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Gain through pain: Augmenting *in vivo* exposure with enhanced attention to internal experience leads to increased resilience to distress[☆]

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ABSTRACT

Recent variants of exposure therapy ask clients to directly engage with the distress associated with avoided experiences in order to become more resilient to future anxiety-provoking situations. In this study, we consider how this engagement impacts behavioral willingness. Forty-eight participants with high fear of cockroaches completed *in vivo* exposures while either mindfully attending externally to the feared object (Ext), or to both the object and their internal distress (Int/Ext). While both groups showed improvement, behavioral, subjective and physiological measures revealed different patterns of change. Immediate testing showed that participants in the Ext condition improved more in subjective distress, with no other differences between groups. A second testing a week later in an ecologically valid environment showed that participants the Int/Ext intervention continued to improve behaviorally, regardless of their reported subjective discomfort. These findings highlight the importance of explicit engagement with distress during exposures, that forego immediate subjective relief for long-term behavioral improvement.

The intolerance and avoidance of distress underlie pathological behaviors that range from drinking to avoid guilt, to staying home to avoid socializing (Shahar & Herr, 2011; Spinhoven, Drost, de Rooij, van Hemert, & Penninx, 2014). This unwillingness to come into contact with aversive internal experiences, *experiential avoidance,* is a noted transdiagnostic factor of psychopathology (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). On the other hand, a preparedness to undergo negative experiences in order to attain higher-ordered goals is a widely noted resilience factor (Arch & Craske, 2008; Bonanno, 2004; Kashdan, 2010; Stange, Alloy, & Fresco, 2017; Teasdale et al., 2000). This preparedness, referred to as *behavioral willingness* (Wilson & Murrell, 2004), is also applicable to a variety of behaviors and situations. Those more willing to face difficult situations are more capable of adapting to situational demands, particularly in cases where immediate discomfort is required in the service of higher-ordered goals (Bonanno & Burton, 2013). An open stance towards painful experiences may, for example, play a prophylactic role in a person's ability to adaptively process trauma (Bonanno, 2004), or help individuals with substance use disorders recognize their cravings, but resist them (Mallett, Varvil-Weld, Turrisi, & Read, 2011; Pomery, Gibbons, Reis-Bergan, & Gerrard, 2009). Therapies that help foster behavioral willingness have also been found to facilitate more positive experiences for clients (Cuijpers, van Straten, & Warmerdam, 2007). Due to its role in effective long-term functioning, behavioral willingness is highlighted in contemporary models of mental health (Baker et al., 2010; Landy, Schneider, & Arch, 2015), such as the psychological flexibility model (Bonanno & Burton, 2013; Kashdan, 2010).

In experimental and clinical work, behavioral willingness may be operationalized in terms of high performance in behavioral measures and tasks even if it is concurrent with subjective distress (Wilson & Murrell, 2004). From that perspective, behavioral willingness is a prerequisite for effective behavioral therapy as well. In exposure therapy, clients willingly expose themselves to feared stimuli in service of the higher-ordered goal of mental health, despite the fact that exposures are necessarily distressing experiences. Earlier theories of exposure therapy (e.g., Foa & Kozak, 1986) that focused on a habituation model of treatment required participants to willingly tolerate that distress for long enough for their fear to subside. Later revisions went a step further, calling for clients to actively pursue fear during exposures, monitoring for safety behaviors (Foa, Yadin, & Lichner, 2012; Gloster, Hummel, Lyudmirskaya, Hauke, & Sonntag, 2012). Even habituation itself had the potential for being identified as a safety signal, and clients pursued distress in order to learn that their behavior may be truly independent of their fear (Craske, Treanor, Conway, Zbozinek, & Vervliet,

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2014; Treanor, 2011). In so doing, people may learn ways through which they can change their behavior to be consistent with their higher order goals, even while distressed (Orsillo & Roemer, 2005; Wampold, 2001).

Some contemporary therapeutic models construct distress as a means of behavioral learning worth pursuing as a goal in and of itself. In the inhibitory learning approach (Craske et al., 2008), people generate hypotheses before the exposure, monitor their experience during the exposure, and check it against their original hypotheses. They may generate hypotheses prior to an *in vivo* exposure that their distress would be severe, and they would be unable to tolerate it. Following the exposure, they may find that their distress was less severe than hypothesized, or that it was as severe as expected, but they were able to tolerate it. In such a case, they may generate new hypotheses that are more adaptive and realistic. During an exposure, people may even verbally label negative affect that arises during exposures as a way to better follow their feelings of distress (Kircanski, Lieberman, & Craske, 2012). Similarly, therapies based in the psychological flexibility model, such as Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 2012), foster a general stance of behavioral willingness as a transdiagnostic mechanism of clinical change (Niles et al., 2014; Wolitzky-Taylor, Arch, Rosenfield, & Craske, 2012). These therapies utilize exposures designed to reduce experiential avoidance, such as eating a disliked food, that challenge the internalized rule that unpleasant experiences must dictate attempts at avoidance (Hayes et al., 2012). Despite their differences, many exposure therapy models explicitly offer clients the opportunity to change their stance towards distress, from a state that must be avoided, towards a state that may be tolerated, and under certain circumstances – even pursued.

Behavioral willingness has been cited as one argument in favor of the inclusion of mindfulness techniques into exposure therapy (Roemer & Orsillo, 2009). A mindful, open stance towards distress allows for a greater awareness of fear-related excitors, and a subsequently more effective process of extinction learning (Arch & Abramowitz, 2015). Furthermore, it has been argued (Treanor, 2011) that intentionally entering into a mindful state may serve as a retrieval cue in order to make learning incurred during an exposure more robust to changes in setting (see Bouton, 1993). It is important to note that a mindful stance may be used in a variety of ways (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Bishop et al., 2004). Nonjudgmental, active attention to the exposure stimulus is often utilized across models of exposure therapy (Foa et al., 2012). Mindful attention to internal distress, on the other hand, is a hallmark of therapies based on the inhibitory learning model and acceptance-based models (Craske et al., 2014; Roemer & Orsillo, 2009; Treanor, 2011).

