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A randomized controlled trial of the judicious use of safety behaviors during exposure therapy

Shannon M. Blakey[a,*], Jonathan S. Abramowitz[a], Jennifer L. Buchholz[a], Sarah C. Jessup[a,1], Ryan J. Jacoby[b], Lillian Reuman[a], Kimberly Z. Pentel[a]

[a] University of North Carolina at Chapel Hill, Davie Hall, Campus Box 3270, Chapel Hill, NC, 27599-3270, United States
[b] Massachusetts General Hospital/Harvard Medical School, 185Cambridge St, Boston, MA, 02114, United States

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ABSTRACT

Safety behaviors—actions performed to prevent, escape from, or reduce the severity of perceived threat—are typically eliminated during exposure therapy for clinical anxiety. Yet some experts have called for the strategic and "judicious use" of safety behaviors during exposure to improve treatment acceptability/tolerability without diminishing its efficacy. Empirical findings regarding this debate are mixed and existing work is subject to several methodological limitations. The current randomized controlled trial incorporated longitudinal design and multimethod assessment to compare the efficacy of traditional exposure with the elimination of safety behaviors (E/ESB) and exposure with judiciously used safety behaviors (E/JU). Adults with clinically significant spider fear ($N = 60$) were randomized to four twice-weekly sessions of E/ESB or E/JU. Self-report and behavioral measures were administered at pretreatment, posttreatment, and 1-month follow-up. Participants exhibited large effects on all measures from pretreatment to posttreatment, with no change from posttreatment to follow-up. There were no significant group differences in treatment outcome or treatment acceptability/tolerability. Exploratory analyses were used to compare behavioral and inhibitory learning processes between conditions. Clinical implications, study limitations, and future directions are discussed in terms of inhibitory learning theory.

1. Introduction

Substantial research documents the efficacy of exposure-based cognitive-behavioral therapy (i.e., "exposure therapy") in the treatment of clinical anxiety (Olatunji, Cisler, & Deacon, 2010). The core feature of exposure therapy is the repeated and prolonged confrontation with feared situations/stimuli. Yet despite its empirical support, not everyone who receives exposure therapy benefits from this approach. For example, 15% of individuals receiving exposure therapy for specific phobia fail to improve (Wolitzky-Taylor, Horowitz, Powers, & Telch, 2008), and treatment dropout rates reach as high as 45% (Choy, Fyer, & Lipsitz, 2007). Furthermore, up to 50% of patients (Craske & Mystkowski, 2006) show at least partial relapse after a successful course of exposure therapy, highlighting the need for strategies to maximize long-term outcome.

In the context of clinical anxiety, safety behaviors are "unnecessary actions taken to prevent, escape from, or reduce the severity of a perceived threat" (Telch & Lancaster, 2012, p. 315). Such behaviors, however, contribute to the development and maintenance of clinical anxiety because they prevent the natural correction of mistaken threat-related beliefs (for a review, see Helbig-Lang & Petermann, 2010). That is, anxious patients may not be able to process disconfirmatory information if their attention is directed toward performing a safety behavior (Sloan & Telch, 2002). Moreover, when a feared outcome does not occur (or is less severe than anticipated) in the context of safety behavior use, the patient might attribute this to the safety behavior rather than to the extremely low probability (or severity) of the feared outcome (Salkovskis, 1991). Accordingly, safety behaviors are traditionally eliminated during exposure therapy (a technique sometimes called "response prevention").

Within an inhibitory learning framework of exposure therapy (Craske et al., 2008; Craske, Treanor, Conway, Zbozinek, & Vervliet, 2014), safety learning refers to the new, non-threat associations that patients develop when confronting feared stimuli during exposure

* Corresponding author. University of North Carolina at Chapel Hill, Department of Psychology & Neuroscience Davie Hall (CB # 3270), Chapel Hill, NC, 27599-3270, USA.
E-mail addresses: shannon.blakey@gmail.com, sblakey@unc.edu (S.M. Blakey).
[1] Current Address: Vanderbilt University, PMB 407817, 2301 Vanderbilt Place, Nashville, TN, 37240-7817, United States

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exercises. Safety behaviors are thought to interfere with safety learning in three ways (for a review, see Blakey & Abramowitz, 2016). First, they could prevent the violation of negative expectancies by attenuating the discrepancy between what a patient predicts will occur during an exposure task (i.e., catastrophe) and what actually occurs (i.e., no catastrophe). Second, safety behaviors might obstruct the generalization of safety-based associations by restricting safety learning to specific contexts. Third, they could impede the development of distress tolerance (i.e., the ability to withstand aversive internal states) by obstructing patients from learning that they can persist in challenging tasks *despite* elevated levels of distress.

Although eliminating safety behaviors is common practice in exposure therapy, some authors have questioned this convention. Specifically, Rachman, Radomsky, and Shafran (2008) proposed the *judicious use of safety behaviors*: the careful and strategic incorporation of safety behaviors during exposure, especially during the earlier stages of treatment. Citing unacceptably high treatment refusal and dropout rates, these authors have argued that the judicious use of safety behaviors could increase the likelihood that patients consent to and complete exposure therapy (Rachman et al., 2008). Although findings from some previous studies suggest judiciously incorporating safety behaviors increases treatment acceptability/tolerability (Levy & Radomsky, 2014; Levy, Senn, & Radomsky, 2014; Milosevic & Radomsky, 2013a), others have not (Deacon et al., 2013, 2012; Deacon, Sy, Lickel, & Nelson, 2010; Milosevic & Radomsky, 2013b). Though not discussed in the original Rachman et al. (2008) proposition, other experts have posited that safety behaviors can even *enhance* exposure therapy by (a) accelerating the rate at which patients approach exposure stimuli and/or (b) promoting closer approach to exposure stimuli (e.g., Hood, Antony, Koerner, & Monson, 2010).

