Running head: SAFETY BEHAVIOR FACILITATES COGNITIVE CHANGE

Keep Your Eye on the Target: Safety Behavior Promotes Lower Levels of Targeted Maladaptive Beliefs following a Behavioral Experiment

Irena Milosevic[a] & Adam S. Radomsky[a]

[a]Department of Psychology, Concordia University, Montreal, Canada

Address correspondence to: Adam S. Radomsky, Department of Psychology, Concordia University, 7141 Sherbrooke St. West, Montreal, QC, H4B 1R6, Canada. Tel: 1-514-848-2424 ext.2202. Fax: 1-514-848-4523. Email: adam.radomsky@concordia.ca.

Abstract

This study examined the effect of safety behavior on belief change during a behavioral experiment. Highly spider fearful participants ($N = 126$) evaluated a targeted negative belief about spiders during a brief behavioral experiment with a live tarantula. Participants were randomly assigned either to use or not use safety gear during the session. Results demonstrated that after the behavioral experiment, targeted negative beliefs were significantly lower in the safety gear condition than in the control condition. Both conditions benefited from comparable improvements across a broader constellation of negative spider-related beliefs. Safety gear facilitated closer approach to the spider during the session; however, participants who did not use safety gear experienced greater improvement in perceived control. These findings suggest that safety behavior need not impair corrective learning during cognitive-behavioral interventions and that it might indeed enhance it. Results are discussed in terms of cognitive-behavioral treatments for anxiety disorders and of the role of safety behavior therein.

Keywords: Safety behavior; behavioral experiment; cognitive therapy; exposure; cognitive-behavior therapy; anxiety disorders.

Keep Your Eye on the Target: Safety Behavior Promotes Lower Levels of Targeted Maladaptive Beliefs following a Behavioral Experiment

According to cognitive-behavioral models of anxiety disorders, safety behavior plays a key role in the maintenance of pathological anxiety (Clark, 1999; Clark & Wells, 1995; Salkovskis, 1991). This highly idiosyncratic behavior consists of overt (e.g., avoidance, safety aids) and/or covert (e.g., mental distraction) strategies aimed at reducing distress or preventing feared outcomes in threatening situations (Salkovskis, Clark, & Gelder, 1996). The anxiety-maintaining function of safety behavior has been attributed to its interference with corrective learning (Salkovskis, 1991). To illustrate, a socially anxious individual who rehearses conversations before speaking with her co-workers lest she might otherwise 'run out of things to say' will not have the opportunity to test the validity of this prediction and to learn that she is probably capable of spontaneously generating conversation material. She instead might infer that the rehearsal allowed her to avert her feared catastrophe. Thus, the proposed critical mechanism for the maintenance of threat beliefs is the impaired acquisition of disconfirmatory information resulting from a misattribution of safety to one's reliance on safety behavior. It has also been hypothesized that safety behavior interferes with threat reappraisal by diverting attention away from disconfirmatory information (Powers, Smits, & Telch, 2004; Sloan & Telch, 2002) and that it hinders the development of new, non-threat associations necessary for inhibitory learning (Craske et al., 2008).

McManus, Sacadura, and Clark (2008) found that highly socially anxious participants used more safety strategies, with greater frequency, and across a broader range of situations than less socially anxious participants. By contrast, Okajima, Kanai, Chen, and Sakano (2010) reported that socially anxious and healthy participants endorsed the same number of strategies;

however, they observed that safety behavior contributed more strongly to anxiety and negative beliefs in the former group. The authors suggested that for anxious individuals, safety behavior is linked to the anticipation of negative outcomes. This hypothesis is supported by Salkovskis et al.'s (1996) findings that panic disorder patients' choice of specific safety strategies was meaningfully related to their catastrophic cognitions. Okajima et al. (2010) also noted that the comparable number of safety strategies used by anxious and healthy participants suggests that some safety behavior used by anxious individuals might function as adaptive coping behavior. As discussed by Thwaites and Freeston (2005), the distinction between helpful coping strategies and safety behavior presents a clinical challenge and mandates an analysis of the perceived function of given strategies in a specific context and of their impact on cognitions.

The current mandate of cognitive-behavioral treatments (CBT) to reduce and eventually eliminate patients' use of safety behavior has considerable empirical support. Studies comparing cognitive change under conditions of safety behavior utilization versus elimination have generally shown significant post-exposure improvements in both cases, but conditions discouraging safety behavior use have benefited from changes of greater magnitude (e.g., Kim, 2005; Morgan & Raffle, 1999; Powers et al., 2004; Sloan & Telch, 2002; Wells et al., 1995). Importantly, some of this work has been limited by the presentation of differing treatment rationales to the experimental groups, whereby a cognitive rationale was paired with instructions to drop safety behavior and a habituation rationale was paired with the maintenance of safety behavior (e.g., Salkovskis, Clark, Hackmann, Wells, & Gelder, 1999; Wells et al., 1995). It is feasible, as Salkovskis et al. (1999) suggested, that "the specifically cognitive rationale made it possible for the patients to take advantage of the experience of disconfirmation" (p.572).

To overcome the limitations of earlier studies, Sloan and Telch (2002) provided the same treatment rationale for all conditions in their investigation of safety behavior use by students with high claustrophobic fear. Nevertheless, by contrast to those in a comparison group, participants who were offered the use of safety strategies did not receive instructions for guided threat focus and reappraisal (GTR). Significant reductions in threat expectancies across six treatment trials were observed in safety behavior utilization, GTR, and control groups, with the greatest reductions in the GTR group. The authors concluded that GTR played a role in participants' disconfirmation of faulty threat perceptions. It is not possible to know from their design whether pairing safety behavior utilization with GTR would have yielded similar effects.

In subsequent work in this area, Powers and colleagues (2004) randomized participants with high claustrophobic fear to one of five conditions (exposure only, exposure with safety behavior utilization, exposure with safety behavior availability, credible placebo treatment, and wait list). All exposure-based interventions included an identical extinction rationale, indicating that an effective fear reduction strategy for is "to be exposed to the feared situation repeatedly until the anxiety decreases" (p. 450). Most participants in the exposure only condition (94%) achieved high end-state functioning post-treatment, whereas fear reduction was half as large for participants in the safety behavior availability and utilization groups. Changes in catastrophic cognitions were not measured, although it follows from the results that they might be of similar magnitude as was fear reduction. The authors emphasized the possible deleterious effects of not only safety behavior utilization during exposure but also its mere availability.

There is emerging evidence, however, that safety behavior use does not necessarily hinder therapeutic cognitive change (e.g., Deacon, Sy, Lickel, & Nelson, 2010; Hood, Antony, Koerner, & Monson, 2010; Milosevic & Radomsky, 2008; Rachman, Shafran, Radomsky, &

Zysk, 2011; Sy, Dixon, Lickel, Nelson, & Deacon, 2011; van den Hout, Engelhard, Toffolo, & van Uijen, 2011; for reviews see Parrish, Radomsky, & Dugas, 2008, and Rachman, Radomsky, & Shafran, 2008). Rachman et al. (2008) proposed that the *judicious* use of safety behavior, which involves offering safety strategies in the earlier stages of exposure and fading them as treatment progresses, has the potential to facilitate reductions in fear and maladaptive beliefs. They outlined a number of potential advantages of judiciously incorporating safety behavior into exposure-based treatments, one of them being that a sense of safety might enable patients to more readily "absorb corrective information about the threat" (p. 170).

Several earlier lines of research have yielded findings that generally lend support for the judicious use of safety behavior proposed by Rachman et al. (2008). Bandura, Jeffrey, and Wright's (1974) investigation into the effects of *response induction aids* during exposure treatment for snake phobia demonstrated substantially greater fear reduction for participants who relied on moderate or high levels of induction aids (e.g., gloves) than for those who were minimally aided. Bandura et al. stressed that the eventual fading of the aids ensured that participants would not attribute their success to them but rather to their own sense of mastery. In studies of escape safety behavior, de Silva and Rachman (1984) and Rachman, Craske, Tallman, and Solymon (1986) instructed agoraphobic participants to leave exposure to a feared situation if/when their fear reached a pre-set level and to return once it fear declined below a specified point. Those who received this treatment experienced improvements in agoraphobia comparable to those of a standard exposure group, with gains maintained at a 3-month follow-up.

More recent work by Deacon et al. (2010) tested the effects of judicious safety behavior use during a single-session intervention for claustrophobic fear. Participants in exposure only and exposure plus safety behavior conditions received identical rationales emphasizing the deleterious effects of avoidance and inaccurate threat beliefs on claustrophobic fear and the efficacy of exposure in reducing this fear. They were asked to “push themselves to face their fears as much as possible” (p. 74). After a series of exposure trials lasting up to 30 minutes, both groups demonstrated clinically significant change in peak fear at post-treatment and follow-up assessments. Furthermore, the use of safety behavior did not preclude cognitive change, as both groups experienced significant and comparable improvements in claustrophobia-related cognitions. Deacon et al. emphasized that their withdrawal of safety aids during treatment was a key methodological difference from previous studies in this area, which prevented the misattribution of safety to the aids and facilitated cognitive change.

