at least three inches away from the edge of the landing; (b) holding onto the railing; (c) holding onto the therapist; (d) avoiding looking down; (e) keeping one's head stationary; (f) "stabilizing stance," defined as standing in a slight squatting position with legs spread slightly apart in order to stay balanced; (g) visible tensing of muscles; and (h) obvious breathing control techniques. A subset of the treatment sessions (15%) for each exposure condition was rated independently by a second trained observer. Interrater reliability, assessed at every minute of the treatment, yielded an ICC of .95, $p < .001$.

Fear activation. Initial fear ratings (on a scale ranging from 0–100) during treatment were obtained to evaluate potential differences in fear activation between exposure conditions.

Between-landing habituation. Landing number (0–9) and fear rating (0 = *no fear* to 100 = *extreme fear*) were recorded at every minute of treatment. This allowed for a more fine-grained analysis of change in phobic reactions over the course of treatment. As participants ascended to higher and higher staircase landings during the course of treatment, the first fear rating at each new staircase landing was used to obtain a fear decline slope "between-landings" for each participant.

TREATMENT CONDITIONS

Procedures common to all treatment conditions. After providing written informed consent prior to their participation in the treatment phase of the study, participants were presented with the treatment rationale for their respective treatments and instructed to complete the CEQ. Treatment was delivered in six, 6-min trials, for a total of one 36-

min session. Experimenters administering treatment read scripts describing the treatment rationales and treatment instructions. Six separate 6-min trials were administered, rather than one continuous 36-min session for several reasons. First, this approach allowed us to collect more complete treatment process data for examining patterns of within-trial and between-trial habituation over the course of treatment. Second, this approach more closely mirrors basic research on fear extinction learning in animals in which multiple presentations of the CS are presented during one training session (Gonzalez-Lima & Bruchey, 2004; Richardson et al., 2004). Finally, the trial length and total number of trials were selected based on our previous treatment research on specific phobia (Kamphuis & Telch, 2000; Powers et al., 2004; Sloan & Telch, 2002; Telch et al., 2000; Telch et al., 2004).

EO. The EO treatment took place on the stairwell of the parking garage used during the screening BAT. Participants ascended stairs until they reached a landing that produced a moderate level of anxiety (i.e., 50 on a 0-to-100 scale). Treatment began at this landing and progressed to the next highest landing when their subjective fear dropped to 30 or below on the 100-point scale. During each treatment trial, participants stood on the target landing and were encouraged to position themselves at the edge while looking over the railing. Therapists were instructed to give one verbal encouragement (e.g., "It's important to try to come as close to the edge as possible. The more you can look over the edge, the less anxious you will start to feel.") at the beginning of each trial. However, participants were not required to follow this recommendation. Whether or not participants chose to lean over the railing had no bearing on determination of when to ascend to the next staircase. Participants ascended the next staircase only when their fear ratings dropped to 30 or below on the 0-to-100 scale. Thus, the highest landing each participant reached depended on their fear ratings during treatment.

E+OA. The procedures for determining the starting landing as well as the progression to subsequent higher landings were identical to those described in the EO condition. In addition, at each landing in the E+OA condition, participants continuously performed specific oppositional actions starting with actions that were less difficult and gradually shifting to more difficult actions. Thus, exposure was graduated on the dimensions of both height and oppositional actions performed.

The specific oppositional actions included, in order of difficulty, were: (a) putting their feet at the edge of the landing with their hands behind their backs, leaning over the railing, and looking down; (b) moving their heads in all directions while standing at the railing without holding it; (c) standing at the edge while shaking their heads from left to right in order to induce dizziness, and staying at the edge while dizzy without holding the railing; (d) running towards the edge and leaning over it as they approach, with their hands behind their backs; (e) running backwards towards the railing with their hands in front of them to prevent touching the railing and their heads facing front to avoid turning back to look at the edge (therapists put their arms out to catch the participants at the railing for safety); and (f) running towards the railing, facing forward, with their eyes closed and hands behind their backs (again, therapists held hands out to ensure safety). Of these six actions, a different action was performed each minute. If the participant refused to engage in the action for more than half of the minute because of anxiety, that action was repeated for the next minute. If the participant performed the action as instructed, the next action in the list was performed for the following minute, and so on. The actions were cycled throughout the entire 36 min of treatment. Treatment was stopped after the participant had completed six, 6-min trials, regardless of how high the participant was able to ascend. Thus, the highest landing participants reached depended on their individual fear ratings. Therapists were instructed to give statements of encouragement and coaching.