The role of safety behaviors during exposure has garnered substantial research attention, yet study findings regarding their effects on treatment outcome are mixed. A recent comprehensive meta-analysis revealed no strong evidence across the literature to unequivocally support either the elimination or judicious use of safety behaviors during exposure (Meulders, Van Daele, Volders, & Vlaeyen, 2016). Specifically, although these authors found a small but marginally significant benefit of eliminating safety behaviors over exposure without any safety behavior manipulation (i.e., a "neutral" condition) across 11 comparisons, no significant differences were found across nine other comparisons of exposure with deliberate safety behavior use to exposure without any safety behavior instructions.

Several methodological issues limit the degree to which conclusions can be drawn from past research. For example, more than half of the studies included in the Meulders et al. (2016) meta-analysis tested brief exposure trials (e.g., touching a contaminant 20 times with a 30 s delay between touches; Rachman, Shafran, Radomsky, & Zysk, 2011; Van Den Hout, Engelhard, Toffolo, & Van Uijen, 2011), even though most treatment protocols recommend delivering prolonged trials of at least 30 min. Similarly, whereas a course of exposure therapy in naturalistic settings involves multiple treatment sessions, existing studies have relied on single-session analogue interventions, which threatens the ecological validity of study findings. Moreover, single-session experiments preclude examination of the judicious use of safety behaviors as originally defined: the strategic use of safety behavior applied "in a limited manner and only for a limited period, especially in the early stages of treatment" (Rachman et al., 2008, p. 171). Longitudinal studies allowing for the fading of safety behaviors over multiple exposure sessions would afford a more precise test of the judicious use of safety behaviors approach, which could better inform clinical practice.

Another limitation of previous studies regards the method of outcome assessment. Accumulated research shows that fear reduction during exposure is not a reliable predictor of long-term outcome (e.g., Baker et al., 2010; Craske et al., 2008); however, most safety behavior studies to date have relied on pre-to post-exposure fear ratings as primary outcome measures (for notable exceptions, see Deacon et al., 2013; Milosevic & Radomsky, 2013b). Studies using multi-method assessment of several indices of exposure success might better explicate the consequences of using safety behaviors during exposure. Measuring processes related to inhibitory learning (e.g., negative expectancies for harm) would further enhance our understanding of if—and *how*—safety behaviors influence exposure outcomes. Finally, studies assessing outcome at follow-up are important within the context of inhibitory learning theory, as this framework prioritizes durability of safety learning over immediate (i.e., posttreatment) fear reduction (Craske et al., 2008).

The current study was designed to compare the efficacy of traditional exposure with the elimination of safety behaviors (E/ESB) and exposure with the judicious use of safety behaviors (E/JU) in a sample of adults with spider phobia. We sought to build on existing work by not only addressing methodological limitations of previous investigations, but also approaching this topic from the lens of inhibitory learning theory—a promising explanatory framework that has received little attention in safety behavior research. To address these gaps in the literature, we (a) adhered to the definition of the judicious use of safety behaviors (i.e., strategically incorporating safety behaviors at the start of treatment but eventually fading them out; Rachman et al., 2008), (b) used multi-method assessment of several indices of exposure success, (c) gathered follow-up data, (d) extended the number and duration of exposures to enhance ecological validity, and (e) incorporated measures of cognitive-behavioral processes proposed to underlie inhibitory learning during exposure.

In light of previous research findings (Blakey & Abramowitz, 2016; Helbig-Lang & Petermann, 2010; Meulders et al., 2016; Telch & Lancaster, 2012), we hypothesized that E/ESB would result in greater spider phobia improvement than would E/JU at follow-up. In addition, we predicted that pre-exposure treatment acceptability/tolerability ratings would be higher for E/JU relative to E/ESB. We also hypothesized that E/ESB participants, relative to E/JU participants, would report lower peak distress and greater distress tolerance during an *in vivo* behavioral task at follow-up. With respect to process variables, we conducted planned exploratory analyses to compare self-reported (a) negative expectancies for exposure-related harm (b) attentional focus (i.e., focusing on belief testing versus performing a safety behavior) during exposure, and (c) exposure outcome attributions (i.e., attributions of safety) across the three exposure trials, as well as to examine the (d) relative rate of exposure success (i.e., the session at which participants first met their exposure goal) across treatment sessions between conditions.

2. Method

2.1. Participants

A sample of 60 adults with DSM-5 spider phobia participated in this study. The target enrollment was determined by a-priori power analyses (G*Power 3.1.9.2; Faul, Erdfelder, Buchner, & Lang, 2009) calculating the sample size needed to provide 80% power to detect a small to medium hypothesized effect at $\alpha = 0.05$ using a repeated measures ANOVA test. The sample was mostly (85.0%, $n = 51$) female and had a mean age of 31.52 years ($SD = 13.10$). Most participants (68.3%, $n = 41$) self-identified as White or Caucasian, 20.0% ($n = 12$) self-identified as Black or African American, 6.7% ($n = 4$) self-identified as Asian or Asian American, and 3.3% ($n = 2$) self-identified with another racial background. Two participants (3.3%) self-identified as Hispanic/Latino/Latina.