Other research has demonstrated that even when safety aids are not faded, they do not necessarily exert deleterious effects on fear reduction and cognitive change. Milosevic and Radomsky’s (2008) study of safety gear use by snake-fearful individuals during a 45-minute exposure session showed no deleterious effects of safety gear use, with participants who used and who did not use safety gear demonstrating comparable and robust pre- to post-treatment changes in fear and maladaptive cognitions. Participants who used safety gear approached a live snake more closely during the early stages of the exposure session, suggesting that safety gear promoted approach behavior and possibly the acquisition of disconfirmatory information.

Similarly, Hood et al. (2010) found that spider-fearful participants who were encouraged to use safety behavior during a two-stage 35-minute exposure task with a live spider experienced significant reductions in self-reported fear and negative beliefs. Safety behavior was not faded during exposure. These gains were comparable to those of participants who were discouraged from using safety behavior, and they remained stable for both groups at a 1-week follow-up assessment, leading the authors to conclude that use of safety behavior “did not preclude meaningful changes in beliefs and associated functioning” (p. 1167).

A recent innovative program of research by Rachman et al. (2011) and van den Hout et al. (2011) compared standard exposure and response prevention (ERP) and exposure plus safety behavior (E+SB) during two sessions, separated by two weeks, in which undergraduate participants completed a series of brief exposure trials to contaminants. Whereas in the ERP condition participants refrained from engaging in any washing behavior after touching a contaminant, those in the E+SB condition used a hygienic wipe following each exposure. Ratings of contamination, fear, disgust, and danger (CFDD) were obtained after each exposure and, in the ERP group, before washing. The general findings across both studies indicated significant and comparable reductions in CFDD ratings in both conditions. Most importantly for the current study, danger cognitions were significantly reduced in both conditions, suggesting that E+SB did not preclude the disconfirmation of maladaptive cognitions. This work warrants replication in a clinical sample, as baseline perceptions of danger were low. Rachman et al. (2011) hypothesized that greater declines in problematic cognitions will be evident following E+SB when baseline ratings are higher.

Taken together, the existing literature both supports the role of safety behavior in the maintenance of threat perceptions and suggests that, in some instances, safety strategies might be valuable in *facilitating* disconfirmatory experiences. Previous experimental research has been limited by a confound of differing treatment rationales and/or methods in the context of the safety behavior manipulation (McManus et al., 2008; Salkovskis et al., 1999; Sloan and Telch, 2002, Wells et al., 1995), although several studies have presented the same rationale to all experimental groups (Deacon et al., 2010; Powers et al., 2004; Sy et al., 2011). In these studies, participants were informed of the role of unrealistic threat beliefs in fear maintenance, but the treatment rationale and methods nevertheless emphasized repeated exposure for fear reduction rather than the acquisition of fear-disconfirming information for belief change. To our knowledge, only Hood et al. (2010) included a condition of safety behavior use under an expressly cognitive rationale, although their protocol also focused on progressive exposure.

Cognitive interventions typically include instructions to reduce or eliminate safety behavior, a design consistent with cognitive models of anxiety disorders (e.g., Clark, 1999; Salkovskis, 1991). Notably, studies that have shown that safety behavior does not necessarily preclude cognitive change have all relied on exposure-based paradigms and it is therefore not known what effects this type of safety behavior has in the context of cognitively-based paradigms. Given findings on the possible facilitative effects of safety behavior in exposure-based interventions, it is possible that further facilitative effects might become evident when safety behavior use is paired with cognitive reappraisal. Safety behavior may allow participants to engage in a broader repertoire of hypothesis testing about their threat beliefs (e.g., through closer behavioral approach) and, by extension, to more readily acquire corrective information.

The present study thus aimed to extend previous work on the impact of safety behavior on information acquisition by introducing a condition of encouraged safety gear (i.e., safety behavior) use in the context of a behavioral experiment, a powerful cognitively-based intervention known to promote change in beliefs and other cognitive domains via carefully constructed, hypothesis-driven exercises (Bennet-Levy et al., 2004). As reviewed above, a growing literature has given rise to diverse definitions of safety behavior. In the current study, we operationalized it broadly as consisting of strategies that might reduce discomfort or anxiety during exposure to a feared situation. The extent to which such strategies interfere with corrective learning was treated as an empirical question.

Our primary hypothesis was that safety gear use would promote information acquisition and disconfirmation of negative beliefs in a sample of spider-fearful participants. We expected that all participants would demonstrate significant declines in the strength of their threat beliefs following the behavioral experiment but that those who used safety gear during the session would benefit from greater change. We anticipated that participants who used safety gear would more readily gather corrective information when asked to test the validity of their threat beliefs (i.e., with less restriction to their information gathering behavior). We also evaluated self-efficacy, perceived-control, and subjective anxiety, and we expected that the safety gear group would demonstrate greater improvements on these measures than the control group. We further assessed treatment acceptability and, as predicted by Rachman et al. (2008), we anticipated that participants who used safety gear would provide ratings of greater treatment acceptability than those who did not use it.

Method

Participants

Recruitment. Participants were recruited from two universities and their surrounding communities in Montreal, Canada. Recruitment methods included classroom announcements, posters, and online classified advertisements. Individuals who expressed interest in participating were screened for spider fearfulness with a questionnaire assessing fear of eight items/situations, including spiders, on a 7-point Likert scale. Those who endorsed either of the two highest fear ratings for spiders, “very much fear” or “terror”, were invited to participate in the study provided they did not report symptoms of depression during a brief telephone screening interview based on criteria from the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 2000). An additional eligibility criterion was incorporated into the baseline assessment of the study: participants who were able to place their hand in a tank with a live spider during an initial behavioral approach test (BAT) were excluded from further testing.

Overall, 144 individuals met eligibility criteria during the first screening procedure and agreed to attend a single test session in the laboratory. They were compensated at a rate of $10/hour. Seventeen participants placed their hand in the spider tank during an assessment BAT and were excluded from subsequent procedures. One additional participant, who completed the study, was excluded from analyses for noncompliance with the experimental protocol. Analyses were conducted with the remaining 126 participants. An a priori power analysis of the main measure of interest (Spider Phobia Beliefs Questionnaire; see below) indicated that an *N* of 126 was necessary to correctly reject the null hypothesis with 80% power based on a small effect.

Participant characteristics. Participants ranged in age from 18 to 62 years (*M* = 23.37, *SD* = 5.98) and 92.1% were women. The majority identified their ethnic background as European (65.9%), with the rest identifying as Middle Eastern (6.3%), multi-ethnic (6.3%), Hispanic (4.8%), South Asian (4.8%), African Canadian (3.2%), East Asian (2.4%) and other (.8%). Seven participants (5.6%) did not identify their ethnicity. None of the participants had previously received treatment for spider fear. Their scores on the specific phobia section of the Anxiety Disorders Interview Schedule for the DSM-IV (DiNardo, Brown, & Barlow, 1994), the Beck Anxiety Inventory (Beck, Epstein, Brown, & Steer, 1988), and the Beck Depression Inventory-II (Beck, Steer, & Brown, 1996) indicated that this was a sub-clinical sample (see Table I). Eleven (8.7%) participants met criteria for spider phobia. However, participants' baseline scores on two spider fear indices (Fear of Spiders Questionnaire and spider-related beliefs subscale of Spider

Phobia Beliefs Questionnaire; see below) were comparable to those of clinically phobic populations (Arntz, Lavy, Van den Berg, & Van Rijsoort, 1993; Muris & Merckelbach, 1996).

Measures

Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV). The ADIS-IV (Di Nardo et al., 1994) is a semi-structured and commonly used standardized clinical interview schedule that assesses current diagnoses of anxiety, mood, somatoform, and substance use disorders consistent with DSM-IV criteria. Participants were administered the specific phobia section to determine their diagnostic status for the disorder. The ADIS-IV has excellent interrater reliability for a current principal diagnosis of specific phobia ($\kappa = .86$; Brown, Di Nardo, Lehman, & Campbell, 2001). It was administered by the first author to all participants. As it was not used as a screening tool or a dependent measure, diagnostic reliability was not evaluated in the current study.

Beck Anxiety Inventory (BAI) and Beck Depression Inventory-II (BDI-II). The BAI (Beck et al., 1988) and BDI-II (Beck et al., 1996) are standardized and well used 21-item self-report measures assessing state anxiety and depressive symptoms, respectively. They have been shown to have excellent psychometric properties (BAI $\alpha = .92$, Beck et al., 1988; BDI-II $\alpha = .93$ in college students, Beck et al., 1996). These measures were administered in order to collect normative data about the sample.