When participants attend to and accept their distress, they may encounter higher rates of distress while also performing better, behaviorally. A meta-analysis of 30 pain tolerance studies found that acceptance-based strategies led to greater improvement in behavioral measures, but not in measures of self-reported pain intensity or sensitivity (Kohl, Rief, & Glombiewski, 2012). Similarly, participants who were afraid of spiders were instructed to place their hands in jars with increasing likelihood of there being a spider inside. Those instructed to accept their fear were willing to place their hands in more jars than those in the control or information-based conditions. Each group's level of subjective distress, however, was similar (Wagener & Zettle, 2011). Across studies, the conditions that fostered a greater recognition and acceptance of distress led to behavioral gains that were independent of subjective ones. However, they do not indicate that exposures augmented with such strategies would change the efficacy of the interventions.

Studies that do augment distress awareness into exposures often find that those who learn to be more behaviorally willing may not feel immediate relief of their fears. Rather, more behaviorally willing participants become better able to behave as they please, even in the face of intense discomfort. In one study (Kircanski et al., 2012), participants who scored in a screening pool's top quartile on the Spider Phobia Questionnaire (SPQ; Klorman, Weerts, Hastings, Melamed, & Lang, 1974) performed a series of ten brief exposure trials integrated with one of three augmented conditions and a control of only a basic exposure. In one of those conditions, affect labeling, participants reported their concurrent emotional response (e.g., "I feel anxious the disgusting tarantula will jump on me."). They were not instructed to evaluate the rationality of their response. Participants in the affect labeling group did not report greater amounts of immediate relief than their peers who did not label affect. They did, however, marginally improve more in followup behavioral measures as compared to the distraction condition, particularly in the presence of greater levels of distress. Nonverbal attention to physiological experiences has also been found to improve exposure efficacy. In another study (Telch, Valentiner, Ilai, Petruzzi, & Hehmsoth, 2000), a predominantly female group of highly claustrophobic students took part in one of two modified exposures, or an exposure only condition. The modified exposures entailed either focusing on a speaker that made tones synchronized with their heart rates or a speaker emitting constant tones. Participants who attended to their heart rates during the exposure were found to improve the most in subjective fear at immediate testing, as well as in a one-week followup. Since no behavioral measures were taken, however, it is unclear the extent to which behavioral willingness was impacted as well.

The above studies' findings, however, may be partially explained by nonspecific effects beyond those of attention to distress (Ilardi & Craighead, 1994; Kazdin, 2007; Wampold, 2001). Exposures augmented with attention to physiological reactions, for example, did not necessarily entail a directive to understand the heartbeat as a proxy for distress, nor did they direct participants to accept their current level of distress (Telch et al., 2000). The causal relationship between directed attention towards distress and behavioral willingness remains unexplored.

When studying the impact of treatment components, it is preferred to examine specific change principles with multimodal measurement, multiple time points and experimental manipulations that reflect differences in basic processes (Herbert & Forman, 2013). Due to practical constraints, however, wholesale efficacy studies are limited in their ability to experimentally examine the effects of specific elements of treatment (Kazdin, 2007). Targeted component research, on the other hand, aims to isolate particular processes (e.g., Yovel, Mor, & Shakarov, 2014) and change principles (e.g., Dethier, Bruneau, & Philippot, 2015), with the level of control allowed by the laboratory context. For this reason, an examination of the effects of a specific component such as attention to internal distress would best be accomplished using a variety of subjective, behavioral and physiological observations.

1. Current study

In order to examine the impact of explicitly confronting aversive internal experiences during *in vivo* exposure, participants with high levels of small-insect phobia took part in an exposure therapy analogue experiment. Following baseline measurements of fear, they participated in a brief, single session of *in vivo* exposure including mindful attention to the feared stimulus, with or without directed attention to internal distress. Behavioral, subjective, and physiological measures of phobic reaction were taken, at the baseline as well as immediately following the exposure. In order to assess temporal and spatial generalizability of the effects (Bandarian-Balooch, Neumann, & Boschen, 2015; Bouton, 1993; Vansteenwegen et al., 2007), participants underwent a second evaluation a week later in an ecologically valid environment.

We hypothesized that attending to internal distress would foster a more behaviorally willing stance towards the feared object. Specifically, we hypothesized that participants attentive to distress would (a) develop greater distress tolerance, expressed in behavioral improvement, and that (b) this improvement would occur regardless of changes in subjective discomfort.

2. Method

2.1. Participants

Participants were preselected for high levels of self-rated phobic reaction to cockroaches (see Vansteenwegen et al., 2007), a common phobia in Israel (Iancu et al., 2007). This was operationalized by scoring among the 10% most severe in a prescreening sample on the 13-item Cockroach Phobia Questionnaire (CPQ), an adaptation of the Spider Phobia Questionnaire (SPQ; Olatunji et al., 2009). Out of a prescreening sample of 836 Hebrew University of Jerusalem students, students with the 88 highest scores were invited to take part in the study. Out of the highest scorers, 89.13% were female. Therefore, due to known gender differences in small animal phobias (Davey et al., 1998; Stoyanova & Hope, 2012), only women were invited to participate, with only female experimenters (see de Jong & Merckelbach, 2000; Gremsl, Schwab, Höfler, & Schienle, 2018).