Participants were recruited from the surrounding community via flyers, a clinical research recruitment website, and email listservs to participate in this study, advertised as "Overcome Your Spider Phobia," between September 15, 2016, and July 31, 2017. Treatment was provided at no cost and participants were compensated with parking reimbursement and $20 cash for attending the follow-up visit. Eligibility

criteria included (a) at least 18 years of age, (b) DSM-5 spider phobia, (c) English fluency, and (d) willingness to audiotape all therapy sessions. Interested individuals were deemed ineligible if they (a) completed 10 or more steps on the pretreatment Behavioral Approach Task (BAT; 3 people excluded for this reason), (b) reported spider or bee allergies (4 people excluded for this reason), (c) had a previous trial of exposure therapy for any anxiety problem (to minimize the potentially confounding effect of prior psychoeducation/beliefs about exposure therapy; 0 people excluded for this reason), (d) had past month alcohol or substance use disorder (2 people excluded for this reason), (e) reported lifetime symptoms of mania or psychosis (2 people excluded for this reason),[2] or (f) reported current suicidal ideation (0 people excluded for this reason).

2.2. Trial design and randomization

This study followed a two-arm, parallel-group randomized controlled trial design. Participants were randomized to either E/ESB or E/JU via a random number generator immediately after the phone screen (if eligibility criteria were met), with the condition that an equal number of participants be assigned to each condition. Participants, study personnel, and the principal investigator (PI) were not aware of the participant's allocated condition at the time of randomization. The PI, who conducted phone screens, assigned participants to study interventions by linking participant information to numerical ID codes contained in a separate password-protected randomization spreadsheet (the column indicating treatment condition was concealed) in the order of phone screen completion. The therapist alone viewed the allocated study condition immediately before the participant's first treatment session by temporarily lifting the concealment specific to that participant.

2.3. Procedure

Interested individuals contacted the PI via email to schedule an initial phone screening. Participants who met initial eligibility criteria were scheduled for their pretreatment (PRE) assessment and first treatment session. Attendees met a trained research assistant who was blind to study hypotheses and participants' assigned conditions to provide written informed consent and complete the PRE assessment (see “Measures,” below). Individuals who completed 10 or more steps on the BAT at PRE (i.e., touched a live tarantula) were deemed ineligible, provided with referral information, and dismissed. Individuals who completed fewer than 10 steps on the BAT at PRE were enrolled in the study. Immediately after the PRE, the participant's therapist delivered Session 1 of either E/ESB or E/JU. Immediately after Session 4, participants completed a posttreatment (POST) assessment with a research assistant blind to condition and study hypotheses. The PI subsequently contacted the participant to schedule the 1-month follow-up (F/U) visit, during which time the participant completed a final assessment with a research assistant blind to condition and study hypotheses before being compensated and debriefed. This study was approved by the university's Institutional Review Board and was registered at http://www.clinicaltrials.gov (NCT03233113).

2.4. Intervention and materials

Procedures common to both conditions. Participants in both conditions received four twice-weekly, hour-long, manualized individual treatment sessions with a trained therapist. Manuals were derived from evidence-based exposure interventions for phobias (Abramowitz, Deacon, & Whiteside, 2011; Antony, Craske, & Barlow, 1995) and a seminal publication on the judicious use of safety behaviors (Rachman et al., 2008). The treatments were approved by E/ESB and E/JU experts (author JSA and study consultant Dr. Adam S. Radomsky, respectively).

Session 1 included functional assessment, psychoeducation, and treatment planning. Next, the therapist provided a rationale for either E/ESB or E/JU, which only differed between conditions with respect to the discussion of safety behaviors. In the E/ESB condition, therapists explained that safety behaviors interfere with exposure therapy because they (a) prevent disconfirmation of mistaken beliefs and (b) absorb attentional resources necessary to achieve corrective learning. In the E/JU condition, therapists explained that safety behaviors enhance exposure therapy because they (a) make the anxiety-provoking situation less distressing and (b) enhance one's ability to remain in the phobic situation for longer or at a closer distance. Next, participants identified their (a) primary feared prediction (i.e., negative expectancy) to be tested during all exposures and (b) exposure task to be attempted over the next three sessions. The same task was attempted at Sessions 2–4 to maximize internal validity (i.e., indices of negative expectancies, safety attributions, and exposure goal completion would all refer to the same task within each participant). Sessions 2–4 included a review of the model of spider phobia and treatment rationale, 30-min *in vivo* exposure to a live tarantula, and post-exposure processing. Session 4 also involved a discussion of relapse prevention strategies. To maximize internal consistency, therapists did not assign additional exposure tasks as homework between sessions or during the follow-up period.

Procedures specific to E/JU. Participants were told at Session 1 that they would strategically use two safety behaviors during the first exposure, one safety behavior during the second exposure, and no safety behaviors during the third exposure. To balance internal and ecological validity, the current study incorporated semi-ideographic safety behaviors. After identifying the exposure task to be attempted at the next three sessions, E/JU participants chose two of eight available items often used in safety behavior research: eye goggles, a dental visor face shield, a long chemistry apron, a long sleeve rain jacket, short work gloves, long chemistry gloves, boot/shoe covers, or a 12” clear plastic shield. E/JU participants used the item perceived to be most helpful during the first and second exposure tasks; the second-most helpful item was used during the first exposure only. In cases where the two preferred items were redundant (e.g., long chemistry gloves and short work gloves), the therapist worked with the participant to find an alternative secondary item.