Fear of Spiders Questionnaire (FSQ). The FSQ (Szymanski & O'Donohue, 1995) is an 18-item self-report measure of spider phobia. Total scores range from 0 to 126, with higher scores indicating greater fear. The FSQ discriminates between phobic and non-phobic individuals and is sensitive to decrements in phobic responding during treatment. In a study of female participants with spider phobia, pre- and post-exposure treatment scores were 89.1 (SD = 19.6) and 39.9 (SD = 25.4), respectively (Muris & Merckelbach, 1996). The FSQ has high internal consistency ($\alpha = .92$; Szymanski & O'Donohue, 1995), high test-retest reliability ($r = .91$), and adequate convergent validity (Muris & Merckelbach, 1996). In the current study, it was administered to assess the degree of spider fear before and after a behavioral experiment.

Self-Efficacy Rating Scale. This measure, which assesses task performance beliefs, was adapted from the work of Bandura and Adams (1977). It requires participants to rate their degree of certainty in their ability to perform a specific task on a scale from 0 to 100, with 0 being completely uncertain and 100 being completely certain. This scale has been widely used in studies investigating self-efficacy (e.g., Zoellner, Echiverri, & Craske, 2000). In the current study, it was administered orally to assess participants' degree of certainty about being able to approach a spider during a behavioral approach test.

Behavioral Approach Test (BAT). The BAT is a commonly used behavioral index of fear in anxiety disorders research. In the present study, participants were instructed to approach the spider as closely as they are able, yielding a distance measure coded along a 33-point hierarchy, ranging from standing outside the therapy room with the door closed to holding the spider. Greater numbers on the hierarchy indicate a closer proximity to the spider.

Subjective Units of Distress Scale (SUDS). The SUDS (Wolpe, 1958) is a widely used measure of subjective fear during exposure-based exercises. It enables participants to quickly rate their current reactivity on scale of 0 to 100, with 0 being no distress and 100 being the worst imaginable distress. It was administered at the closest distance of approach during the BATs and at 5-minute intervals during the behavioral experiment.

Anxiety Control Questionnaire-Revised (ACQ-R). The ACQ-R (Brown, White, Forsyth, & Barlow 2004) is a 15-item self-report measure that assesses one's perceived ability to control anxiety-related emotional reactions and external threats. Total scores range from 0 to 75, with higher scores indicating greater perceived control. The ACQ-R global scale has demonstrated good reliability with both clinically anxious ($\alpha = .85$; Brown et al., 2004) and non-clinical participants ($\alpha = .87$; Moulding & Kyrios, 2007). It was administered in the current study to assess participants' perceptions of control over emotions, stress, and threat during a behavioral approach to a spider. Modified instructions asked participants to rate how much each statement was characteristic of them while they were in the presence of the spider.

Spider Phobia Beliefs Questionnaire (SBQ). The SBQ (Arntz et al., 1993) is a self-report measure of one's catastrophic beliefs about spiders (e.g., When there is a spider in my vicinity, I believe that the spider will attack me) and about one's own reactions when encountering a spider (e.g., If the spider does not go away, I will become crazy because of anxiety), assessed with 42- and 36-item subscales, respectively. Respondents are asked to rate the strength of their beliefs along a 100-point scale, with 0 = "do not believe it at all" and 100 = "absolutely believe it". Scores are obtained by calculating the mean rating for each subscale. The SBQ has demonstrated sensitivity to the effects of treatment. Scores in a sample of patients with spider phobia before and after exposure treatment were 48.76 ($SD = 17.74$) and 10.15 ($SD = 13.69$) for the spider-related beliefs subscale, respectively, and 49.79 ($SD = 18.72$) and 8.00 ($SD = 13.15$) for self-related beliefs subscale, respectively (Arntz et al., 1993). The SBQ has demonstrated excellent internal consistency for both subscales ($\alpha = .94$) and acceptable test-retest reliability (spider-related, $r = .64$; self-related, $r = .71$). It was used to assess belief change in the current study.

Safety Behavior Inventory (SBI). The SBI is a 22-item self-report measure developed by the authors of the current study to assess respondents' perceived need to rely on a broad range of covert and overt safety behaviors during anxiety-provoking situations. Respondents are asked to indicate to what extent given strategies were essential to their ability to endure a specific situation, with response options ranging from 0 = "did not use" to 5 = "extremely essential-could not have endured situation without it". The SBI was administered to ensure equality of groups in terms of non-safety gear safety behavior (i.e., to ensure that participants in the control group were not supplementing the absence of safety gear with additional strategies during their exposure to the spider). This measure has demonstrated good internal consistency in samples of nonclinical (αs = .84 - .85) and clinically anxious (α = .89) participants (Milosevic & Radomsky, 2011). In the current study, it had acceptable internal consistency (α = .71).

Endorsement and Discomfort Scale. This 10-item self-report scale was developed by Tarrier, Liversidge, and Gregg (2006) for research on treatment preference and acceptability. It includes dimensions assessing acceptability, suitability, tolerability, expectation of positive benefit, credibility, efficacy, appropriateness, reasonableness, justifiability, and discomfort. Tarrier et al. (2006) found that the first nine dimensions loaded onto a factor that they conceptualized as treatment endorsement, and a second component, which included just the remaining item, was labeled as treatment discomfort. This measure was administered to determine to what extent participants would find the types of therapeutic procedures used in the study as an acceptable treatment option in a clinical setting. In the current study, the treatment endorsement scale demonstrated excellent internal consistency (α = .94).

Spider and Exposure Room

The fear stimulus was a docile Chilean Rose tarantula (11 cm diameter). The tarantula was presented to the participants in an empty clear plastic terrarium (33 cm x 19 cm x 16 cm) with a removable lid. The terrarium was placed on a 110 cm-high cabinet located in a corner of the room that was used for exposing participants to the spider. The room in which participants were exposed to the spider was 3.13 x 2.30 m. Distance markers with intervals of 0.30 m were placed on the floor in red tape, spanning the farthest to the closest distance to the spider terrarium (i.e., 2.74 m), which facilitated the measurement of distance of approach during the BATs.

Procedures Common to Both Groups

Participants were tested individually in a laboratory setting. All procedures not involving the spider were conducted in a room different from the one in which tasks involving the spider took place. The same spider was used during the BATs and the behavioral experiment, and at the starting point of both of these procedures, the spider was located inside a clear, closed terrarium on top of a cabinet, as described above. With the exception of BATs conducted at baseline (i.e., pre-session) and 20 minutes following the behavioral experiment (i.e., post-session), all procedures were conducted by the first author, who followed a standardized protocol. The pre- and post-session BATs were conducted by a research assistant who was blind to participants' condition and who also adhered to a standardized protocol.

After providing informed consent, participants were administered the phobia section of the ADIS-IV. They then completed the BAI, the BDI-II, and the FSQ, followed by a baseline BAT. Before they approached the spider, participants were asked to provide ratings of certainty regarding their ability to approach it (i.e., self-efficacy). At the distance of closest approach, they provided a SUDS rating. They then completed the ACQ-R and the SBQ. The experimenter then explained to them that the next part of the study would involve a 20-minute activity with the spider. At this point, participants were randomly assigned to one of the two conditions, safety gear or control, and those who were in the safety gear condition were given the opportunity to select items to take with them to the session with the spider (see *Conditions* below).

Participants next completed a 20-minute behavioral experiment during which they gathered information to test a negative belief about the spider (see *Rationale and Behavioral*

Experiment below). During this task, SUDS ratings and the distance from the spider were recorded at 5-minute intervals. At the end of the session, the experimenter guided participants through another BAT (i.e., end-of-session BAT during which protective gear was still worn by the safety gear group) and collected data on self-efficacy and SUDS ratings at closest approach.

Following the behavioral experiment, participants completed the ACQ-R again, as well as the SBI. They were given 20 minutes to complete these measures (which take approximately 5-10 minutes to complete). For the remainder of the time, they were provided with magazines as a filler task. Thus, there was a standardized 20-minute delay between the end of the behavioral experiment and the re-administration of baseline measures, which included the FSQ, the BAT (including self-efficacy and SUDS ratings obtained prior to and at the closest approach to the spider, respectively), the ACQ-R, and the SBQ. All participants completed the behavioral component of this final assessment without the use of safety gear. Participants also completed the Endorsement and Discomfort Scale and responded to additional questions about treatment acceptability. They were then debriefed and compensated for their time.

Conditions

Participants assigned to the safety gear condition were shown a selection of 14 safety items, such as gloves of various sizes, head covers, and goggles. The items were described as gear that might be helpful to them while they are in the room with the spider. They were instructed to select any number of items, with as few as one and as many as all of them. Participants in the control condition were not made aware of the safety gear and proceeded immediately to the next part of the study.