Forty-eight individuals between the ages of 20 and 31 (M = 23.85, SD = 2.40) responded to the invitation. Participants' scores on the CPQ (M = 10.67, SD = 1.37) were comparable to those of clinical samples on the SPQ (Olatunji et al., 2009). Three participants for whom the experimental intervention worsened their behavior (i.e., worse performance on BAT2 than BAT1; see below) were not included in the final analyses (cf. Wagener & Zettle, 2011). The study was approved by the departmental Ethics Committee. All participants gave informed consent, and were either paid $15, or received course credit.

2.2. Measures

Cockroach Phobia Questionnaire (CPQ). This brief scale, which was used for prescreening, is an adaptation of the 15-item Spider Phobia Questionnaire (SPQ-15; Klorman et al., 1974; Olatunji et al., 2009). Items were converted from the original SPQ to refer to cockroaches instead of spiders (e.g., "*I would feel some anxiety holding a toy cockroach in my hand*"). Two items were inappropriate for a cockroach measure and were therefore removed (e.g., "*I enjoy watching spiders build their webs*"). In the CPQ, participants rated 13 items related to their reactions to cockroach-related situations (e.g., *"I dislike looking at pictures of cockroaches"*) as either true (1) or false (0). Among the prescreening sample, the CPQ showed very good levels of internal consistency (α = 0.86).

Fear of Cockroach Questionnaire (FCQ; Botella, Bretón-López, Quero, Baños, & García-Palacios, 2010). The FCQ is an adaptation of the Fear of Spiders Questionnaire (FSQ; Szymanski & O'Donohue, 1995). In the FCQ, participants endorsed 17 behavioral, emotional and cognitive reactions to cockroaches (e.g., "*If I saw a cockroach now, I would get help from someone else to remove it*"), on a Likert scale of 0 (*completely disagree*) to 6 (*completely agree*). In the present study, the FCQ showed excellent levels of internal consistency (αs = 0.92 - 0.94).

Subjective Units of Distress Scale (SUDS; Wolpe, 1958, 1973). The SUDS is a widely-used, single item measure of distress in a stressful situation. During moments of peak distress, participants rated their discomfort on a scale of 0 (*no distress*) to 10 (*great distress*).

Behavioral Measure. A behavioral approach test (BAT; Merluzzi, Taylor, Boltwood, & Götestam, 1991) is a standardized behavioral measure for phobic stimuli (Öst, Salkovskis, & Hellström, 1991) also used in the context of cockroach phobia (Botella et al., 2005). In a BAT, participants were guided to approach and physically interact with a dead cockroach as much as they could. Scores were assigned based on willingness to behaviorally engage with the cockroach. Participants received a score of 0 (refusing to enter the room) to 11 (standing next to it) on the basis of their proximity to the cockroach, and 12 (touching the cockroach with a pencil) to 16 (holding the feared object) on the basis of their willingness to physically interact with it.

Physiological Measure. Heart rate (HR) was measured with a POLAR RS800CX heart monitor (Kempele, Finland), via an electrode strap placed on participants' chests. The POLAR monitor measures with good reliability (r = .75–1.00) in standard laboratory conditions (Goodie, Larkin, & Schauss, 2000).

2.3. Procedure

The experiment took place in two sessions, administered over 5–9 days.

First Session. Upon entering the laboratory, participants were directed to the laboratory's testing room. After providing informed consent, they privately applied the heart rate monitor. Participants first completed the CPQ to ensure their maintenance of high levels of cockroach fear. Then they completed a demographic questionnaire and the FCQ (FCQ1; Botella et al., 2010; Szymanski & O'Donohue, 1995), in order to assess baseline levels of cockroach phobia.

Participants were then brought into the laboratory's experimental room to take part in a BAT as a baseline measure of their response to the feared stimulus. They began the BAT (BAT1) standing at a distance of 5 m from a dead cockroach placed on a table. A ruler attached to the floor allowed the experimenter to measure proximity attained. To minimize distraction from the cockroach, the experimenter remained by the entrance, and directed the participant from behind. To begin the BAT, she instructed the participant to approach the cockroach and interact with it as much as she could. Once participants were at the closest point of contact they were willing to attain, they were instructed to rate their distress using the SUDS.

Following BAT1, all participants were first asked to take one step backwards from the maximal proximity they attained. They then participated in one of two randomly assigned experimental conditions that highlighted different attentional foci during a brief *in vivo* exposure to the cockroach. As detailed below, in one condition participants maintained a focus on their external situation (Ext), and were asked to direct their attention to the cockroach. Participants in the other condition attended to both the cockroach and to their internal distress (Int/Ext). Thus, both conditions were designed to improve participants' phobic symptoms, and besides for the instructions to attend to internal distress, they were identical.

Each condition was administered by an experimenter standing two steps diagonally behind the participant. Instructions in the two conditions were pre-written, equitable in length, and administered verbally. Following each instruction, the experimenter would attend to the participant's reaction in order to ensure that they were understood. If, either verbally or physically, participants indicated that they were distracting themselves from the cockroach or the exposure, the experimenter would guide their attention back to the cockroach. If participants indicated that they did not understand an instruction, the experimenter would reread the instruction a second time. The brief exposure procedures were limited to 10 min, in order to prevent ceiling effects. During the exposure, participants were instructed to attend to different aspects of the situation (see below), and occasionally were asked questions regarding their experience. Participants were encouraged to verbally respond to the prompts where relevant, though such responses were not required. Full texts of the exposure procedures are available in the Supplemental Materials.