Treatment setting and providers. Data were collected at a large university in the southeastern United States. Three advanced clinical psychology graduate students and two post-baccalaureate research assistants (all female) served as study therapists. All therapists underwent a five-week standardized training program with the PI, which involved didactic readings, group seminars, and experiential role-plays. Furthermore, therapists received regular (at least weekly) group supervision from the PI, who reviewed 40% of recorded sessions in full (and 100% of recorded exposure trial segments) for the purposes of providing clinical supervision and minimizing therapist “drift” (Bellg et al., 2004).

Phobic stimuli. Two visually distinct tarantulas were used in this study: an Arizona blonde (*Aphonopelma chalcodes*) and rose hair (*Grammostola rosea*) tarantula. To maximize internal consistency, participants conducted exposures to the same tarantula for all treatment sessions. To enhance external validity, the other (i.e., novel) tarantula was used for all assessments. Tarantulas were counterbalanced to mitigate the potentially confounding effect of tarantula breed on study findings.

Treatment fidelity. Several methodological strategies (Bellg et al., 2004; Borrelli et al., 2005) were used to enhance and monitor treatment fidelity. In addition, two trained, hypothesis-blind research assistants coded 15% (n = 36) of the recorded treatment tapes (Lombard, Snyder-Duch, & Bracken, 2002). Session recordings were randomly selected

[2] Both participants who reported lifetime symptoms of mania or psychosis also had past month alcohol or substance use disorder.

with the condition that an equal number of tapes be coded for each session number ($n = 9$) and treatment condition ($n = 13$). Twelve items assessing treatment process (e.g., interpersonal effectiveness) were inspired by the Beck Cognitive Therapy Scale (Young & Beck, 1980). Up to 17 additional items assessed session-specific treatment content. We elected to include these additional items to ensure fidelity monitoring considered treatment content as well as general therapeutic skills. All items were rated on a 0 (*poor*) to 6 (*excellent*) scale, or else marked as "not applicable" (i.e., specific component was not delivered). Interrater agreement was defined as providing identical scores for nominal ratings and a difference score of ≤ 1 for continuous ratings. Interrater reliability of the current study's fidelity coders was excellent (simple agreement 98.38%; agreement on 1877 of 1908 coded items).

3. Measures

3.1. Primary outcomes

Fear of Spiders Questionnaire (FSQ; Szymanski & O'Donohue, 1995). The FSQ is a self-report measure on which participants rate their agreement with 18 statements (e.g., "If I saw a spider now, I would think it will harm me") using a scale of 0 (*totally disagree*) to 7 (*totally agree*). Possible total scores range from 0 to 126, with higher scores indicating greater spider fear. The FSQ has shown high internal consistency, test-retest reliability, and convergent validity in previous work (Muris & Merckelbach, 1996; Szymanski & O'Donohue, 1995). Internal consistency was excellent in the current sample ($\alpha_{PRE} = 0.91$, $\alpha_{POST} = 0.95$, $\alpha_{F/U} = 0.95$).

Behavioral Approach Task (BAT). A tarantula BAT inspired by spider-related BATs used in previous research (e.g., Olatunji, Huijding, De Jong, & Smits, 2011) served as the behavioral outcome. The BAT included 13 rank-ordered steps ranging from standing at the opposite end of a room from a tarantula in a covered terrarium to allowing the tarantula to crawl up one's bare arm. A participant must have conducted a BAT step for 10 consecutive seconds for the step to count as completed. BAT scores were recorded as the number of the highest step completed. Total scores range 0–13, with higher scores indicating greater behavioral approach.

3.2. Secondary outcomes

Treatment Acceptability and Adherence Scale (TAAS; Milosevic, Levy, Alcolado, & Radomsky, 2015). The TAAS is a 10-item self-report measure of treatment acceptability/tolerability and was administered at the end of Session 1 (after delivery of the treatment rationale). Participants rate each statement (e.g., "It would be distressing to me to participate in this treatment") on a 1 (*disagree strongly*) to 7 (*agree strongly*) scale. Six items are reverse-scored, such that possible total scores range from 10 to 70, with higher scores indicating greater treatment acceptability/tolerability. The TAAS demonstrated acceptable internal consistency in the current sample ($\alpha = 0.70$).

Peak BAT distress. Immediately after each completed BAT step, participants verbally reported their anxiety and disgust using a scale of 0 (*not at all*) to 10 (*maximally*). The highest self-reported values were separately recorded as peak BAT anxiety and peak BAT disgust, which were averaged to form a single peak BAT distress value (possible distress scores range 0–10, with higher scores indicating greater peak distress).

In vivo *BAT distress tolerance.* Immediately after finishing the BAT, participants were asked: "Regardless of how intense your distress was, how well did you tolerate your distress? That is, how well were you able to manage whatever emotions and sensations came up during the exercise, regardless of how strong they were?" Participants verbally reported ratings of *in vivo* distress tolerance using a 0 (*not at all able to tolerate my distress*) to 10 (*completely able to tolerate my distress*) scale.

3.3. Exposure process variables

Negative expectancy for harm. Immediately before each exposure, participants verbally reported how strongly they believed their negative prediction for harm (i.e., the primary phobic belief being tested during the exposure) would occur, using a scale of 0 (*0% certain it will occur*) to 100 (*100% certain it will occur*). Negative expectancy ratings from all three exposures were averaged to yield a single summary score.

Attentional focus on challenging negative predictions. At the midpoint of each exposure, participants verbally reported how much attention they were paying toward testing their negative prediction for harm, versus letting their attention go toward doing or thinking about something else, using a scale of 0 (*paying 0% attention to testing belief*) to 100 (*paying 100% attention to testing belief*). Attentional focus ratings from all three exposures were averaged to yield a single summary score.