APS. APS (Seiver, Mind Alive, Inc.) is typically used by health professionals to induce relaxation. The APS device resembles a small soundboard and is about the size of a MP3 player. The device consists of a headset, which emits controllable pulsing sounds like a metronome, and a plastic mask, which produces orange lights at controllable rates. The APS device has been used as the basis for a credible placebo control group in our laboratory in treatment studies of claustrophobia (Powers et al., 2004) and social phobia (Smits, Powers, Buxcamper, & Telch, 2006). Participants were told that introducing these lights and sounds would relax them by inducing alpha waves in the brain, which are typically associated with relaxation and meditation.

After being provided with the rationale for treatment, participants completed 36 minutes of the APS in the form of six, 6-min trials. Although it was not expected that participants would experience any anxiety during the administration of the APS, fear ratings were taken at the end of every minute to control for the monitoring of subjective fear.

Table 1
Pretreatment screening and credibility measures not included in outcome assessments by treatment condition

Measure	E+OA (*n*=28)	EO (*n*=24)	APS (*n*=25)	WLC (*n*=11)
CEQ				
M	71.25	58.13	50.52	N/A
SD	14.27	16.96	19.57	N/A
BAT 1- Fear				
M	79.64	78.33	83.60	70.00
SD	15.03	18.10	17.29	14.44
BAT 1-Approach				
M	98.46	99.63	91.90	100.00
SD	5.65	1.81	14.34	0.00
BAT 2 - Approach				
M	89.32	98.36	89.62	93.18
SD	27.13	8.05	18.65	22.61
Stairs HR				
M	116.43	113.57	111.46	116.50
SD	18.71	15.08	12.76	21.71

Note. There were no significant differences across treatment groups, with the exception of CEQ, $p<.01$. EO=Exposure Only; E+OA=Exposure with Oppositional Actions; APS=Audio-Photic Stimulation; WLC=Wait-list control. CEQ=Credibility Expectancy Questionnaire (first 4 items); AQ=Acrophobia Questionnaire; BAT 1 – Fear=Peak Fear during the first screening behavioral approach test; BAT 1 Approach=Number of stairs ascended during the first screening behavioral approach test; BAT 2 – Fear=Peak Fear during the second screening behavioral approach test; and BAT 2 Approach=Number of stairs ascended during the second screening behavioral approach test. Stairs HR=baseline climbing stairs heart rate.

WLC. Participants received no treatment until after the posttreatment assessment was completed. At that time, they received one 36-min session of in vivo exposure treatment. In order to provide treatment as soon as possible, participants in this condition did not complete a follow-up assessment.

Posttreatment and follow-up assessments. After completing treatment, participants immediately completed a posttreatment assessment. Participants returned 1 month later for a follow-up session. Four participants did not return for their follow-up sessions.

Results

EQUIVALENCE OF GROUPS AT BASELINE

One-way ANOVAs were used to assess whether randomization was successful in achieving equivalent groups at baseline. As seen in Table 1, the four experimental groups did not differ on the measures at baseline with the exception of BAT-2 peak fear ratings, $F(3, 84)=3.57$, $p<.01$. Participants in the APS group reported significantly higher fear ratings on the BAT-2 ($p<.05$) than the other conditions. The groups did not differ on any other demographic or clinical measure at pretreatment.

TREATMENT CREDIBILITY CHECK

The mean CEQ scores for each of the four treatment conditions are reported in Table 1. Participants rated each of the four treatments as at least moderately credible. However, the three treatments did differ with respect to total scores on the CEQ, $F(2, 71)=9.74$, $p<.01$. Further probing of these differences revealed that participants rated the E+OA treatment as more credible than the other two treatments on item 2 (i. e., how successful treatment will be), $t(46)=2.22$, $p<.05$. There were no significant differences on any other CEQ items (p's>.10).

TREATMENT FIDELITY CHECK

To assess the fidelity of the E+OA treatment, the two exposure conditions were compared with respect to the number of oppositional actions used by participants during their 36 min of exposure treatment. Participants in the E+OA group engaged in significantly more oppositional actions during treatment ($M=8.79$, $SD=0.42$) than those in the EO group ($M=1.96$, $SD=1.08$), $F(1, 50)=950.96$, $p<.001$, $\eta^2=0.95$. Further, 100% of participants in the E+OA condition used either eight or nine (out of nine) oppositional actions, whereas 0% of those in the EO condition used eight or nine oppositional actions.[1] These data indicate that the instructions provided to the E+OA group were successful in achieving the targeted treatment process objective of having participants enact oppositional actions during treatment.