External focus (Ext). First, the experimenter read aloud a brief rationale of the exposure, pointing out that by focusing on the cockroach, the participant will be better able to rationally challenge her fear of it. Following the reading of the rationale, the experimenter asked the participant whether she was prepared to begin, and waited for a verbal confirmation. Participants then maintained their gaze on the cockroach while receiving further prompts from the experimenter (see Table 1 for examples). Instructions related to mindfully considering the cockroach, with a particular emphasis on the cockroach's physical characteristics. To ensure that the attentional directives did not distract participants, the experimenter instructed them to maintain focus on the cockroach and to reflect on questions posed about its physical appearance. As a

Table 1
Sample Prompts from *in vivo* Exposure Exercises.

External Focus	Internal/External Focus
Look at the cockroach. **Carefully stare at it. Focus on it.**	Look at the cockroach. **But also, focus on your feelings and thoughts**.
Focus on the cockroach's body, on the substance it is made out of. **Pay special attention to the cockroach's body. Look at it well – there is nothing about it that can harm you, certainly not now**.	Focus on the cockroach's body, on the substance it is made out of. **Focus also on your bodily sensations, and pay special attention to the fact that you are not at all required to change them, and that it is possible to only consider them as they are.**
See how the cockroach is placed on the tray.	See how the cockroach is placed on the tray.
Look at how the wings are attached to the body of the cockroach. **Pay attention to what you see as you focus.**	Look at how the wings are attached to the body of the cockroach. **What is passing through your head? Pay close attention to your thoughts.**
Does the cockroach body look hard or soft?	Does the cockroach body look hard or soft?
Be aware of the cockroach, and the way in which it is placed on the tray. What exactly do you see? Is there something about the way it is laid on the tray that changes it, or the situation, to be at all more dangerous?	**Be aware of your body. Where do you feel the most tension? Where do you feel the least? Here too, notice that you can consider the tense feelings and accept the current reality, without trying to change anything.**
Fix your stare on the cockroach, pay attention, **what do you see? What are you paying attention to?**	Fix your stare on the cockroach, pay attention, **what do you feel? What is going through your head?**
Focus on the cockroach. Pay attention **to what you see right now. Try to focus well, without looking away or distracting yourself in any way. Just focus on the cockroach placed before you.**	Focus on the cockroach. Pay attention, **what thoughts are passing through your head? Don't try to change these thoughts, or to "argue" with them. Just notice them.**

Note: Differences between conditions are shown in bold.

continuation of the theoretical rationale, participants also received prompts encouraging them to realistically reconsider their fear and avoidance patterns.

Internal and external focus (Int/Ext). Participants in this condition were instructed to focus on the physical characteristics of the cockroach, as in the other condition, but were also explicitly instructed to attend to and accept their distressing reactions. First, the experimenter read aloud a brief rationale that framed the open engagement and acceptance of internal distress as a way to better recognize internal sensations as being non-harmful. Then, as in the other condition, the experimenter asked the participant whether she was prepared to begin, and waited for confirmation. Participants then maintained their gaze on the cockroach while receiving further instructions (see examples in Table 1). While staring at the cockroach, participants were instructed both to focus on its physical characteristics as well as on their own internal distress. They were explicitly encouraged to engage with and accept their distress throughout, while being reminded that such experiences (e.g., thoughts, sensations, urges) may be experienced fully, without danger. In order to maintain focus, such prompts were interspersed with questions about the cockroach's appearance as well as the participants' mental state. Participants also received prompts in keeping with the condition's theoretical rationale, by considering how their stressful feelings may be harmlessly encountered, even when unchanged.

Following the exposure, participants returned to the testing room in order to complete a second FCQ (FCQ2). They then returned to the experimental room and completed a second BAT (BAT2), in order to examine the immediate effects of the interventions on the behavioral, subjective and physiological measures of anxiety. The second BAT followed the same protocol as the first, including measurement of HR throughout, and SUDS at the moment when participants came closest to the cockroach.

Second Session. The second session occurred 5–9 days later, and was designed to test the durability and generalizability of the exposure protocols' effects (Bandarian-Balooch et al., 2015; Bouton, 1993). Participants arrived to the laboratory, completed a third FCQ (FCQ3) in the testing room, and again privately applied the heart monitor. A different experimenter from the first session then brought the participant outside the laboratory, and repeated the BAT protocol (BAT3) in a different, ecologically valid setting. Specifically, the BAT took place in an empty fallout shelter in a basement below the laboratory. This setting was notably distinct from the laboratory's, with musty air, occasional cobwebs, and strong insulation from outside noise. Importantly, the shelter was also highlighted as a place where cockroaches were likely to be encountered. As in the laboratory experiment room, the basement experiment room was equipped with a ruler and dead cockroach at the far end from the entrance. As in the prior protocols, participants reported their peak discomfort via the SUDS. After the final BAT, participants returned to the laboratory, removed the heart monitor, and were thanked, compensated, and debriefed.

Analysis Plan. Baseline characteristics of the two groups were compared with a series of independent-sample *t*-tests of the prescreening CPQ and all the dependent variables (SUDS, BAT, heart rate and FCQ). Group differences at Times 2 and 3 were examined via a series of ANCOVAs for each of the dependent variables (e.g., T2 SUDS), and entering the corollary baseline measures as covariates (e.g., T1 SUDS). A series of post-hoc, within-samples *t*-tests were then performed in order to examine each group's change patterns (e.g., comparing T1 SUDS to T2 SUDS for the Ext group).

3. Results

Due to technical reasons, six participants' SUDS scores and three participants' heart rate levels were not recorded.

3.1. Group characteristics

First, equivalence of baseline measures between the groups was examined with a series of independent *t* tests, comparing differences between the two conditions (Ext, Int/Ext) on the baseline dependent variables (BAT1, SUDS1, HR1, & FCQ1), as well as CPQ and age. As Table 2 shows, no significant differences in baseline scores emerged between the two groups (all p's > 0.25).