Rationale and Behavioral Experiment

All participants were provided with a cognitive rationale for the treatment of spider fear, emphasizing the importance of acquiring information to test negative beliefs. The experimenter worked with each participant to select his/her most strongly held negative belief from the SBQ (for those who endorsed several equally strong beliefs, standardized guidelines were offered for selecting just one). Participants then received detailed instructions for how to proceed during the 20-minute session with the spider, which was framed as a behavioral experiment. They were instructed to acquire as much information as possible to test the accuracy of their target belief.

The behavioral experiment was conducted in the presence of the experimenter but was guided by the participants, who were instructed to move around the room freely and at their own pace (if they elected to do so, they were permitted to touch or hold the spider). The experimenter's role during this part of the study was to record, at 5-minute intervals, whether participants had removed the lid from the spider terrarium and to query them for SUDS ratings. The experimenter additionally provided a standardized instructional reminder (e.g., "Keep in mind that your goal is to obtain information to test the accuracy of your belief that...") at the 5, 10, and 15-minute assessment points.

The experimenter's interaction with participants during the behavioral experiment was limited to the aforementioned assessments and prompts. To minimize the possible distraction of conversation and to reduce the likelihood of the experimenter's differential treatment of groups, participants were instructed before the start of the session to restrict conversation to aspects of the protocol. When questions arose during the session, only those related to clarification of the protocol were answered; the experimenter responded to all other queries by indicating that they will be addressed at the end of the study and by asking participants to re-focus on the task.

Results

Baseline Comparability of Groups

Participant characteristics. Participants in the safety gear and control groups did not differ in age, $t(121) = .38$, $p = .70.$, or sex, $\chi^2(1, N = 126) = .00$, $p = .63$. They were also similar in terms of the specific phobia severity rating on the ADIS-IV, $t(124) = .00$, $p = 1.00$, diagnosis of specific phobia, $\chi^2(1, N = 126) = .10$, $p = .75$, and mean total scores on the BAI, $t(124) = .76$, $p = .45$, and the BDI-II, $t(124) = 1.33$, $p = .19$ (see Table I for means and standard deviations).

Outcome measures. A series of independent samples *t*-tests was conducted to ensure the baseline equivalence of groups for the outcome measures. There were no significant baseline differences between conditions on the FSQ, $t(124) = .05$, $p = .96$, Cohen's $d = .01$, on the SBQ spider-related beliefs subscale, $t(124) = .65$, $p = .52$, Cohen's $d = .12$, and the self-related beliefs subscale, $t(124) = 1.31$, $p = .19$, Cohen's $d = .23$. There were also no between-group differences in terms of self-efficacy (SE), $t(124) = .65$, $p = .52$, Cohen's $d = .12$, distance of approach to the spider, $t(124) = .62$, $p = .54$, SUDS ratings at distance of closest approach, $t(120) = 1.05$, $p = .28$, Cohen's $d = .11$, and in terms of ACQ-R scores, $t(123) = .47$, $p = .64$, Cohen's $d = .09$. There was a nonsignificant trend on the SBQ target belief to be more strongly endorsed in the control condition, $t(124) = 1.76$, $p = .08$.

Effectiveness of Behavioral Experiment

Cognitive change. To assess the impact of the behavioral experiment on participants' change in maladaptive beliefs, a one-way ANCOVA was conducted on the post-session ratings of the target SBQ belief (co-varying out the marginal baseline difference between conditions), and 2 x 2 (condition x time) repeated measures ANOVAs were conducted for each of the two SBQ subscales. Participants in the safety gear condition reported significantly lower post-session ratings of the strength of their target negative belief relative to the control condition, $F(1, 123) =$

4.96, $p < .05$, partial $\eta^2 = .04$, and participants in both conditions reported significant and comparable declines in the strength of their negative beliefs about spiders, $F(1, 24) = 196.43$, $p < .001$, partial $\eta^2 = .61$, and about themselves in the presence of a spider, $F(1, 23) = 199.17$, $p < .001$, partial $\eta^2 = .62$ (see Figure 1; means and standard deviations are reported in Table II). We did not observe significant condition x time interactions or between-participant effects for either spider-related beliefs, $F(1, 124) = .67$, $p = .41$, partial $\eta^2 = .01$ and $F(1, 124) = .08$, $p = .77$, partial $\eta^2 = .001$, respectively, or self-related beliefs, $F(1, 123) = 2.47$, $p = .12$, partial $\eta^2 = .02$ and $F(1, 123) = .72$, $p = .40$, partial $\eta^2 = .01$, respectively.

Fear change. To assess the effect of the behavioral experiment on self-reported fear of spiders, a 2 x 2 repeated measures ANOVA was conducted for the FSQ. A significant main effect of time was observed, with participants in both groups experiencing a pre- to post-intervention decline in spider fear, $F(1, 124) = 151.63$, $p < .001$, partial $\eta^2 = .55$. No significant interaction, $F(1, 124) = .32$, $p = .58$, partial $\eta^2 = .003$, or between-participant effects were observed, $F(1, 124) = .07$, $p = .80$, partial $\eta^2 = .001$, for this measure.

Participants' distance of closest approach to the spider during three BATs (before, immediately after, and 20 minutes after the behavioral experiment) and their SUDS ratings at this distance were subjected to 2 x 3 (condition x time) repeated measures ANOVAs[1]. A significant main effect of time was observed for each measure, indicating that both groups increased their proximity to the spider across the BAT assessments, $F(1.38, 170.26) = 242.08$, $p < .001$, partial $\eta^2 = .66$, and they reported lower subjective distress at the distance of closest approach, $F(1.86, 221.53) = 25.14$, $p < .001$, partial $\eta^2 = .17$. There were no significant interactions or between-participant effects for either of these measures, all Fs < .89, ps > .41, indicating comparable improvement across the assessment points and between conditions (see Table II for means and standard deviations of fear measures).

Change in self-efficacy and perceived control. Self-efficacy ratings taken prior to each BAT and ACQ-R scores obtained after each BAT were subjected to 2 x 3 (condition x time) repeated measures ANOVAs. There was a main effect of time for each measure, with participants across both conditions reporting greater certainty in their ability to approach the spider after the behavioral experiment[1], $F(1.10, 135.60) = 41.13$, $p < .001$, partial $\eta^2 = .25$, and greater perceived control during the approach[1], $F(1.64, 199.74) = 70.10$, $p < .001$, partial $\eta^2 = .37$ (see Table II for means and standard deviations). No significant between-participant or interaction effects were observed for self-efficacy ratings, and there was no between-participant effect for ACQ-R scores, *F*'s < 1.04, *p*s >.31. There was, however, a significant interaction effect[1] for the ACQ-R, with greater improvement in perceived control for participants who did not use safety gear, $F(1.64, 199.74) = 4.74$, $p = .02$, partial $\eta^2 = .04$. Follow-up *t*-tests of between-group differences of ACQ-R change scores between each of the three assessment points suggest that the control group experienced greater increases in perceived control between the baseline BAT and the BAT immediately following the behavioral experiment, $t(123) = 2.43$, $p = .02$, Cohen's $d = .43$, and between the baseline and final post-session BATs, $t(122) = 2.36$, $p = .02$, Cohen's $d = .42$.

Time-Course Analysis of Behavioral Experiment

To assess the impact of safety behavior on initial fear reduction during exposure, the session was divided into four intervals (0 to 5 minutes, 5 to 10 minutes, 10 to 15 minutes, and 15 to 20 minutes). Independent samples t-tests were then conducted for distance of approach and SUDS ratings at each interval. Use of safety behavior was found to have a significant effect on the distance of approach during the first interval, $t(101) = 2.06$, $p = .04$, Cohen's $d = .41$, with participants in the safety behavior group ($M = 6.75$, $SD = 5.77$), demonstrating a greater increase in their approach to the spider than controls ($M = 4.73$, $SD = 4.06$) during the first 5 minutes of the behavioral experiment (see Figure 2). A significant difference was further observed for SUDS ratings during the second interval, $t(124) = 3.11$, $p = .002$, Cohen's $d = .55$, with participants in the control group reporting a decrease in subjective distress between 5 and 10 minutes ($M = -5.49$, $SD = 14.92$), whereas participants in the safety behavior group reported an increase in subjective distress during this interval ($M = 2.94$, $SD = 15.46$; see Figure 2).

To eliminate a possible bias from our examination of approach behavior[2], we conducted a secondary analysis with a focus on whether participants had chosen to remove the lid from the terrarium while gathering information about the spider (data was available for the entire sample). A chi-square test was conducted for five assessment points (taken at 5-minute intervals) during the behavioral experiment. No significant differences were observed; however, there were two nonsignificant trends for more participants in the safety gear condition to remove the lid from the spider terrarium while testing their beliefs at 10 minutes, $\chi^2(1, N = 126) = 2.93$, $p = .09$, $\Phi = .15$, and at 15 minutes, $\chi^2(1, N = 126) = 2.64$, $p = .10$, $\Phi = .15$, into the session.