EFFECTS OF THE TREATMENTS AT POSTTREATMENT

Means and *SD*s for the major outcome measures for each of the four treatment conditions are presented in Table 2. Treatment efficacy at posttreatment was examined by performing a series of repeated measures ANOVAs with condition (EO, E+OA, APS, and WLC) as a four-level between-subjects factor and time (baseline, posttreatment) as a two-level within-subjects factor.[2] Each of the three outcome variables (peak fear during the nontraining context BA`T, AQ, and

[1] Several of the participants in the EO condition spontaneously engaged in one or more of the following oppositional actions during treatment: (a) leaning over the railing with feet at the edge (29%), (b) putting one's hands behind one's back while leaning over (8%), and (c) visible attempts at muscle relaxation (4%). Seventy-nine percent of participants in EO leaned over the railing at some point during treatment, suggesting most did as they were encouraged to do.

[2] Because WLC participants were lost to follow-up, it was not possible to conduct a 4 (Condition)×3 (Assessment Period—pre, post, and follow-up) repeated-measures ANOVA.

Table 2
Means and standard deviations of outcome measures by treatment condition

Measure	E+OA			EO			APS			WLC	
	Pre (*n*=28)	Post (*n*=28)	FU (*n*=26)	Pre (*n*=24)	Post (*n*=28)	FU (*n*=23)	Pre (*n*=25)	Post (*n*=25)	FU (*n*=24)	Pre (*n*=11)	Post (*n*=11)
Fear - BAT 2											
M	85.00	36.25[aei]	38.88[fj]	83.33	64.79[d]	62.83	92.00	70.00	59.58	75.45	76.36
SD	15.52	23.60	26.52	13.41	21.03	23.10	12.25	24.83	27.10	19.16	9.24
HR – BAT 2											
M	135.58	136.92	136.83	135.04	133.64	143.19	134.92	136.87	138.78	142.00	138.91
SD	18.00	19.70	21.90	16.14	13.94	15.20	14.47	16.98	16.67	23.74	20.14
AQ											
M	62.39	34.44[afj]	35.04[gl]	57.62	45.63[b]	42.32	62.16	46.68[b]	47.75	56.27	61.64
SD	13.67	15.94	17.53	14.44	19.38	18.94	18.90	22.01	19.57	14.45	9.73

Note. EO=Exposure Only; E+OA=Exposure with Oppositional Actions; APS=Audio-Photic Stimulation; and WLC=Wait-list control.
BAT 2=Behavioral Approach Test (Non-Training Context); HR=Raw Heart Rate; AQ=Acrophobia Questionnaire.
Means with superscripts are significantly lower (more improvement) than means of other conditions as follows: [a]significantly different from WLC at $p<.001$; [b]significantly different from WLC at $p<.01$; [c]significantly different from WLC at $p<.05$; [d]different from WLC, $p<.10$; [e]significantly different from APS at $p<.001$; [f]significantly different from APS at $p<.01$; [g]significantly different from APS at $p<.05$; [h]different from APS, $p<.10$; [i]significantly different from EO at $p<.001$; [j]significantly different from EO at $p<.01$; [k]significantly different from EO at $p<.05$; [l]different from EO, $p<.10$.

HRR) were entered in separate analyses as dependent variables. A significant effect of time was observed for BAT peak fear, $F(1, 84)=61.47$, $p<.001$, $\eta^2=.42$, and AQ, $F(1, 83)=32.33$, $p<.001$, $\eta^2=.28$. In contrast, no main effect of time was observed on the HRR measure ($p=.73$).