Table 2
Descriptive Statistics and *t*-Test Comparisons of Dependent Variables at T1.

	External Focus	Internal/External Focus	*t*	*df*	*d (95% CI)*
Age	23.78 (2.81)	24.09 (2.02)	.42	43	.13 (−0.47 – 0.73)
CPQ	10.83 (1.37)	10.50 (1.37)	.80	43	.24 (−0.36 – 0.83)
SUDS	5.80 (2.59)	5.37 (2.52)	.53	37	.17 (−0.42 – 0.76)
BAT	8.74 (2.94)	9.05 (2.63)	.37	43	.11 (−0.48 – 0.70)
HR	100.61 (14.66)	97.37 (12.20)	.80	43	.24 (−0.35 – 0.83)
FCQ	88.57 (20.29)	94.55 (13.25)	1.17	43	.35 (−0.25 – 0.94)

Note: Standard deviations in parentheses. BAT = Behavioral Approach Test; SUDS = Subjective Units of Distress; HR = Heart Rate; FCQ = Fear of Cockroach Questionnaire; CPQ = Cockroach Phobia Questionnaire.

Table 3
Descriptive statistics for dependent variables at times 1, 2 and 3.

	SUDS			BAT			HR			FCQ		
	Time 1	Time 2	Time 3	Time 1	Time 2	Time 3	Time 1	Time 2	Time 3	Time 1	Time 2	Time 3
External Focus	5.80 (2.59)	3.85 (2.83)	3.70 (2.96)	8.74 (2.94)	9.65 (2.25)	9.22 (2.19)	100.61 (14.66)	98.37 (12.27)	96.37 (16.64)	88.57 (20.29)	76.74 (26.13)	75.09 (24.58)
Internal/External Focus	5.37 (2.52)	5.58 (2.93)	4.68 (2.50)	9.05 (2.63)	10.50 (2.11)	10.36 (2.26)	97.37 (12.20)	97.25 (9.92)	89.01 (13.33)	94.55 (13.25)	81.86 (16.83)	83.27 (17.83)

Note: Standard deviations in parentheses. SUDS = Subjective Units of Distress; BAT = Behavioral Approach Test; HR = Heart Rate; FCQ = Fear of Cockroach Questionnaire.

3.2. Immediate effects of the interventions

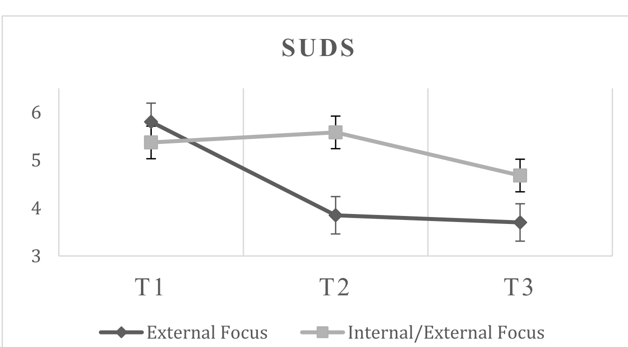
Immediate differences between the groups in the exposures' impact on behavior, subjective anxiety, physiological response, and self-rated symptom severity were examined. To do that, a series of ANCOVAs was performed, with condition as the between-subjects factor (Ext, Int/Ext), the four Time 2 measures as dependent variables (SUDS2, BAT2, HR2, and FCQ2), and with the corollary baseline (Time 1) measures as covariates (SUDS1, BAT1, HR1, and FCQ1 respectively). Descriptive statistics are presented in Table 3. SUDS at Time 2 was significantly higher in the Int/Ext group than in the Ext group, $F(1,36) = 12.63$, $p = .001$, $\eta_p^2 = 0.26$ (see Fig. 1a). Behavioral scores at Time 2 were not significant, $F(1,42) = 2.87$, $p = .098$, $\eta_p^2 = 0.06$ (see Fig. 1b). No significant group differences were detected between the two conditions in physiological response or symptom severity immediately following the exposure (p's $> .62$, < 0.01). Thus, immediately following the exposure, participants in the Int/Ext group reported higher levels of distress, with no other significant group differences.

To more closely examine patterns of change within each group, separate paired t tests were performed for each condition, comparing the dependent variables (SUDS, BAT, HR, and FCQ) at baseline (Time 1) with those immediately following the exposure (Time 2). These tests revealed that participants in the Ext condition reported lower SUDS levels immediately following the exposure than they did at baseline, $t(19) = 4.28$, $p < .001$, $d = 0.71$, 95% CI [0.36, 1.06]. Those in the Int/Ext group, on the other hand, essentially did not change (see Fig. 1a), $t(18) = 0.57$, $p = .58$, $d = 0.07$, 95% CI [-0.20, 0.35]. Participants' BAT scores improved in the Int/Ext condition, $t(21) = 3.34$, $p = .003$, $d = 0.60$, 95% CI [0.23, 0.97], as well as in the Ext condition (see Fig. 1b), $t(22) = 3.89$, $p = .001$, $d = 0.28$, 95% CI [0.13, 0.43]. FCQ scores also improved in both the Int/Ext condition, $t(21) = 5.20$, $p < .001$, $d = 0.81$, 95% CI [0.48, 1.13], and the Ext condition, $t(22) = 3.67$, $p = .001$, $d = 0.48$, 95% CI [0.21, 0.74]. No significant temporal changes in HR were observed in either condition (p's > 0.27, d's < 0.16).