Attributions for exposure outcome. Immediately after each exposure, participants verbally reported their attribution for the exposure's outcome. Responses were recorded verbatim and coded to denote the number of times E/JU participants' responses included a safety behavior-related attribution (e.g., "the spider did not bite me because I was wearing gloves," "I did not faint because I had a protective barrier").

Behavioral approach across exposure trials. All treatment session recordings were coded to compare the rate of behavioral approach (i.e., exposure goal completion) between treatment conditions. Ordinal coding was used to indicate whether participants first met the identified exposure goal at Session 2, Session 3, Session 4, or not at all.

3.4. Diagnostic screening measures

Anxiety Disorders Interview Schedule for DSM-5 (ADIS-5; Brown & Barlow, 2014). The ADIS-5 is a semi-structured clinical interview that assesses current anxiety-related diagnoses according to DSM-5 criteria, as well as severity of interference and distress on a 0 (*none*) to 8 (*very severe*) scale. We used a score of at least 4 (*moderate fear/sometimes avoids*) on the distress and/or interference item to indicate the presence of clinically significant spider fear. The specific phobia module was administered during the initial phone screen to ensure that enrolled participants met DSM-5 diagnostic criteria for spider phobia.

Mini International Neuropsychiatric Interview for DSM-5 (MINI; Sheehan, 2015). The MINI is a brief structured interview that assesses several current DSM-5 disorders. The manic and hypomanic episodes, alcohol use disorder, substance use disorder, and psychotic disorders and mood disorder with psychotic features modules were administered during the phone screen to determine initial eligibility to participate.

3.5. Data analytic strategy

Primary and secondary outcome analyses. To test for group differences in spider phobia symptoms, we conducted two separate 2 (condition: E/ESB, E/JU) x 3 (time: PRE, POST, F/U) mixed factorial (i.e., repeated measures) ANOVAs, with treatment condition as the between-subjects factor, time as the within-subjects factor, and FSQ and BAT scores as the dependent variables. Greenhouse-Geisser corrected degrees of freedom were applied to tests of within-subjects effects. To compare treatment acceptability/tolerability, we conducted an independent samples *t*-test with TAAS scores as the dependent variable. To test for group differences in BAT-related distress intensity and tolerance, we conducted two 2 (condition: E/ESB, E/JU) x 3 (time: PRE, POST, F/U) mixed factorial ANOVAs (again using Greenhouse-Geisser corrected degrees of freedom for tests of within-subject effects), with peak BAT distress and *in vivo* BAT distress tolerance as separate dependent variables.

Exploratory analyses. Two independent samples *t*-tests were conducted to examine group differences in (a) negative expectancies for harm and (b) attentional focus on challenging negative predictions

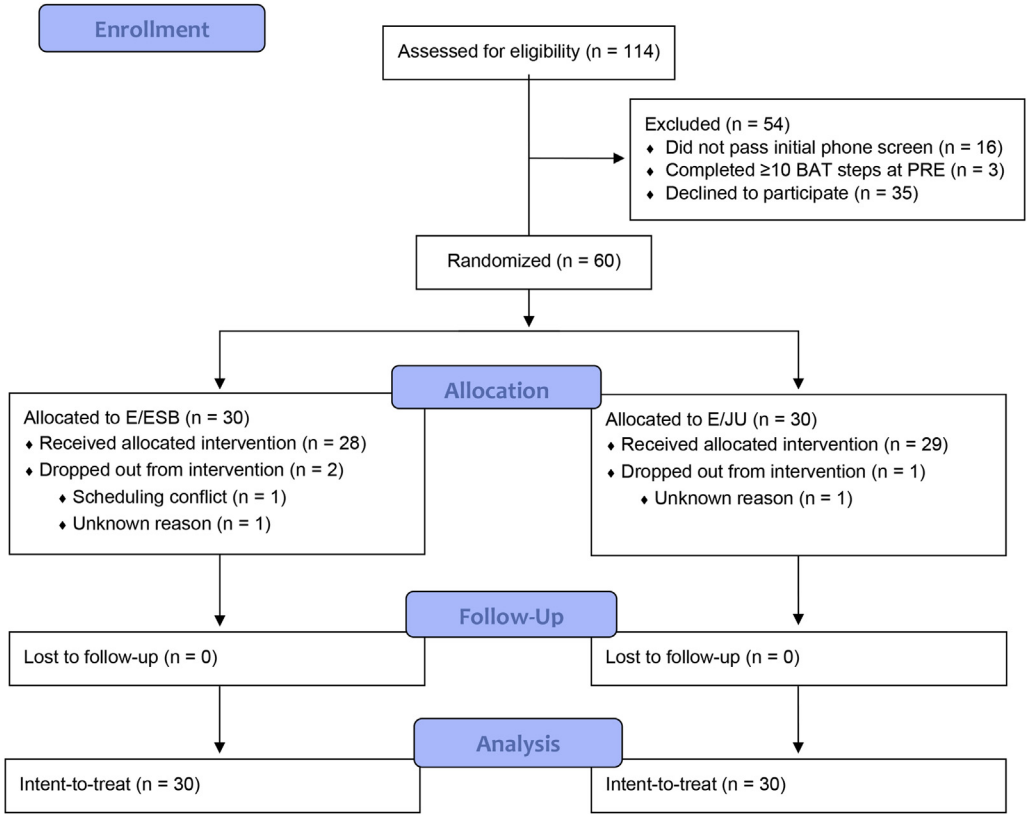

Fig. 1. CONSORT flow diagram.

across exposures. A one-sample *t*-test was conducted to examine whether the mean number of safety behavior-related exposure outcome attributions reported by E/JU participants was significantly non-zero. We planned to conduct a chi-square test of independence to examine the relationship between treatment condition and exposure goal completion.