Between-group differences in the level of improvement from baseline to posttreatment were indicated by a significant time×condition interaction for BAT peak fear, $F(3, 84)=13.19$, $p<.001$, $\eta^2=.32$, power=.99, and for the AQ, $F(3. 83)=8.38$, $\eta^2=.23$, power=.99. Simple effects tests examining between-group differences at posttreatment revealed a significant difference between groups on the BAT peak fear, $F(3, 88)=15.02$, $p<.001$, $\eta^2=.35$, power=.99, and on the AQ, $F(3, 87)=8.14$, $p<.001$, $\eta^2=.23$, power=.99. Pairwise comparisons were performed to assess these intergroup differences at posttreatment. On the BAT fear measure, those in the E+OA condition improved significantly more than those assigned to EO, APS, and WLC (all p's<.001), with no significant differences between the other conditions (the difference between EO and WLC approached significance, $p=.10$). Pairwise comparisons on the AQ at posttreatment showed that E+OA outperformed EO ($p<.01$), APS ($p<.01$), and WLC ($p<.001$), with EO and APS both outperforming WLC as well (p's<.01). No differences were observed between EO and APS. There were no significant between-group or interaction effects for HRR ($p=.88$).

Because the two exposure conditions differed with respect to perceived credibility, the analyses reported above were repeated controlling for CEQ scores. This adjustment had no effect on any of the findings reported above.

MAINTENANCE FROM POSTTREATMENT TO FOLLOW-UP

To assess maintenance of treatment effects at the 1-month follow-up assessment, a series of repeated measures ANOVAs were conducted with condition (EO, E+OA, and APS) as a three-level between-subjects factor and time (posttreatment, follow-up) as a two-level within-subjects factor. Peak fear during the BAT and AQ total score were entered individually as dependent variables in two separate analyses. No significant Time or time×condition effect was observed for the AQ, suggesting that the treatment gains on the AQ at posttreatment were maintained equally for all three groups. Simple effects tests at follow-up revealed a significant condition effect on the AQ, $F(2, 72)=3.14$, $p<.05$, $\eta^2=.08$. Pairwise comparisons revealed that those in E+OA reported significantly lower acrophobic fear on the AQ than those in APS ($p<.05$). Differences between EO and E+OA approached significance ($p=.09$), with E+OA outperforming EO. No differences were observed between EO and APS.

For BAT peak fear, the pattern of findings was similar, with the exception that the Time×Condition effect was marginally significant $F(2, 70)=2.97$, $p=.06$, $\eta^2=.08$. Follow-up probing of this interaction showed that the APS group showed marginally significant additional improvement from post to follow-up ($p<.07$), whereas the EO and E+OA groups showed maintenance of their fear reduction but no significant additional improve-

ment (p's>.10). Simple effects tests at follow-up revealed a significant condition effect for BAT peak fear, $F(2, 73) = 6.09$, $p < .01$, $\eta^2 = .15$, with pairwise comparisons showing that those receiving E+OA reported significantly lower fear on the BAT at follow-up than those in EO and APS (p's<.01), with no differences between EO and APS. Finally, no significant time or condition effects were observed HRR data at the follow-up assessment (see Table 2).

TREATMENT EFFECTS AFTER CONTROLLING FOR LEVEL OF SAFETY BEHAVIOR UTILIZATION

To examine whether the superior outcome observed in the E+OA group might be due to the possibility that E+OA participants engaged in fewer safety behaviors during treatment relative to the EO group, we performed a series of 2 (Condition)×2 (Assessment Time) repeated measures ANCOVAs controlling for number of safety behaviors (SBs) used during treatment. The pattern of results from these analyses did not differ from those of the original analyses, suggesting that the superior outcome of the E+OA group was not accounted for by the lower utilization of safety behaviors among E+OA participants.

RELIABLE IMPROVEMENT AT POSTTREATMENT AND FOLLOW-UP

Participants were classified as showing reliable improvement if they met the reliable change criteria (reliable change index, RCI) outlined by Jacobson and Truax (1991). Chi-square tests were used to examine between group differences in the percentage of participants achieving significant improvement at posttreatment and follow-up on the two primary outcome indices.

Significant improvement from baseline to posttreatment on the BAT peak fear index was achieved by 89% of the E+OA-treated participants, which was significantly higher than the 54% improvement rate observed for the EO group, $\chi^2(1) = 8.10$, $p < .01$, or the 52% improvement rate observed for the APS group, $\chi^2(1) = 9.05$, $p < .01$, which in turn was significantly higher than the 18% improvement observed among the WLC group, $\chi^2(1) = 3.94$, $p < .05$. A similar pattern of findings was observed for the AQ index, although the overall response rates were lower than those observed for BAT fear. Specifically, 63% of E+OA participants showed reliable improvement, which was significantly higher than the 29% improvement rate for the EO group, $\chi^2(1) = 5.83$, $p < .05$, and the 36% improvement rate for the APS group, $\chi^2(1) = 3.78$, $p < .05$, which in turn was higher than the 0% percent improvement rate for the WLC group, $\chi^2(1) = 5.28$, $p < .05$.