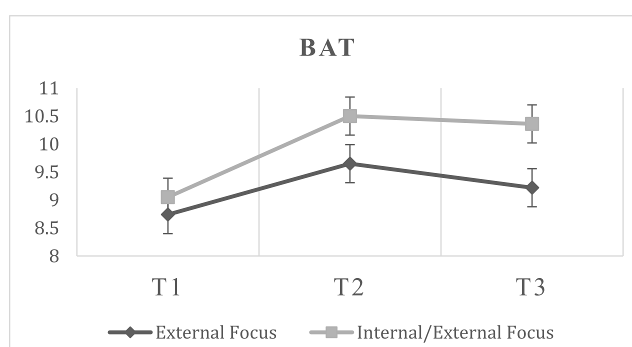
Taken together, results revealed that immediately following the exposure, the Ext group reported lower SUDS following the exposure whereas the Int/Ext group did not, and this difference between the two groups was significant. Behaviorally, however, both groups improved compared to baseline. There were no group differences in FCQ score, with participants in both groups improving compared to baseline. Physiological scores did not significantly change for either group.

3.3. Followup ecological assessment

The durability and generalization of the interventions were examined via measures obtained in the second session, which was conducted in an ecologically valid context. In order to examine differences between groups in generalized effects, a series of ANCOVAs was performed with condition as the between-subjects factor (Ext, Int/Ext), with the four Time 3 measures as dependent variables (SUDS3, BAT3, HR3, and FCQ3), and with the corollary baseline measures as covariates (SUDS1, BAT1, HR1, and FCQ1, respectively; see Table 3 for descriptive statistics). SUDS levels were again rated higher in the Int/Ext condition than in the Ext condition, $F(1,36) = 4.40$, $p = .043$, $\eta_p^2 = 0.11$ (see Fig. 1a). In contrast, participants in the Int/Ext condition scored higher on BAT scores than those in the Ext condition, $F(1,42) = 5.48$, $p = .024$, $\eta_p^2 = 0.12$ (see Fig. 1b). No significant group differences were observed in FCQ or HR (p's > 0.19, η_p^2's < 0.04). Thus, compared to baseline levels, at the followup, ecological assessment, participants in the Int/Ext condition still reported greater subjective distress than those in the Ext condition, yet nevertheless performed better behaviorally.



(a)



(b)

Note. Bars represent standard error. SUDS = Subjective Units of Distress; BAT = Behavioral Approach Test.

Fig. 1. Dependent variables of SUDS and BAT at Times 1, 2 and 3.
Note. Bars represent standard error. SUDS = Subjective Units of Distress; BAT = Behavioral Approach Test.

To more closely examine the patterns of change within the groups, a separate set of paired *t* tests were performed for each condition on each dependent variable (SUDS, BAT, HR, and FCQ), comparing improvement at followup (Time 3) to baseline (Time 1). Analyses showed that improvement at followup in FCQ occurred for both participants in the Int/Ext condition, $t(21) = 4.95$, $p < .001$, $d = 0.66$, 95% CI [0.38, 0.94], as well as in the Ext condition, $t(22) = 4.84$, $p < .001$, $d = 0.57$, 95% CI [0.33, 0.82]. Such uniformity was not observed in the other dependent variables. Participants in the Int/Ext focus condition improved on their BAT between baseline to followup measurement, $t(21) = 3.42$, $p = .003$, $d = 0.53$, 95% CI [0.21, 0.85]. In the Ext condition, however, no significant improvement in BAT was observed, $t(22) = 1.47$, $p = .16$, $d = 0.17$, 95% CI [-0.07, 0.40] (see Fig. 1b). This was the same case with HR change, with a reduction in HR from baseline to followup measurement observed in the Int/Ext condition, $t(19) = 2.68$, $p = .015$, $d = 0.58$, 95% CI [0.13, 1.04], but not in the Ext condition, $t(22) = 1.04$, $p = .31$, $d = 0.27$, 95% CI [-0.27, 0.81]. Conversely, participants in the Ext condition reported lower SUDS from baseline to followup measurement, $t(19) = 4.59$, $p < .001$, $d = 0.75$, 95% CI [0.41, 1.09], whereas participants in the Int/Ext conditions did not, $t(18) = 1.51$, $p = .15$, $d = 0.27$, 95% CI [-0.11, 0.65] (see Fig. 1a).

Taken together, the results of the one-week followup, ecological assessment that was obtained in a challenging environment indicate that the brief exposures led to a stable, generalized improvement in FCQ across the whole sample, but according to a very different pattern in each condition. Only the Ext group improved in SUDS, leading to a significant difference between the two groups in reported levels of distress. Behaviorally, however, the opposite occurred. The groups differed due to improvement observed in the Int/Ext condition, but not in the Ext condition. HR was also reduced for only the Int/Ext group, but despite this difference, the two groups still did not significantly differ from each other at T3.

For completeness, to examine the extent to which each group changed beyond the immediate effects of the single exposure session, a set of paired *t* tests were performed for each condition (Int/Ext and Ext), comparing post-exposure (Time 2) and ecological followup (Time 3) levels on the dependent variables (SUDS, BAT, HR, FCQ). SUDS did not change in the Int/Ext condition between immediate and later assessments, $t(18) = 1.77$, $p = .094$, $d = 0.32$, 95% CI [-0.06, 0.71], or in the Ext condition, $t(19) = 0.44$, $p = .67$, $d = 0.05$, 95% CI [-0.20, 0.30] (see Fig. 1a). BAT scores in the Ext condition significantly worsened following T2, $t(22) = 2.10$, $p = .047$, $d = 0.20$, 95% CI [0.003, 0.39], while participants in the Int/Ext condition maintained their post-exposure behavioral performance and did not significantly change, $t(21) = 0.49$, $p = .633$, $d = 0.06$, 95% CI [-0.20, 0.33] (see Fig. 1b). Furthermore, HR decreased between assessments in the Int/Ext condition, $t(19) = 2.88$, $p = .010$, $d = 0.69$, 95% CI [0.19, 1.18], but not in the Ext condition, $t(22) = 0.64$, $p = .527$, $d = 0.13$, 95% CI [-0.30, 0.57]. No significant change in FCQ was detected in either condition (p's > 0.412, d's < 0.06). Thus, the results indicate that compared to post-exposure assessment, participants in the Int/Ext group improved in their HR, maintained SUDS and their immediate BAT gains. At the same time, participants in the Ext group maintained their SUDS gains, but worsened behaviorally.