Safety Behavior Utilization

Safety gear condition. The mean number of safety items selected by participants in the safety gear condition was 1.53 ($SD = 1.14$). The most frequently selected items were a pair of long gloves, a pair of short gloves, and a protective jacket, selected by 48.40%, 25.80%, 17.70% of participants, respectively. Twenty-one different combinations of items were selected. We examined whether this idiosyncratic selection was associated with particular types of cognitions. Safety gear items were divided into four categories that represented the area of the body on which they were worn, thus the area which was protected. These included the head/face (3 items), upper body not including the head (3 items), arms/hands (4 items), and legs/feet (4 items). Categories of cognitions were represented by the two SBQ subscales. Correlational analyses indicated that self-related beliefs were significantly positively associated with all categories of safety gear (all *r*s = .29, $p < .05$), whereas there were no significant associations between any of these categories and spider-related beliefs (*r*s <.17). Thus, it appears, that participants' selection of safety gear was informed by their concerns about their reactions when encountering a spider more so than by their expectations about the spider's behavior.

Covert safety behavior utilization. To evaluate whether there were between-group differences in participants' use of covert and/or non-safety gear safety behavior, an independent samples *t*-test was conducted on the mean SBI scores. There were no significant differences between the safety behavior ($M = 38.03$, $SD = 13.72$) and control ($M = 35.44$, $SD = 11.50$) groups on this measure, $t(124) = 1.15$, $p = .25$, Cohen's $d = .20$, indicating that participants in the control group did not disproportionately rely on other safety behaviors in the absence of safety gear. The mean number of reported safety behaviors used during the behavioral experiment across both conditions was 11.75 ($SD = 4.02$). Participants' mean rating of their perceived need to rely on these safety behaviors was 3.19 ($SD = .69$), suggesting that they perceived them as being somewhat essential (i.e., they could have endured situation without them but with some difficulty). The most frequently endorsed safety strategies across both conditions included moving about very slowly (96.80%) and trying to control one's thoughts (90.40%).

Treatment acceptability. Independent samples *t*-tests of mean scores on the treatment endorsement and discomfort scales were conducted to determine whether the use of safety gear during the behavioral experiment affected participants' perceptions of the acceptability of this method. No significant between-group difference was observed for treatment endorsement, $t(123) = .71$, $p = .48$, Cohen's $d = .13$. Both groups highly endorsed the behavioral experiment, with a mean item score of 7.26 on a 9-point Likert scale where 9 was the highest possible endorsement. There was a nonsignificant trend for participants in the control group to report greater anticipated discomfort than those in the safety gear group at the prospect of undergoing a treatment for their spider fear that incorporated elements such as the behavioral experiment from the current study, $t(123) = 1.69$, $p = .09$, Cohen's $d = .30$.

Discussion

This study examined the effect of safety gear use during a behavioral experiment on change in threat beliefs. To our knowledge, this is the first study in which encouraged safety behavior was paired with a cognitively-based intervention. Our hypothesis that safety gear would facilitate the acquisition of corrective information was partially supported. Compared to those in the control condition, participants who used safety gear benefited from a significantly greater improvement in the negative belief they tested during the behavioral experiment. Participants in both conditions experienced significant and comparable declines in the overall strength of their negative spider- and self-related beliefs. The findings that use of safety gear enhanced improvement in specific threat beliefs and that it did not preclude broader cognitive change is consistent with recent work this area (Deacon et al., 2010; Hood et al., 2010; Milosevic & Radomsky, 2008) and with earlier studies (de Silva & Rachman, 1984; Rachman et al., 1986). Our results suggest a challenge to the premise that safety behaviour unequivocally hinders corrective learning and offers potential for its judicious incorporation in CBT protocols to promote cognitive change.

Safety gear facilitated a closer approach to the spider during the behavioral experiment, which we anticipated might be the mechanism of superior cognitive change in this group. Participants who used safety gear approached the spider more closely during the first 5 minutes of the session. They also reported increased subjective distress following this interval, which is unsurprising, as moving closer to a feared stimulus is likely to temporarily increase distress. No between-group differences in distress were evident during two subsequent assessments.

There were no significant between-group differences in participants' choice to remove the lid from the terrarium while gathering information about the spider. Two nonsignificant trends suggest that participants who used safety gear were willing to expose themselves to a more threatening situation (i.e., terrarium with removed lid) to gather corrective information. However, based on these findings, we cannot conclude that safety gear yielded an advantage in participants' hypothesis-testing behavior, and further research that includes a more thorough and systematic assessment of participants' behavior during the behavioral experiment is warranted.

Notably, participants in the control condition ascended the exposure hierarchy by approximately 10 steps during the BAT that immediately followed the behavioral experiment, effectively 'catching up' to the safety gear condition. One reason for this might be the shift from an exploratory, unstructured task to one that specifically encourages approach behavior. Perhaps in the absence of safety gear, participants were less likely to volunteer to approach the spider, whereas they were willing to do so if asked explicitly. Another explanation is a change in sample composition, as we were unable to code the approach distance for all participants during the behavioral experiment. Whereas different methodology, such as asking participants to gather information while adhering to a standardized hierarchy, would have enabled us to describe everyone's behavior during the session, it would have also hindered the idiosyncratic nature of information gathering. For instance, one participant who was concerned that the spider was unpredictable tested this belief by turning off the lights, whereas another, who believed the spider would approach him, placed it on the floor and observed its behavior. While some participants could have adapted their belief testing strategies to a more restrictive protocol, others might not have been able to do so effectively, thus compromising the study's ecological validity.

The results further showed that use of safety gear did not impair fear change, with both conditions benefiting from significant pre- to post-session reductions in fear based on a self-report measure, a behavioral index, and SUDS ratings. These findings are broadly consistent with a growing literature showing that the incorporation of safety behavior into exposure-based treatments is not necessarily detrimental (Deacon et al., 2010; Hood et al., 2010; Milosevic & Radomsky, 2008; Rachman et al., 2011; van den Hout et al., 2011). We also observed significant and comparable increases in confidence about approaching the spider in both conditions, a finding similar to that of Hood et al. (2010). Participants who did not use safety gear, however, experienced a greater increase in perceived control between the baseline assessment and the end-of-session and 20-minute post-session assessments. Perhaps the more rapid approach behavior by those who used safety gear negatively impacted their perceptions of control. Alternatively, the offer of safety gear might have signaled that exposure to the spider will be uncontrollable or unpredictable. Deacon et al. (2010) have similarly discussed the potential for safety behavior manipulations to increase participants' perceptions of danger during exposure. These hypotheses highlight the possibility that introducing safety behavior into treatment may have unintended negative consequences, and future research should thus directly assess participants' perceptions of the offer of safety strategies during exposure.

Of note, our interpretations of the perceived control results are limited by our use of the ACQ-R, which is not specific to spider or phobic fear. Although we modified the instructions to reflect the current protocol, we do not know how participants interpreted the item content, which remained in its original format. More specific assessment of perceived control during exposure to fear-provoking situations should be applied in future investigations.

Proponents of judicious safety behavior use cite improvements in treatment acceptability as an important possible benefit of incorporating it into the early stages of exposure-based treatment (Rachman et al., 2008). When we asked participants to consider the acceptability of receiving a full course of treatment for their spider fear that incorporated elements such as the behavioral experiment, both conditions endorsed the treatment to the same extent. Although there was a nonsignificant trend for those in the control condition to report greater anticipated discomfort during this treatment, our overall results on acceptability do not support the hypothesis that use of safety gear would improve the acceptability of the behavioral experiment. As we relied on a sub-clinical, non-treatment seeking sample, we cannot draw firm conclusions about the impact of safety behavior use on treatment acceptability. Furthermore, the 20-minute session in this study did not, of course, encompass the full range of interventions in CBT, particularly graduated exposure, which likely poses a greater threat to acceptability.

Interestingly, our findings suggest that all categories of selected safety gear were more closely associated with self-related beliefs (e.g., “I will die of fear”) than to expectations about the spider, suggesting that the availability of other types of safety behavior might have better addressed these beliefs. This finding is somewhat surprising, as the safety gear, much of it beekeeping equipment, has a principal function of physical protection, which seems highly suitable for addressing spider-related beliefs such as “The spider will bite me”. Participants were aware, having completed a baseline BAT, that the spider was in a closed terrarium; perhaps the anticipation that it would remain in the terrarium during the behavioral experiment shifted the perceived value of the safety gear from the spider to the participant.

Analysis of the SBI indicated that participants in both conditions were relying, to the same extent, on a substantial number of additional safety strategies, which has been previously observed even when participants were instructed to drop all safety behavior (e.g., Hood et al., 2010; Morgan & Raffle, 1999). The use of additional safety behavior might have weakened the effects of our manipulation; however, as we observed group differences on several measures and in light of studies with diverse methodology reporting few group differences in cognitive change and fear reduction, it is also reasonable to conclude that our manipulation was effective. Importantly, given participants' use of additional safety behavior across conditions, our conclusions are limited to the effects the safety gear. The safety behavior manipulation in Hood et al.'s (2010) study, which included a number of methodological similarities to ours, consisted of a more extensive array of strategies (e.g., looking away from the spider, standing close to the exit), suggesting that the effects of safety gear might generalize to other forms of safety behavior. Nevertheless, this common limitation in the existing literature must be addressed in future studies with the inclusion of a comparison group in which no safety behavior is used. It would also be worthwhile to compare the therapeutic impact of fading this baseline level of safety behavior to that of conditions in which safety behavior is added.