At the 1-month follow-up, a significantly higher percentage of E+OA participants (88%) showed reliable improvement on BAT Fear, relative to participants receiving EO (48%), $\chi^2(1) = 9.49$, $p < .01$, or APS (58%), $\chi^2(1) = 5.89$, $p < .05$. Improvement did not differ between the EO and APS groups (p>.10). The pattern of results for the AQ was similar to that for BAT Fear. Again, a significantly higher percentage of E+OA participants (65%) showed reliable improvement from their baseline AQ scores when compared to participants receiving EO (36%), $\chi^2(1) = 4.02$, $p < .05$, and this difference approached statistical significance for APS (41%), $\chi^2(1) = 2.83$, $p < .09$. Improvement rates did not differ significantly between the EO and APS groups (p>.10).

ANALYSES OF EXPOSURE PARAMETERS DURING TREATMENT

Fear activation and between-landing habituation. Initial fear activation during treatment and between-landing habituation were each examined as possible mediators of the observed between-group effect at posttreatment and follow-up using a 3-level hierarchical linear model (HLM; see Bryk, Raudenbush, & Congdon, 1996). In the model, repeated measures of peak fear obtained every minute throughout the 36 minutes of treatment (Level 1) were nested within landing (Level 2) and were compared between conditions (Level 3). Generalized least squares estimates analysis was performed within HLM to obtain y-intercept (i.e., fear activation) and fear decline slope (between-landing habituation) parameter estimates for each participant in the two exposure conditions. Mediation was tested using the MacArthur guidelines as outlined by Kraemer, Wilson, Fairburn, and Agras (2002). In this approach, a variable can be considered a mediator of treatment outcome if (a) it occurs during treatment; (b) is correlated with treatment condition; and (c) has either a direct relation with the outcome variable *or* must interact with the treatment variable in its relation with the outcome.

The first mediation criterion was clearly met since both fear activation and between-landing habituation occur during treatment. The second criterion was also met for both putative mediators. Fear activation was significantly higher for participants in the E+OA condition ($M = 51.55$) relative to that in the EO condition ($M = 37.32$), $t(48) = 2.10$, $p < .05$. Similarly, examination of the between-landing fear decline slopes revealed significantly greater between-landing habituation for those in the E+OA condition

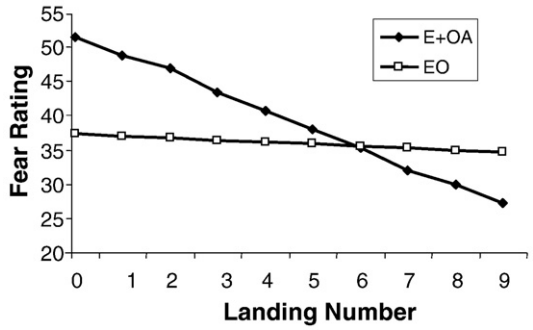

FIGURE 1 Between-landing habituation for the two exposure conditions.

relative to the EO condition, $t(48) = -2.59$, $p < .01$ (see Figure 1). The final mediation criterion was tested by regressing BAT peak fear at follow-up and AQ at follow-up (in two separate models) on the proposed mediators (centered) and their interaction terms (Proposed Mediator × Treatment Condition). We chose to examine both potential mediators in the same model to determine whether either or both uniquely mediated treatment outcome while accounting for the other.

Figure 1 shows the intercept (fear activation) and fear decline slopes across landings for each of the two exposure conditions. A similar pattern was found across outcome measures: between-landing habituation mediated outcome with BAT peak fear at follow-up as the dependent variable, $t(47) = 2.80$, $p < .01$, and with the AQ, $t(46) = 2.18$, $p < .05$, with steeper decline slopes associated with lower fear at follow-up. In contrast, fear activation was not statistically significant as a mediator, but did approach significance for the BAT peak fear, $t(47) = 1.93$, $p < .07$, and for the AQ, $t(46) = 1.79$, $p < .09$, with greater fear activation associated with higher fear ratings at follow-up.