4. Discussion

In this study, an *in vivo* exposure was augmented to engage participants' attention closely with either their feared object alone, or with both the feared object and their internal distress. Individuals with high levels of cockroach phobia took part in these augmented exposures during a two-part therapy simulation – first in a laboratory setting, and then a week later, in an ecologically valid environment. Both exposures led to similar overall improvement in self-reported phobia symptoms, measured by the FCQ.

Closer examination, however, revealed differences in the groups' change patterns with regard to the areas of improvement, as well as their generalizability. First, participants in the two groups showed improvement in different areas. Those who attended to both the cockroach and their internal distress (Int/Ext) reported less improvement in subjective anxiety than their peers who only attended to the cockroach (Ext) both immediately following the *in vivo* exposure, and later in an ecologically valid environment. In fact, those who attended their distress did not show improvement in SUDS at both post-exposure measures. Despite their greater discomfort, however, they still performed better behaviorally in the ecologically valid environment at followup. Second, the two groups differed with regards to the generalization of improvements observed in the final assessment. Those who only focused on the cockroach (Ext) showed slight losses in their immediate improvements. Specifically, they maintained their immediate improvement in subjective anxiety, but did not maintain their behavioral gains. On the other hand, those who also focused on their distress (Int/Ext) showed greater generalized improvements.

Taken together, the two conditions present two distinct patterns of improvement. The Ext group showed an immediate reduction in subjective distress. The Int/Ext group, on the other hand, showed a generalized gains in behavioral willingness – behavioral improvement in the face of distress. Indeed, some of the additional distress encountered by participants in the Int/Ext condition may have been a result of their closer proximity to the cockroach than their peers in the Ext condition.

These two patterns are in accordance with the two models of therapy that served as the basis for the present experimental design. Early, habituation-based models of exposure therapy prioritized immediate distress reduction as a primary measure of in-session improvement (Foa & Kozak, 1986). Accordingly, participants in the Ext condition showed immediate improvement in SUDS when focusing only on the cockroach. Participants in the Int/Ext condition, on the other hand, were more in line with current models of therapy, such as acceptance-based models (Hayes et al., 2012; Orsillo & Roemer, 2011) and the inhibitory learning model (Craske et al., 2014). These therapeutic models explicitly encourage clients to notice the distress they experience during the session, so that they may later internalize how such experiences are harmless and need not impact their behavior. Indeed, participants in the Int/Ext condition showed greater behavioral improvement than their peers, with more generalized gains. More importantly, they showed more resilience towards distress by improving behaviorally, even in the absence of decreased distress.

It is important to note such group differences in the context of the overall improvement encountered in both experimental conditions, and the brevity of the therapeutic intervention. Indeed, both conditions in the present study used an exposure protocol with substantial empirical support (e.g., Wolitzky-Taylor, Horowitz, Powers, & Telch, 2008). Thus, the Ext group served as an exceptionally active control condition with regards to general improvement encountered in exposure therapy. On one hand, these conditions' similarities may have reduced between-group differences. That is, this design unambiguously isolated attention to distress as an active ingredient, to the exclusion of other possible nonspecific effects (for examples, see Podină, Koster, Philippot, Dethier, & David, 2013). Even with such similarities, and in the context of the expected general improvement of symptoms across both conditions, the difference in attentional deployment towards one's distress clearly affected participants' patterns of change.

There are a number of possible mechanisms that may have led to these divergent patterns of improvement. First, simply put, it may be that those who attended to their internal distress were more aware of it, and therefore rated their distress more highly. The mere act of focusing on the self may increase reported anxiety levels (Wells, 1990), particularly among those in stressful situations or in populations with high clinical incidence (Mor & Winquist, 2002). Thus, for example, participants in the Int/Ext group reported higher levels of SUDS relative to their peers at T3, despite their having physiological data indicating lower levels of stress. This explanation alone, however, would not explain why those who were more aware of their distress, perhaps with a greater incentive to avoid the cockroach, were still more willing to approach it. Nor does it offer an explanation regarding differences in the robustness of outcomes. Current models of exposure therapy offer more elaborate explanations for why attention to internal distress may have been more effective at fostering behavioral willingness.

The pattern of improvement observed in the Int/Ext group seems to represent an increase in psychological flexibility (Kashdan, 2010). Indeed, therapies based in the psychological flexibility model (e.g., ACT) bring clients in contact with their internal distress and instruct them in ways to respond to situational demands, even in the face of discomfort (Hayes et al., 2012; Roemer & Orsillo, 2006, 2009). This newfound ability to flexibly approach formerly avoided situations becomes a mechanism of change within therapy, and a source of mental health afterwards (Aldao, Sheppes, & Gross, 2015). Immediately distressing experiences such as grieving are thus reframed as methods of enabling long-term health (Bonanno, Papa, Lalande, Westphal, & Coifman, 2004). In the current study, participants in the Int/Ext condition faced their experiential avoidance more fully, and may have thus improved in psychological flexibility – at least with regard to the specific feared object targeted here. Then in the final assessment, they indicated that they indeed were more willing to come in contact with this feared object because the situation demanded it, albeit in the face of concurrent distress.