Two important considerations in reconciling the differences between studies that have reported detrimental effects of safety behavior use and those that have found facilitative effects include the distinctions between adaptive coping strategies and safety behavior and between the *judicious* use of safety behavior and safety behavior that is not faded during treatment. It is possible that safety gear, which has been shown to facilitate approach to threatening stimuli (Hood et al., 2010; Milosevic & Radomsky, 2008), functions as an adaptive coping strategy that assists participants with enduring exposure-based experiences without hindering the acquisition of corrective information. By contrast, the type of behavior that has been encouraged or retained in safety behavior conditions in studies showing its detrimental effects (e.g., avoidance of eye contact in social situations; McManus et al., 2008) clearly has the capacity to interfere with corrective learning. Whereas the difference between adaptive and maladaptive safety strategies in these examples is quite clear, it is also possible for the same types of strategies to promote or detract from disconfirmatory experiences (Thwaites & Freeston, 2005). For instance, Deacon et al. (2010) and Powers et al. (2004) provided participants with similar coping aids but observed different effects on fear reduction, the former facilitative and the latter disruptive. In this case, it appears that the withdrawal of the safety aids during treatment (i.e., their judicious use) was a key factor in determining their effect. Future studies should undertake direct comparison of the effects of judicious safety behavior use to that of safety strategies that are not withdrawn.

As our protocol did not include a no-treatment or waitlist control condition, we cannot establish the general effectiveness of the two interventions. Furthermore, without a long-term follow-up, we do not know to what extent belief change was sustained beyond the duration of the study. Current evidence suggests that gains in corrective learning facilitated by safety behavior can indeed be maintained in the longer term, including at 3-month (Rachman et al., 1986) and 1-week follow-ups (Hood et al., 2010). Notably, Hood et al. (2010) found that many participants in a safety behavior condition discontinued their use of the behavior at follow-up, suggesting that corrective learning rendered the behavior unnecessary over time. Longer follow-up periods are needed to establish whether the introduction of safety strategies into treatment increases patients' risk for maladaptive use of these or new strategies or for return of fear.

An additional limitation includes the shared setting between the BATs and the behavioral experiment, and we thus do not know to what extent the results generalize to a different context. The generalizability of our findings is also limited by the mostly female, sub-clinical sample. While clinically anxious individuals stand to benefit most from the inclusion of safety strategies in CBT, they might also be more vulnerable to consolidating these strategies with maladaptive behavior. The effect of symptom severity on response to safety behavior offered during treatment is an empirical question, and it points generally to the need for research aimed at establishing empirically-based guidelines for judicious safety behavior use.

Most studies that have not found detrimental effects of safety behavior use have focused on phobic fear, raising the possibility that the role of safety behavior during treatment of specific phobias is distinct from its role in the treatment of other anxiety disorders (for a discussion on this topic, see Hood et al., 2010). However, recent evidence suggests that safety behavior might also have facilitative effects in the treatment of contamination fear in obsessive-compulsive disorder (Rachman et al., 2011; van den Hout et al., 2011). The use of a markedly different safety behavior manipulation in these preliminary studies, compared to the strategies offered in phobia studies, suggests that the facilitative effects of safety behavior are not limited to use of safety gear or aids. Furthermore, in an investigation of safety behavior subtypes in social anxiety disorder, avoidance behavior was associated with negative social responses but not with impression-management behavior, leading the authors to suggest that it might be helpful to incorporate the latter into treatment as an initial step toward overcoming avoidance (i.e., as judicious safety behavior; Plasencia, Alden, & Taylor, 2011). This question points to novel directions in evaluating possible benefits of safety behavior in CBT for social anxiety, an area in which findings to date have uniformly pointed to its detrimental effects during treatment.

Overall, the current study implemented a cognitively-focused analysis of the effects of safety gear on the acquisition of corrective information during a behavioral experiment. Contrary to current cognitive-behavioral models of anxiety disorders, we found that use of safety gear promoted cognitive change and did not interfere with fear reduction. These findings challenge the notion that safety behavior must be eliminated from CBT for anxiety disorders at all costs. They suggest instead that it might be possible to successfully incorporate safety strategies into CBT interventions, particularly during the early stages of treatment, with the aim of enhancing therapeutic progress. There is, however, considerable need for further research to establish whether there is sufficient evidence for the clinical utility of this method. A clear understanding of reasons for the discrepancies in the current literature, as well as expansion of the empirical basis for the judicious use of safety behavior, are necessary for the development of effective safety behavior procedures in CBT.

Author Note

We wish to thank Amanda Levine, Sarah Zullo, Jeff Renaud, and Amanda Ruthman for their assistance with the project, as well as the anonymous reviewers, whose comments have been most helpful. This research was supported by grant funding from the Canadian Institutes of Health Research and by a Fonds de la recherche en santé du Québec Doctoral Training Award. These funding sources had no involvement in the study design, in data collection, analysis, and interpretation, in manuscript preparation, and in the decision to submit the paper for publication.

References

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders*, (4th ed., text revision). Washington, DC: American Psychiatric Association.

Arntz, A., Lavy, E., Van den Berg, G., & Van Rijsoort, S. (1993). Negative beliefs of spider phobics: A psychometric evaluation of the spider phobia beliefs questionnaire. *Advances in Behaviour Research and Therapy*, *15*, 257-277.

Bandura, A., & Adams, N. E. (1977). Analysis of self-efficacy theory of behavioural change. *Cognitive Therapy and Research, 1*, 287-310.

Bandura, A., Jeffrey, R. W., & Wright, C. L. (1974). Efficacy of participant modeling as a function of response induction aids. *Journal of Abnormal Psychology, 83,* 56-64.

Beck, A. T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology, 56*, 893-897.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory,* (2^{nd} ed.). San Antonio, TX: The Psychological Corporation.

Bennett-Levy, J., Butler, G., Fennell, M., Hackmann, A., Mueller, M., & Westbrook, D. (Eds.). (2004). *Oxford guide to behavioural experiments in cognitive therapy*. Oxford, UK: Oxford University Press.

Brown, T. A., Di Nardo, P. A., Lehman, C. L., & Campbell, L. A. (2001). Reliability of DSM-IV anxiety and mood disorders: Implications for the classification of emotional disorders. *Journal of Abnormal Psychology, 110*, 49-58.

Brown, T. A., White, K. S., Forsyth, J. P., & Barlow, D. H. (2004). The structure of perceived emotional control: Psychometric properties of a revised Anxiety Control Questionnaire.

Behaviour Therapy, 35, 75-99.

Clark, D. M. (1999). Anxiety disorders: Why they persist and how to treat them. *Behaviour Research and Therapy, 37*, S5-S27.

Clark, D. M., & Wells, A. (1995). A Cognitive Model of Social Phobia. In R. Heimberg, M. Liebowitz, D. A. Hope, & F. R. Schneier, *Social phobia: Diagnosis, assessment and treatment*. New York: Guilford Press.

Choy, Y., Fyer, A. J., & Lipsitz, J. D. (2007). Treatment of specific phobia in adults. *Clinical Psychology Review, 27*, 266-286.

Craske, M.G., Kircanski, K., Zelikowsky, M., Mystkowski, J., Chowdhury, N., &. Baker, A. (2008). Optimizing inhibitory learning during exposure therapy. *Behaviour Research and Therapy, 46*, 5-27.

Deacon, B. J., Sy, J. T., Lickel, J. J., & Nelson, E. A. (2010). Does the judicious use of safety behaviours improve the efficacy and acceptability of exposure therapy for claustrophobic fear? *Journal of Behaviour Therapy and Experimental Psychiatry, 41*, 71-80.

Di Nardo, P., Brown, T., & Barlow, D. (1994). *Anxiety Disorders Interview Schedule for DSM-IV*. Albany, NY: Greywind Publications.

de Silva, P., & Rachman, S. (1984). Does escape behaviour strengthen agoraphobic avoidance? A preliminary study. *Behaviour Research and Therapy, 22*, 87-91.

Foa, E. B., Liebowitz, M. L., Kozak, M. J., Davies, S., Campeas, R., Franklin, M. E., et al. (2005). Randomized, placebo-controlled trial of exposure and ritual prevention, clomipramine, and their combination in the treatment of obsessive-compulsive disorder. *American Journal of Psychiatry, 162,* 151-161.