Discussion

This investigation sought to test whether exposure treatment could be enhanced by having individuals with acrophobia perform actions in direct opposition to fear action tendencies during treatment. Because our principal aim was to test a "new" treatment process variable (exposure augmentation technique), we employed what might be best described as a hybrid design combining elements of the randomized clinical trial with elements of psychotherapy change process research. Elements consistent with the RCT approach included (a) the randomization of participants to two or more treatment conditions; (b) use of reasonably well-defined inclusion and exclusion criteria; (c) use of placebo and wait-list control groups; (d) specification and measurement of primary outcomes; and (e) reporting of traditional outcome analyses aimed at making inferences about the relative efficacy of the treatments under investigation. However, other elements of the design more closely fit a treatment process research framework. These included: (a) experimental manipulation of a treatment process variable; (b) the repeated assessment of client change process variables, i.e., number of oppositional actions used by participants during the course of treatment; (c) investigation of potential change mechanisms (i.e., fear activation and between-landing habituation) occurring during treatment; (d) use of a non-treatment-seeking sample; and (e) deemphasis on the assessment of long-term outcome. Our decision to borrow from both research traditions was inspired by both the early high-impact mechanism-driven phobia research by Bandura and his colleagues (Bandura, Jeffrey, & Wright, 1974; Bandura, Adams, Hardy, & Howells, 1980) as well as more recent prescriptions for advancing psychotherapy research (see Kazdin, 2001).

SUMMARY OF THE MAJOR OUTCOME FINDINGS

Our check on the integrity of our manipulation of the exposure augmentation variable revealed that those randomized to the experimental treatment did indeed perform each of the targeted oppositional actions during treatment, whereas those assigned to the exposure only condition did not. These data suggest that our attempt to experimentally manipulate this treatment process variable was successful.

A relatively consistent pattern of findings emerged with respect to treatment outcome. Participants receiving exposure while enacting threat-relevant oppositional action tendencies showed significantly greater improvement at the end of treatment and at a 1-month follow-up assessment relative to participants receiving exposure only. The robustness of the observed enhancement effects across multiple outcome indices is noteworthy as are the findings pertaining to the generalization of treatment effects across contexts. Whereas those receiving exposure only did not show significantly greater improvement than placebo on our two primary outcome measures assessed in the untrained context (i.e., generalization probe), treatment gains in the untrained context for participants in the E + OA group were marked and significantly greater than those observed in the other three treatment conditions. The lack of differences between conditions on the physiological index of fear is not surprising and consistent with the literature on specific phobias. Few treatment studies

of specific phobia report physiological data. Of those that do, most find significant differences in the expected direction between conditions on behavioral and questionnaire measures, while finding no differences, or even differences in the unexpected direction, between groups on physiological measures (e.g., Bates, McGlynn, Montgomery, & Mattke, 1996; Hellström & Öst, 1995; Rowe & Craske, 1998a; 1998b). This discordance between measures deserves future study.

Our finding that exposure only did not generalize to an untrained context is consistent with studies showing that brief exposure treatment of arachnophobia conducted in one context may not generalize to an untrained context (Mineka, Mystkowski, Hladek, & Rodriguez, 1999; Mystkowski et al., 2002). Some have argued that exposure treatments should be conducted in multiple contexts in order to maximize generalization to untrained fear cues (Mystkowski et al., 2003; Rodriguez et al., 1999). However, recent evidence suggests that training in multiple contexts is insufficient for promoting treatment generalization (Craske, 2006). Findings from the present study suggest that augmenting exposure treatment with threat-relevant oppositional action strategies may indeed enhance generalization of treatment effects without having to conduct exposure therapy in multiple contexts.

We considered the possibility that the observed superiority of the experimental treatment over exposure only was due to the poor performance of exposure only as opposed to an enhanced effect for the augmented exposure treatment. The fact that exposure only did not outperform our credible placebo control appears consistent with this hypothesis. However, it should be noted that this is the first study with a height-phobic sample to include a psychological placebo treatment. Moreover, the few treatment studies of specific phobia that have included a psychological placebo treatment (Foa et al., 1977; Gauthier & Marshall, 1977; Kirsch et al., 1983; Powers et al., 2004; Syzmanski, & O'Donahue, 1995) have shown a relatively large placebo response rate. Several other lines of evidence fail to support the view that our exposure-only treatment performed particularly poorly. First, the pre-to-posttreatment effect sizes for exposure only in our study ($d = 0.70$ for the AQ and $d = 1.05$ for the BAT) compare favorably to all but one of the four published studies of exposure treatments for acrophobia that reported statistics allowing for this comparison (Emmelkamp et al., 2002; Pendelton, & Higgins, 1983; Williams, Turner, & Peer, 1985). The one exception (Rothbaum et al., 1995) used an eight-session treatment of VR exposure plus self-directed exposure between sessions (as opposed to our one session). Second, although our rates of clinically significant improvement for exposure alone are lower than in some studies of exposure treatments of other specific phobias (e.g., claustrophobia; Powers et al., 2004), these studies typically use the fear ratings from a behavioral test identical to the exposure training context. Our use of BAT-2 (nontraining context) as the primary outcome measure provides a more stringent index of change that eliminates the confounding of treatment outcome with a training effect. Fear assessed in the nontrained context would be expected to be higher than the same measures collected from a BAT conducted in the training context due to the failure of exposure to generalize to an untrained context (see Mineka et al., 1999).