4. Results

4.1. Treatment dropout

As seen in Fig. 1, three participants (5%) dropped out of treatment. The non-completers did not significantly differ from completers on any baseline measure (all *ps* > .05). Rather than remove data from participants who dropped out of treatment, we conducted intent-to-treat analyses using a "last observation carried forward" imputation approach.[3] Primary and secondary outcome descriptive data are presented in Table 1.

4.2. Primary outcomes

Self-reported spider phobia symptom severity. As shown in Table 1, both groups evidenced substantial reductions in FSQ scores. Analyses detected a significant main effect of time, $F(1.24, 72.11) = 204.88$, $p < .001$, $\eta^2 = 0.78$, but not condition, $F(1, 58) = 2.00$, $p = .163$, $\eta^2 = 0.03$. There was no significant time by condition interaction, $F(1.24, 72.11) = 0.62$, $p = .469$, $\eta^2 = 0.01$. Follow-up paired samples *t*-tests indicated that across conditions (i.e., in the entire sample), FSQ scores significantly improved from PRE to POST, $t(59) = 15.34$, $p < .001$, $d = 2.53$, and from PRE to F/U, $t(59) = 14.51$, $p < .001$, $d = 2.44$, with no change from POST to F/U, $t(59) = 1.08$, $p = .286$, $d = 0.06$.

***In vivo* behavioral approach (BAT steps).** Both groups evidenced substantial improvement on the BAT. Analyses detected a main effect of time, $F(1.17, 67.69) = 201.71$, $p < .001$, $\eta^2 = 0.78$, but not condition, $F(1, 58) = 0.30$, $p = .589$, $\eta^2 = 0.01$. There was no significant time by condition interaction, $F(1.17, 67.69) = 0.06$, $p = .845$, $\eta^2 = 0.001$. Follow-up paired samples *t*-tests indicated that across conditions, BAT scores significantly improved from PRE to POST, $t(59) = 14.75$, $p < .001$, $d = 1.94$, and from PRE to F/U, $t(59) = 14.67$, $p < .001$, $d = 2.01$, with no change from POST to F/U, $t(59) = 1.43$, $p = .159$, $d = 0.06$.

4.3. Secondary outcomes

Treatment acceptability and tolerability. As seen in Table 1, participants in both E/ESB and E/JU endorsed positive treatment acceptability/tolerability ratings at the end of Session 1, after they received psychoeducation and a treatment rationale. An independent samples *t*-test did not detect a significant effect of group on TAAS ratings, $t(58) = 0.14$, $p = .891$, $d = 0.03$.

Peak BAT distress. Participants in both conditions demonstrated large decreases in peak BAT distress. Analyses detected a main effect of time, $F(1.36, 76.18) = 43.05$, $p < .001$, $\eta^2 = 0.44$, but not condition, $F(1, 56) = 0.52$, $p = .475$, $\eta^2 = 0.01$. There was no significant time by condition interaction, $F(1.36, 76.18) = 0.97$, $p = .354$, $\eta^2 = 0.02$. Follow-up paired samples *t*-tests indicated that across conditions, peak BAT distress ratings significantly decreased from PRE to POST, $t(57) = 6.73$, $p < .001$, $d = 0.97$, and from PRE to F/U, $t(57) = 7.24$, $p < .001$, $d = 1.03$, with no change from POST to F/U, $t(59) = 0.73$, $p = .469$, $d = 0.05$.

***In vivo* BAT distress tolerance.** Participants in both conditions also reported large increases in BAT distress tolerance. Analyses detected a main effect of time, $F(1.18, 64.84) = 54.28$, $p < .001$, $\eta^2 = 0.50$, but

[3] Completer analyses using data from $n = 57$ completers produced the same pattern of findings.

Table 1
Outcome descriptive data for intent-to-treat sample across assessments.

Outcome	Total sample (N = 60)			E/ESB (n = 30)			E/JU (n = 30)		
	M	*SD*	Range	*M*	*SD*	Range	*M*	*SD*	Range
FSQ									
PRE	90.88	19.71	46–125	96.33	19.56	46–125	85.43	18.60	52–112
POST	32.33	26.54	0–120	35.80	26.89	0–120	28.87	26.18	1–100
F/U	34.00	26.89	0–120	35.80	28.34	0–120	32.20	25.72	0–100
BAT steps									
PRE	6.10	2.75	0–9	5.90	2.76	0–9	6.30	2.77	1–9
POST	11.17	2.49	3–13	11.00	2.94	3–13	11.33	1.99	7–13
F/U	11.33	2.45	4–13	11.23	2.79	4–13	11.43	2.10	7–13
TAAS									
Session 1	53.28	6.53	39–69	53.17	6.08	39–63	53.40	7.06	42–69
Peak BAT distress									
PRE	6.62	2.54	0–10	6.59	2.69	2–10	6.65	2.43	0–10
POST	4.02	3.16	0–10	4.57	3.26	0–10	3.47	3.02	0–10
F/U	3.88	2.89	0–10	4.20	2.97	0–10	3.55	2.81	0–10
BAT distress tolerance									
PRE	6.25	2.60	0–10	5.93	2.35	1–9	6.53	2.81	0–10
POST	8.87	1.60	3–10	8.73	1.44	5–10	9.00	1.76	3–10
F/U	8.88	1.53	3–10	8.90	1.35	6–10	8.87	1.72	3–10