Hood, H. K., Antony, M. M., Koerner, N., & Monson, C. M. (2010). Effects of safety behaviours on fear reduction during exposure. *Behaviour Research and Therapy, 48*, 1161-1169.

Kim, E. J. (2005). The effect of decreased safety behaviours on anxiety and negative thoughts in social phobics. *Anxiety Disorders, 19*, 69-86.

McManus, F., Sacadura, C., & Clark, D. M. (2008). Why social anxiety persists: An experimental investigation of the role of safety behaviours as a maintaining factor. *Journal of Behaviour Therapy, 39,* 147-161.

Milosevic, I., & Radomsky, A. S. (2008). Safety behaviour does not necessarily interfere with exposure therapy. *Behaviour Research and Therapy, 46*, 1111-1118.

Milosevic, I., & Radomsky, A. S. (2011). *The Safety Behaviour Inventory: Development and psychometric evaluation.* Manuscript in preparation.

Morgan, H., & Raffle, C. (1999). Does reducing safety behaviours improve treatment response in patients with social phobia? *Australian and New Zealand Journal of Psychiatry, 33*, 503-510.

Moulding, R., & Kyrios, M. (2007). Desire for control, sense of control and obsessive-compulsive symptoms. *Cognitive Therapy and Research, 31*, 759-772.

Muris, P., & Merckelbach, H. (1996). A comparison of two spider fear questionnaires. *Behaviour Therapy and Experimental Psychiatry, 27*, 241-244.

Okajima, I., Kanai, Y., Chen, J., & Sakano, Y. (2010). Effects of safety behaviour on the maintenance of anxiety and negative belief social anxiety disorder. *International Journal of Social Psychiatry, 55*, 71-81.

Parrish, C. L., Radomsky, A. S., & Dugas, M. J. (2008). Anxiety-control strategies: Is there room for neutralization in successful exposure treatment? *Clinical Psychology Review, 28*, 1400-1412.

Plasencia, M. L., Alden, L. E., & Taylor, C. T. (2011). Differential effects of safety behaviour subtypes in social anxiety disorder. *Behaviour Research and Therapy, 49*, 665-675.

Powers, M. B., Smits, J. A., & Telch, M. J. (2004). Disentangling the effects of safety-behaviour utilization and safety-behaviour availability during exposure-based treatment: A placebo-controlled trial. *Journal of Consulting and Clinical Psychology, 72*, 448-754.

Rachman, S., Craske, M., Tallman, K., & Solyom, C. (1986). Does escape behaviour strengthen agoraphobic avoidance? *Behaviour Therapy, 17*, 366-384.

Rachman, S., Radomsky, A. S., & Shafran, R. (2008). Safety behaviour: A reconsideration. *Behaviour Research and Therapy, 46*, 163-173.

Rachman, S., Shafran, R., Radomsky, A. S., & Zysk, E. (2011). Reducing contamination by exposure plus safety behaviour. *Journal of Behavior Therapy and Experimental Psychiatry, 42*, 397-404.

Salkovskis, P. M. (1991). The importance of behaviour in the maintenance of anxiety and panic: A cognitive account. *Behavioural Psychotherapy, 19*, 6-19.

Salkovskis, P. M., Clark, D. M., & Gelder, M. G. (1996). Cognition-behaviour links in the persistence of panic. *Behaviour Research and Therapy, 34*, 453-458.

Salkovskis, P. M., Clark, D., Hackmann, A., Wells, A., & Gelder, M. (1999). An experimental investigation of the role of safety-seeking behaviours in the maintenance of panic disorder with agoraphobia. *Behaviour Research and Therapy, 37*, 559-574.

Sloan, T., & Telch, M. J. (2002). The effects of safety-seeking behaviour and guided threat reappraisal on fear reduction during exposure: An experimental investigation. *Behaviour Research and Therapy, 40*, 235-251.

Szymanski, J., & O'Donohue, W. (1995). Fear of Spiders Questionnaire. *Journal of Behavioural Therapy and Experimental Psychiatry, 26*, 31-34.

Sy, J. T., Dixon, L. J., Lickel, J. J., Nelson, E. A., & Deacon, B. J. (2011). *Failure to replicate the deleterious effects of safety behaviors in exposure therapy. Behaviour Research and Therapy, 49, 305-314.*

Tarrier, N., Liversidge, T. & Gregg, L. (2006). The acceptability and preference for the psychological treatment of PTSD. *Behaviour Research and Therapy, 44,* 1643-1656.

Thwaites, R., & Freeston, M. H. (2005). Safety-seeking behaviours: Fact or function? How can we clinically differentiate between safety behaviours and adaptive coping strategies across anxiety disorders? *Behavioural and Cognitive Psychotherapy, 33*, 1-12.

Wells, A., Clark, D. M., Salkovskis, P., Ludgate, J., Hackmann, A., & Gelder, M. (1995). Social phobia: The role of in-situation safety behaviours in maintaining anxiety and negative beliefs. *Behaviour Therapy*, *26*, 153-161.

Wolpe, J. (1958). *Psychotherapy by reciprocal inhibition.* Stanford, CA: Stanford University Press.

van den Hout, M. A., Engelhard, I. M., Toffolo, M. B. J., & van Uijen, S. L. (2011). Exposure plus response prevention versus exposure plus safety behaviours in reducing feelings of contamination, fear, danger and disgust. An extended replication of Rachman, Shafran, Radomsky & Zysk (2011). *Journal of Behavior Therapy and Experimental Psychiatry, 42*, 364-370.

Zoellner, L. A., Echiverri, A., & Craske, M. G. (2000). Processing of phobic stimuli and its relationship to outcome. *Behaviour Research and Therapy, 38,* 921-931.

Footnotes

[1] For these repeated measures analyses, the condition of sphericity had not been met, thus the Greenhouse-Geisser correction for nonsphericity was applied.

[2] Not all approach behavior during the behavioral experiment was codable on our standardized 33-point hierarchy, as participants were allowed to move freely about the room. Because of this, the analysis of change in distance of approach must be interpreted with caution, as it represents only 75% of the sample.

Table I

Participant Characteristics by Group

Variable	Condition	
	Safety Gear (*n*=63)	Control (*n*=63)
Female *n* (%)	58 (92.10)	58 (92.10)
Age *M* (*SD*)	23.16 (4.99)	23.57 (6.88)
ADIS-IV-SP *M* (*SD*)	3.05 (.46)	3.05 (.38)
BAI *M* (*SD*)	10.63 (7.94)	9.60 (7.40)
BDI-II *M* (*SD*)	8.97 (7.71)	7.35 (5.84)

Note. ADIS-IV-SP = Specific Phobia Section of the Anxiety Disorders Interview Schedule for the DSM-IV; BAI = Beck Anxiety Inventory; BDI-II = Beck Depression Inventory-II.

Table II

Descriptive Statistics of Outcome Measures at Three Assessment Points

	Pre-Session		End-of-Session		Post-Session	
	Safety Gear (*n* = 63)	Control (*n* = 63)	Safety Gear (*n* = 63)	Control (*n* = 63)	Safety Gear (*n* = 63)	Control (*n* = 63)
Measure	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
FSQ	83.74 (20.78)	83.56 (20.48)	--	--	58.14 (27.17)	60.19 (24.22)
SBQ-Target	97.02 (6.80)	98.73 (3.70)	--	--	56.11 (31.43)	63.46 (29.07)
SBQ-SPD	53.51 (16.70)	55.55 (18.49)	--	--	34.77 (18.66)	34.48 (21.18)
SBQ-SLF	30.68 (17.10)	34.60[c] (16.63)	--	--	16.79 (16.17)	17.35[c] (15.60)
SE	79.13[c] (24.84)	76.51 (26.03)	92.2[c] (14.37)	93.38 (18.21)	92.08[c] (13.10)	94.98 (15.34)
BAT	10.90 (6.81)	11.71 (7.82)	23.06[c] (9.96)	24.35 (8.77)	24.29 (9.07)	24.97 (8.83)
SUDS	68.31[c] (21.80)	72.20[a] (17.85)	68.16[c] (23.47)	65.83 (25.23)	55.44 (24.16)	54.78 (27.14)
ACQ-R	34.89 (10.48)	33.87[b] (10.22)	37.32 (10.70)	39.84[b] (10.93)	41.40 (11.64)	44.49[b] (10.82)