The relatively high response rate observed among those receiving the audio-photic stimulation placebo is noteworthy. Over one-third of the placebo-treated participants showed reliable improvement at both posttreatment and follow-up. Moreover, placebo-treated participants performed about as well as those receiving exposure treatment alone on the two primary outcome measures. This placebo intervention has been used in two previous trials in our laboratory (Powers et al., 2004; Smits et al., 2006). In both studies, response rates at follow-up for APS-treated participants were 30%. These data call into question the assumption that specific phobia has a low placebo response rate and echo the recommendation by Huppert et al. (2004) that additional research is needed on the placebo response rate across the various anxiety disorders. Findings from a recently completed meta-analysis of treatments for specific phobias (Wolitzky-Taylor, Horowitz, Powers, & Telch, 2008) also suggest that placebo treatments do in fact show large effects when compared to no-treatment control groups.

HOW MIGHT OPPOSITIONAL ACTIONS DURING EXPOSURE FACILITATE FEAR REDUCTION?

Numerous change mechanisms may operate independently or in combination to account for the observed facilitative effect of enacting threat-relevant oppositional actions during exposure treatment. At this point, we can only speculate as to the change mechanisms governing the observed enhancement effects of having phobics enact opposition action tendencies. Telch (2006) has suggested that this augmentation strategy may exert its beneficial effects by providing greater disconfirmation of the threats perceived in connection with the phobic target. The facilitation of threat disconfirmation brought about by this treatment process variable might occur through

one of several pathways. First, performing actions that are antagonistic to the phobic threat may result in the inadvertent elimination of specific phobic safety aids or behaviors that might interfere with threat disconfirmation. For example, implicit in the act of having acrophobic patients keep their hands behind their backs (i.e., threat antagonistic action) while they look over the railing of a fifth story balcony is that they can no longer hold on to the railing as though their life depended on it! Hence, one way in which oppositional actions may enhance the potency of exposure is by reducing or eliminating phobic safety aids which, when made available, have been shown to significantly reduce the efficacy of exposure treatments (Powers et al., 2004; Sloan & Telch, 2002).

Alternatively, enacting actions antagonistic to the phobic threat during exposure may also serve to create new, or strengthen existing "nonthreatening" associative links to the phobic target. For example, the act of running toward the railing of a fifth floor balcony introduces new nonthreatening associations into the phobic fear memory network, such as running to catch a taxi or running to embrace one's partner, etc. The process of incorporating new incompatible information into the phobic fear network has been proposed as a potential mechanism involved in the emotional processing of fear (Foa & Kozak, 1986).

We considered the possibility that having the patient enact threat antagonistic actions during exposure might lead to enhanced outcome through a more complete activation of the fear structure. Indeed, our treatment process data showed that participants who enacted oppositional action tendencies during exposure displayed greater initial fear activation than those receiving exposure alone. However, consistent with previous reports (Kamphuis & Telch, 2000; Telch et al., 2000; Telch et al., 2004), level of fear activation was not associated with a more favorable treatment outcome; rather, also consistent with these aforementioned reports, the nonsignificant trend showed that higher fear activation was associated with higher fear ratings at follow-up. Our treatment process analyses revealed that the two exposure conditions differed significantly in the pattern of between-landing habituation. More specifically, those receiving exposure while enacting threat antagonistic actions displayed significantly greater between-landing habituation as indexed by a steeper fear decline slope across the 36 min of direct exposure and that this between-landing habitation slope significantly mediated treatment outcome, with steeper decline slopes associated with a more favorable treatment outcome at follow-up.