Note. FSQ = Fear of Spiders Questionnaire; BAT = Behavioral approach test; TAAS = Treatment Acceptability/Adherence Scale; PRE = Pretreatment assessment; POST = Posttreatment assessment; F/U = 1-month follow-up assessment; E/ESB = Exposure with the elimination of safety behaviors condition; E/JU = Exposure with judicious use of safety behaviors condition.

not condition, $F(1, 55) = 0.41$, $p = .526$, $\eta^2 = 0.01$. There was no significant time by condition interaction, $F(1.18, 64.84) = 0.56$, $p = .487$, $\eta^2 = 0.01$. Follow-up paired samples *t*-tests indicated that across conditions, BAT distress tolerance significantly increased from PRE to POST, $t(56) = 7.58$, $p < .001$, $d = 1.28$, and from PRE to F/U, $t(56) = 7.58$, $p < .001$, $d = 1.25$, with no change from POST to F/U, $t(59) = 0.13$, $p = .901$, $d = 0.01$.

4.4. Exploratory analyses (exposure process variables)

Exposure process data are presented in Table 2. Mean negative expectancy ratings indicated that at the start of each exposure, participants generally predicted their feared exposure outcome would occur. Analyses showed that mean negative expectancy ratings were greater for participants in the E/ESB condition than in the E/JU condition, $t(57) = 2.39$, $p = .020$, $d = 0.62$. Mean attentional focus ratings indicated that participants were mostly focused on belief testing during exposure, with no difference between conditions, $t(57) = 0.91$, $p = .365$, $d = 0.24$. A one sample *t*-test showed that the mean number of safety behavior-related attributions made by E/JU participants was significantly different from zero and therefore unlikely to be due to chance, $t(29) = 2.53$, $p = .017$, $d = 0.46$.

A chi-square test of independence examining the association between treatment condition and exposure goal completion could not be conducted as planned because statistical assumptions for this test were not met (the number of observations in one cell fell below the minimum required value of five). Visual inspection of the data suggests that E/JU participants reached their exposure goal earlier in treatment than did E/ESB participants. Two E/ESB and two E/JU participants never met their exposure goal, and three additional E/JU participants could only complete their exposure goal when using safety behaviors.

5. Discussion

The judicious use of safety behaviors during exposure represents an ongoing controversy with important clinical implications. Findings

Table 2
Exposure process data for intent-to-treat sample across exposure trials.

Continuous Variables	Total sample (N = 60)			E/ESB (n = 30)			E/JU (n = 30)		
	M	*SD*	Range	*M*	*SD*	Range	*M*	*SD*	Range
Negative expectancy (%)									
Exposure 1	62.98	27.83	0–100	71.90	21.73	10–100	54.37	30.61	0–100
Exposure 2	35.10	24.81	0–90	43.28	25.57	10–90	27.20	21.64	0–90
Exposure 3	21.69	20.53	0–85	21.72	22.18	0–85	21.67	19.19	0–70
Attentional focus (%)									
Exposure 1	77.29	22.34	5–100	74.17	25.14	5–100	80.30	19.22	40–100
Exposure 2	81.31	24.09	0–100	78.10	26.10	0–100	84.40	21.97	20–100
Exposure 3	84.98	20.54	10–100	84.38	20.60	20–100	85.57	20.82	10–100

Ordinal Variables	Total sample (N = 60)		E/ESB (n = 30)		E/JU (n = 30)	
	n	%	*n*	%	*n*	%
Exposure goal first met[a]						
Exposure 1	17	28.33	7	11.67	10	16.67
Exposure 2	27	45.00	11	18.33	16	26.67
Exposure 3	11	18.33	10	16.67	1	1.67
Never met goal	4	6.67	2	3.33	2	3.33

[a] Three E/JU participants met their exposure goal when using safety behaviors, but could not meet their goal without using safety behaviors.

from previous research on this topic, however, are mixed as well as subject to methodological limitations. The current study was designed to extend previous work surrounding the safety behavior debate by (a) increasing the number and duration of treatment sessions, (b) allowing for the introduction *and fading* of safety behaviors over treatment, (c) using multi-method assessment of short- and long-term exposure outcomes, (d) including measures related to the inhibitory learning model of exposure, and (e) assessing treatment processes in addition to symptom severity in a community sample of adults with DSM-5 spider phobia.

Our primary hypothesis—that E/ESB participants would demonstrate greater improvement than E/JU participants along self-report and behavioral symptom measures at follow-up—was not supported. Participants in both conditions evidenced large (and comparable) improvements in self-reported and behavioral symptoms from pre-to posttreatment, which were maintained over the follow-up period. Thus, our findings lend support to the claim that safety behaviors do not necessarily interfere with exposure. It is important to bear in mind, however, that whereas previous experiments on this topic (with the exception of Levy & Radomsky, 2016) required participants to use safety behaviors during the entirety of exposure, safety behaviors were systematically faded over the course of multiple exposure sessions in the current study.