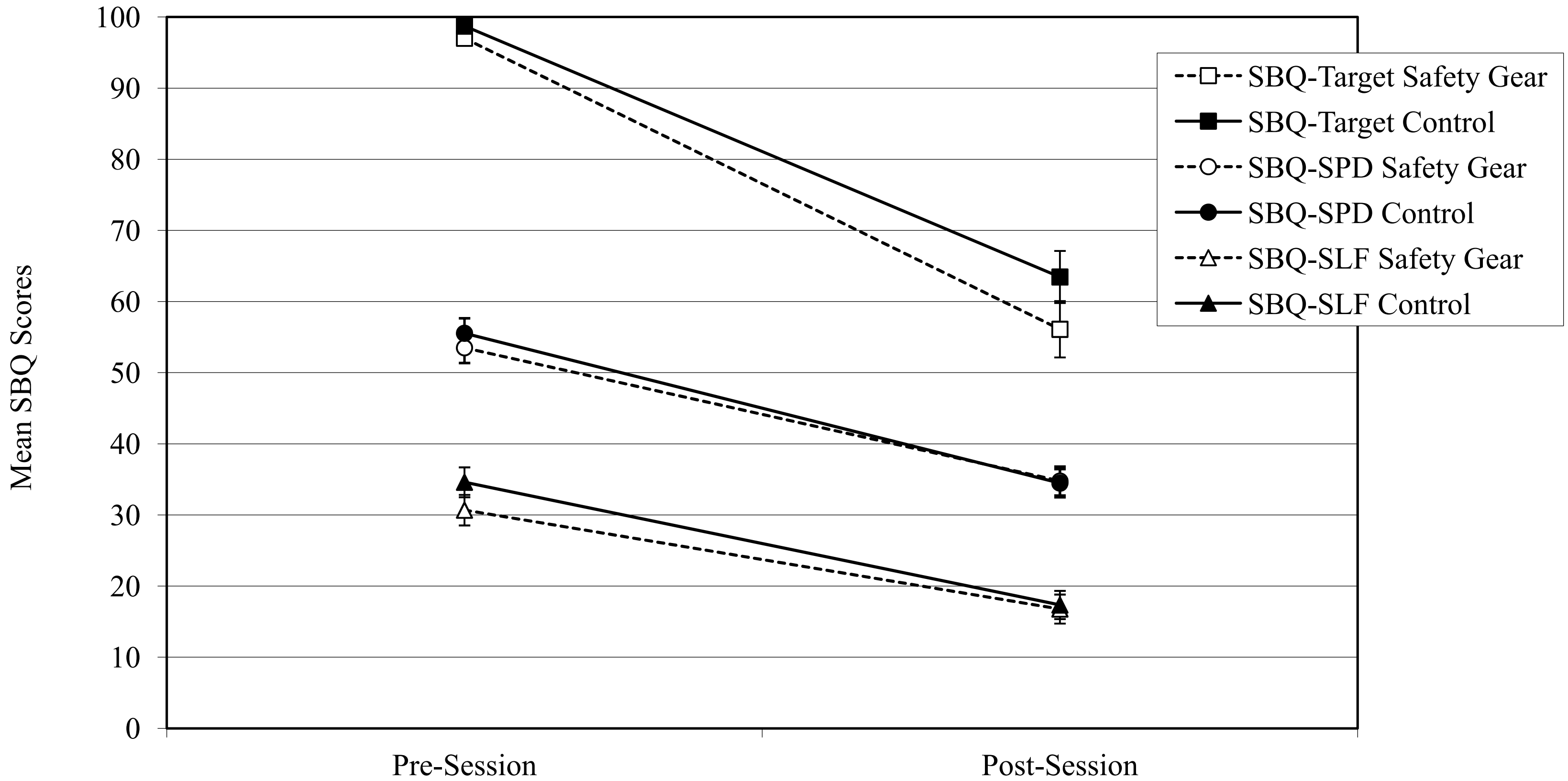
Note. FSQ = Fear of Spiders Questionnaire; SBQ-Target = Target belief of behavioral experiment selected from the Spider Phobia Beliefs Questionnaire; SBQ-SPD = Spider Phobia Beliefs Questionnaire—Spider-Related Beliefs Subscale; SBQ-SLF = Spider Phobia Beliefs Questionnaire—Self-Related Beliefs Subscale; SE = Self-Efficacy; BAT = Behavioral Approach Test; SUDS = Subjective Units of Distress Scale; ACQ-R = Anxiety Control Questionnaire-Revised.

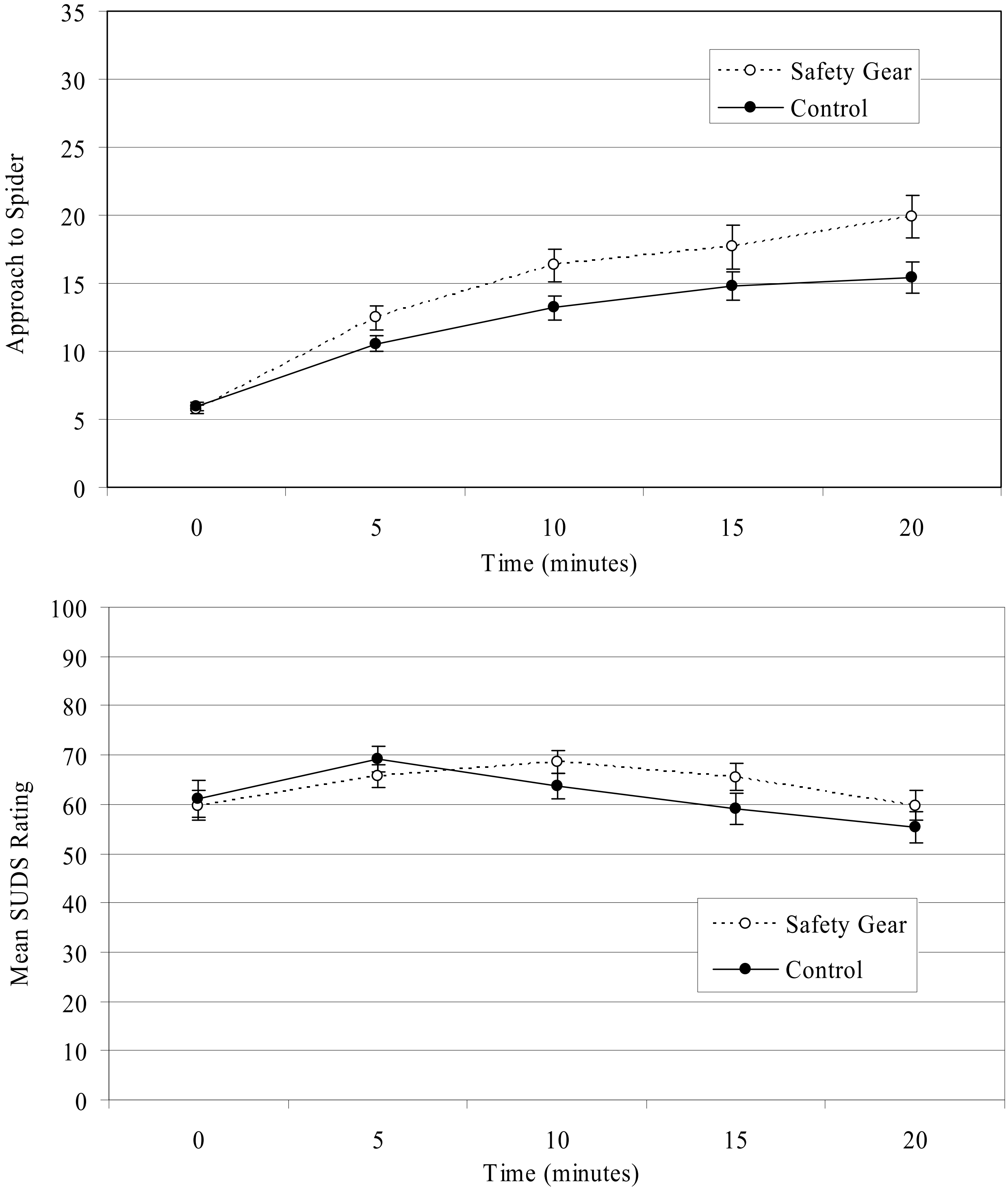
[a] *n* = 60, [b] *n* = 61, [c] *n* = 62.

Figure Captions

Figure 1. Target belief, spider-related beliefs, and self-related beliefs before and 20 minutes after a behavioral experiment. SBQ-Target = Target belief of behavioral experiment selected from the Spider Phobia Beliefs Questionnaire; SBQ-SPD = Spider Phobia Beliefs Questionnaire—Spider-Related Beliefs Subscale; SBQ-SLF = Spider Phobia Beliefs Questionnaire—Self-Related Beliefs Subscale.

Figure 2. Distance of approach to the spider and subjective distress during a behavioral experiment. SUDS = Subjective Units of Distress Scale.


100
90
80
70
60
50
40
30
20
10
0
Mean SBQ Scores
Pre-Session
Post-Session
SBQ-Target Safety Gear
SBQ-Target Control
SBQ-SPD Safety Gear
SBQ-SPD Control
SBQ-SLF Safety Gear
SBQ-SLF Control


35
30
25
20
15
10
5
0
Approach to Spider
Safety Gear
Control
0
5
10
15
20
Time (minutes)
100
90
80
70
60
50
40
30
20
10
0
Mean SUDS Rating
Safety Gear
Control
0
5
10
15
20
Time (minutes)