Finally, although quite speculative, Telch (2006) has suggested that performing "anti-phobic" actions when confronted with the phobic threat may deactivate alarm processes through a more automatic or primitive (i.e., subcortical) fear circuit (Ledoux, 1998; 2003) in which the oppositional actions transmit sensory signals of safety from the thalamus directly to the amygdala thus facilitating the habituation of fear. This process may be akin to the work (Dimberg, 1988) suggesting that having people engage in certain actions (e.g., smiling) activates the corresponding emotional experience (e.g., feeling happy).

LIMITATIONS

Several limitations of the study deserve comment. First, our two behavioral approach tests used in the behavioral assessment of acrophobia were only modestly challenging. This resulted in a ceiling effect at pretreatment for our measure of behavioral approach. Despite this, the pretreatment mean peak fear ratings on these behavioral approach tests were both above 75 on a 0-to-100 scale, and all participants reported at least moderate subjective fear while performing each of the two BATs. Thus, BAT subjective fear ratings proved to be a useful measure despite the ceiling effect for behavioral approach. These data, along with the fact that participants met *DSM-IV* criteria for specific phobia of heights, scored in at least the moderate range on the AQ, and displayed significant elevations in heart rate when performing only a mildly challenging behavioral approach test suggest that the sample, although non-treatment-seeking, was sufficiently phobic of heights.

Second, our experimental design does not disentangle the effects of enacting oppositional actions from the effects of safety behavior fading. As mentioned earlier, one contributing factor for the enhancement effects observed in the experimental group may be the elimination of anxiety-maintaining safety behaviors. Given that this is the first empirical test of this technique, it seemed reasonable to first demonstrate its efficacy prior to attempting a study to dismantle its treatment effects. However, we are encouraged by our finding that the experimental treatment outperformed exposure alone even after controlling for the number of safety behaviors used during treatment. Our next step is to provide a more stringent test of the incremental effects of having phobics enact threat-oppositional actions by comparing it to an exposure plus safety behavior fading condition.

Third, the standardization of the fear hierarchy of oppositional actions, created in order to ensure participants in the experimental condition were

exposed to all of the same oppositional actions, also presented a limitation common to many controlled treatment studies. Some participants may have experienced the graduation of steps (from one oppositional action to the next) as too quick or too slow. However, the pace at which the landings were ascended was based on subjective fear. Thus, the protocol was designed to balance experimental control with individualized pacing of treatment. Still, in a real-world clinical setting, fear hierarchies should be tailored to each individual patient.

Caution is warranted when attempting to generalize the findings to clinical practice. The exposure treatment used in this study is not representative of exposure therapy as it is typically conducted in the real world. Although specific phobia is one of the few emotional disorders in which one-session exposure treatments have demonstrated clinical efficacy (Öst et al., 1992; 2001), our dose of exposure treatment (i.e., 36 min) is significantly less than what is typically provided for treating specific phobia. In addition, the exposure-only treatment may not represent what a highly skilled behavior therapist would administer in clinical practice (i.e., fading safety behaviors). However, this treatment likely represents an exposure session conducted by an average therapist in the community, most of whom do not have training in or knowledge of safety behavior fading. It is also worth noting that 79% of participants in this exposure condition did follow the recommendation to lean over the railing.

Fourth, although our study participants did reveal significant severity on several independent measures of acrophobic fear, most (82%) were not seeking treatment and thus our findings cannot be generalized to a treatment-seeking clinical sample. Thus, replication of these findings with a more severe treatment-seeking sample is needed before drawing firm conclusions regarding the efficacy of augmenting exposure with oppositional actions. Fifth, our brief 1-month follow-up was designed to assess the stability of the acute effects of this augmentation strategy; conclusions about the long-term benefits of this strategy await future studies using longer follow-up periods. Finally, our findings do not allow us to completely rule out the possibility that differential treatment credibility contributed to the observed superiority of the experimental treatment. Treatment credibility in the experimental condition may have been higher because the explanation of the rationale for treatment was slightly longer than that of the other two conditions. Slight differences in length of treatment description and subtle differences in language may have resulted in greater belief that the experimental treatment would help reduce fear. However, we are encouraged by the fact that a similar pattern of findings emerged after statistically controlling for treatment expectancy.

Despite these limitations, the findings from this investigation provide encouraging preliminary support for the potential value of having phobic individuals enact oppositional action tendencies during exposure treatments and thus warrant further investigation.

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