An additional mechanism, which may have also led to differences in outcome patterns, may be that inhibitory learning was more effective in the Int/Ext condition. Inhibitory learning develops as a function disconfirmed hypotheses. One common hypothesis is that of imminent danger and distress, paired with a lack of harmful consequence (Craske et al., 2014). This disconfirmation work is often quite stressful, and therapies that utilize the inhibitory learning approach therefore deemphasize the necessity of within-session improvement. Instead, they opt for a more resilient, long-term change (Kircanski et al., 2012; see; Rescorla, 2000). From the inhibitory learning perspective, participants in the Int/Ext condition may have taken part in an elaborate form of affect labeling. Indeed, some of the prompts in the Int/Ext manipulation resemble those used in affect labeling (e.g., "Look at how the wings are attached to the body of the cockroach. What is passing through your head?"). This greater awareness of their inner state could have disconfirmed a variety of prior hypotheses. Participants may have hypothesized that their distress would be more severe than they expected, or that they would have been less willing to approach the cockroach while distressed. By coming in closer contact with their internal distress, participants in the Int/Ext group may have experienced more effective inhibitory learning, by more explicitly disconfirming their catastrophic expectations about the effects of the cockroach. Furthermore, by arousing and extinguishing more fear cues (i.e., both the cockroach and their distressed reaction), participants in the Int/Ext group may have experienced a more deepened extinction during their exposure (Culver, Vervliet, & Craske, 2015; Rescorla, 2000). A pattern of improvement then ensued which was similar to that following affect labeling (Kircanski et al., 2012). Within the same session, participants did not show immediate improvements compared to their peers. Later, however, they showed greater behavioral willingness that was more resilient to future times and environments.

These proposed mechanisms are not necessarily mutually exclusive, and are often facilitated together in successful interventions (see Kazdin, 2007). Greater psychological flexibility is associated with a greater willingness to interact with internal distress, resulting in a more deepened extinction (Arch & Craske, 2008; Treanor, 2011). Similarly, participants in the Int/Ext group may have become more open to experiencing their catastrophic expectations and thus improved their subsequent inhibitory learning (Craske et al., 2008). In any case, the present findings clearly indicate that attention to distress was an important active ingredient of the intervention.

While the current findings may indicate potential clinical applications, there are a number of aspects of this study that should be taken into account when evaluating its generalizability. First, the sample used included women with high levels of self-rated phobia. While this is a population with a high incidence of specific phobias (Fredrikson, Annas, Fischer, & Wik, 1996), it is not necessarily equivalent to the characteristics of all clients in exposure therapy. Moreover, while the exposures themselves were similar to those used in therapy, experimental demands required a more limited, standardized procedure than what is often done in clinical settings.

The current experiment placed practical constraints on a single exposure (e.g., duration) with additional measurements during the exposure and following it. Interventions performed over the course of exposure therapy, on the other hand, are more idiosyncratic, are performed multiple times, in the context of a closer working relationship, and accompanied by more extensive psychoeducation beforehand and a therapeutic debriefing afterwards (Hembree, Rauch, & Foa, 2003). Similarly, it is important to note that the generalizability which occurred in the followup assessment was operationalized through temporal and contextual changes. These changes have been found elsewhere to predict a higher fear renewal (Mystkowski, Mineka, Vernon, & Zinbarg, 2003; Vansteenwegen et al., 2007). Future studies may expand on the current work, and explore the extent to which similarly augmented exposures may generalize to changes in stimulus itself. For example, participants could perform an exposure to a dead cockroach, and perform a subsequent BAT with a live one. Also, the exposure procedure was designed to ensure participant compliance. Each exposure was administered individually, with the nearby experimenter attentive to any indications of distraction or noncompliance. Still, this study's results should be interpreted in light of the fact that a formal manipulation checks were not administered.

Finally, it is worth noting that the current study limited followup to only one week following the exposure. Within this timeframe, meaningful differences emerged between the two conditions with regards to changes in behavior and subjective distress. Future studies may examine the extent to which these differences continue through longer-term differences, allowing for a greater examination of mechanisms of change. For example, it seems that symptom improvement in the Ext condition (compared to baseline) have been primarily predicted by SUDS, whereas symptom improvement in the Int/Ext condition have been more influenced by changes in BAT. A long-term study which includes repeated measurements (e.g., Dethier et al., 2015; Tsao & Craske, 2000) may shed more light on the mechanisms of change experienced in both types of interventions. These questions are of particularly clinical relevance as behavior therapy utilizes fear hierarchies that include changes to both the stimulus as well as the characteristics of the situation, and take place over a longer period of time (Choy, Fyer, & Lipsitz, 2007).

5. Conclusion

The current study touches on a salient point of tension in therapy: that of feeling better versus doing better. Ideally, both these goals consistently accompany each other. This study, however, provides an exception. While all participants improved, those who directly interacted with their distress during the *in vivo* exposure showed more situationally robust behavioral gains. However, they did not show improvement in subjective distress at the same rate as their peers who did not attend to their distress. Models that construe well-being in absolute hedonic terms (e.g., Fredrickson & Losada, 2005), highlight subjective improvement. Other models of well-being, such as the psychological flexibility model (Kashdan, 2010), may find improvement in goal-directed behavior preferable. According to the latter model, distress may be justified given certain situational demands, and greater distress tolerance may be a distinctive feature of better adaptiveness to new environments (Zvolensky, Vujanovic, Bernstein, & Leyro, 2010). Current methods of exposure therapy argue that any opportunity to become more in touch with one's experience and to challenge experiential avoidance is a valuable step towards health in and of itself. The present findings support such a claim.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.brat.2018.12.001.

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