Our hypothesis that E/JU participants would endorse greater treatment acceptability/tolerability than would E/ESB participants was not supported. Our observed 95% retention rate is also inconsistent with the concern, held by some, that exposure faces a "refusal problem" or "unacceptably high" dropout rates. Although our findings contrast with previous studies showing that permitting safety behaviors fosters acceptability/tolerability (Levy et al., 2014; Milosevic & Radomsky, 2013a), they align with other work showing that consumers perceive E/ESB to be equally as acceptable as exposure with safety behaviors (Deacon et al., 2010, 2013, 2012; Milosevic & Radomsky, 2013b). As noted elsewhere (Blakey & Abramowitz, 2016), this discrepancy in past research could be due to insufficient psychoeducation regarding the rationale and procedures of exposure therapy (i.e., brief written descriptions of E/ESB and E/JU, often shown to samples not meeting diagnostic criteria for an anxiety-related disorder)—limitations that were addressed in the current study.

Our other secondary hypotheses, that E/ESB participants would report lower peak distress and greater distress tolerance during the BAT at follow-up relative to E/JU participants, were likewise not supported by the data. Specifically, participants in both conditions evidenced significant improvement on both indices from pre-to posttreatment, which did not deteriorate over the follow-up period. Some investigators have suggested that increasing a patient's ability to tolerate distress is critical to inhibitory learning (Abramowitz & Arch, 2014; Blakey & Abramowitz, 2016). To our knowledge, this is the first safety behavior study to measure perceived distress tolerance in addition to distress intensity. Future research on safety behaviors (and inhibitory learning models of exposure in general) should continue to examine the importance of distress tolerance to treatment outcome.

Findings from exploratory analyses of exposure process variables were mostly in line with theoretical accounts of how safety behaviors can impede or enhance exposure. That pre-exposure negative expectancies were significantly higher in the E/ESB group is consistent with inhibitory learning-based arguments that safety behaviors minimize the potential violation of threat-based predictions for exposure-related harm (Craske et al., 2014). That is, safety behaviors attenuated the magnitude of the discrepancy between E/JU participants' predicted exposure outcome (i.e., catastrophe) and the actual outcome (i.e., no catastrophe). Contrary to information processing accounts (Sloan & Telch, 2002), we did not detect a difference in self-reported attentional focus toward belief testing during exposure as a function of safety behavior use. Yet considering that attentional focus ratings may have been subject to measurement error in this study due to response bias or inaccurate estimations of an automatic cognitive process, future research on this proposed explanation for safety behaviors' adverse effects should incorporate objective (and perhaps implicit) measures of directed attention.

Our results are in line with the proposition that patients are prone to misattribute the non-occurrence of a feared exposure outcome to safety behavior use (Salkovskis, 1991). Specifically, participants in the E/JU condition made more safety behavior-related attributions than would be expected by chance, which suggests individuals performing safety behaviors during exposure do not *entirely* conclude that their fear-based expectancies are mistaken. Thus, a clinical implication is that therapists should explicitly frame a successful exposure outcome as discordant with the preconceived expectancy, making sure their patients "give credit where credit is due" (i.e., not merely to a safety behavior) following a successful exposure task. Finally, exploratory analyses were somewhat consistent with previous research showing that safety behaviors facilitate approach toward feared situations/stimuli (e.g., Hood et al., 2010), although the degree to which this ultimately affects outcome appears negligible. Additional research on the relation between treatment response trajectories and long-term outcome would be useful.

The present study had several strengths, including the use of distinct treatment and assessment stimuli and solicitation of input on study design from both E/ESB and E/JU experts. At the same time, several limitations deserve mention. First, the sample was fairly homogeneous with respect to demographic variables (e.g., race/ethnicity). Second, many participants were able to get very close to a tarantula at PRE (i.e., interact with a spider in a treatment study context) despite endorsing elevated spider-related distress/avoidance in their daily life. Third, because we restricted our trial to adults with spider phobia, our findings may not generalize to the treatment of more complex anxiety presentations (e.g., obsessive-compulsive disorder, posttraumatic stress disorder). Dropout rates in this study may have also been lower than would be typical or expected in exposure therapy for other anxiety conditions requiring longer treatment duration in naturalistic clinical settings. Therefore, although specific phobia nicely served as a model of clinical anxiety in which to experimentally study the effects of exposure with or without safety behaviors, it would be helpful for future studies to elucidate safety behaviors' effects on treatment outcome, process, and acceptability/tolerability during treatment for more complex anxiety conditions or in samples with greater symptom severity.

Fourth, although we built on previous work by delivering a multi-session (versus single-session) treatment, there might have been a ceiling effect related to exposure's efficacy that obscured our ability to detect hypothesized group differences. Fifth, although we invited E/JU participants to self-select their preferred safety behaviors from several options, it is possible that participants rely on alternative safety behaviors in naturalistic contexts. Relatedly, this study only examined the effect of overt safety behaviors on treatment outcome, as participants in both conditions were instructed to refrain from mental safety behaviors (e.g., distraction) during exposures.

In summary, although we did not find the predicted deleterious effects of safety behavior use on long-term outcome following a full course of exposure therapy for specific phobia, our study did not yield support for some purported advantages of judiciously incorporating safety behaviors into treatment either. On the other hand, our findings offer preliminary evidence for effects of safety behavior use on inhibitory learning and behavioral approach across exposure sessions. Extrapolating to clinical practice, therapists may not need to be concerned if their patient is unwilling to immediately eliminate their safety behavior(s) as long as the patient explicitly tests their fear-based negative expectancies through direct and sustained confrontation with feared situations/stimuli and also understands they should eliminate their use of safety behaviors as soon as they are willing.

Conflicts of interest

The authors declare no conflict of interest.

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