

The Impact of Demand Characteristics on Brief Acceptance- and Control-Based Interventions for Pain Tolerance

Bryan Roche, *National University of Ireland, Maynooth*
John P. Forsyth, *University at Albany, State University of New York*
Elaine Maher, *National University of Ireland, Maynooth*

The present analog study compared the effectiveness of an acceptance- and control-based intervention on pain tolerance using a cold pressor task, and is a partial replication and extension of the Hayes, Bissett et al. (Hayes, S. C., Bissett, R.T., Korn, Z., Zettle, R. D., Rosenfarb, I. S., Cooper, L. D., & Grundt, A. M. (1999). The impact of acceptance versus control rationales on pain tolerance. The Psychological Record, 49, 33-47) study. Our aim was to test the effects of a nonspecific source of therapeutic change within the context of ACT therapy. Otherwise healthy undergraduates (N=20) were exposed to a cold pressor task before, immediately after, and 10 min following one of the two interventions. Half of the participants also were assigned to a high demand characteristic condition in which the experimenter maintained close physical proximity, eye contact, and placed subtle social pressure on participants to please the experimenter. The results showed that the most important factor influencing latency to withstand the cold pressor task was social pressure. The acceptance-based intervention was more subject to demand than the control strategy. Evaluative ratings of pain were unaffected by the demand manipulation. The current data suggest that demand characteristics can exert a significant positive impact on the outcome of therapeutic protocols. The implications of this view for acceptance- and control-based psychosocial interventions are discussed.

ACCEPTANCE AND COMMITMENT therapy (ACT) is a relatively new behavioral psychotherapy that is predicated on several somewhat counterintuitive assumptions about the nature of human suffering and its alleviation (Hayes, Strosahl, & Wilson, 1999). At the core of these assumptions is the notion that psychological suffering (e.g., unwanted thoughts, memories, emotions, pain, overt acts) is neither good nor bad, but rather a ubiquitous facet of human life that need not get in the way of an individual living a full and valued life. Clients, however, often enter therapy with the view that in order to have a good life, one must first eliminate or control the symptoms and sources of suffering (i.e., thoughts and feelings). Quite often this takes the form of experiential avoidance, or a tendency to engage in behaviors to alter the frequency, duration, or form of unwanted private events (i.e., thoughts, feelings, physiological events, and memories) and the situations that occasion them (Hayes, 1994a, 1994b; Hayes & Gifford, 1997; Hayes, Strosahl, & Wilson, 1999).

From an ACT perspective, experiential avoidance, though not uniformly pathogenic, is thought to function

as a core psychological diathesis underlying the development and maintenance of several forms of psychopathology (Blackledge & Hayes, 2001; Hayes & Wilson, 1993, 1994; Hayes, Wilson, Gifford, Follette, and Strosahl, 1996) and human suffering more generally (see Hayes, Strosahl, et al., 1999, for a review). Several somewhat independent lines of research (e.g., thought and emotion suppression) seem to support the notion that rigid and inflexible (i.e., context insensitive) attempts to suppress and control unwanted private events are largely ineffective, and can result in more (not less) unwanted thoughts and emotions (e.g., Clark, Ball, and Pape, 1991; Feldner, Zvolensky, Eifert, and Spira, 2003; Gold & Wegner, 1995; Karekla, Forsyth, and Kelly, 2004; Lavy & van den Hout, 1990; Wegner, Schneider, Knutson, and McMahon, 1991; see also Purdon, 1999, for a review), suffering and pain (Gross & Levenson, 1997; Hayes, Bissett, et al., 1999; McCracken et al., 1999), distress and restriction in life functioning (Marx & Sloan, 2002), diminished contact with meaningful and valued life activities, and poorer overall quality of life (Hayes, 2004).

The mechanisms and processes by which experiential avoidance develops and functions have yet to be fully worked out empirically. ACT suggests that experiential avoidance operates paradoxically and it does so, in large part, because of the bi-directional nature of language

itself. That is, for humans the psychological functions (e.g., fear) of objects and events are present for their referents and symbols (i.e., words and thoughts; see Hayes, Barnes-Holmes, and Roche, 2001, for a more detailed account). Thus, just as one can learn to respond to avoid or escape external sources of fear and harm, one can just as readily turn this capacity on oneself in an effort to avoid, escape from, or minimize internal thoughts, feelings, or bodily sensations that may be unpleasant or hurt. This struggle, in turn, takes enormous energy and effort, tends not to yield the desired outcomes (i.e., relief, feeling better) in the long-term, and can bring about the very things that the person wishes not to experience.

Though experiential avoidance can be conceptualized as an inflexible, broad-band, emotion regulation strategy, its assessment is nonetheless limited to self-report (i.e., Acceptance and Action Questionnaire [AAQ]; Hayes et al., 2004). This is somewhat problematic given that experiential avoidance refers to overt behavior rather than reports of subjective feelings regarding the desire to avoid aversive events. Thus, there is a real need for direct and unobtrusive behavioral indices of experiential avoidance. Additionally, it is worth noting that experiential avoidance itself is not problematic or even pathogenic (see Forsyth, Eifert, & Barrios, 2006). For instance, avoiding an oncoming car makes adaptive sense.

Avoidance, and particularly experiential avoidance, can become problematic because it denotes a broad-band rule-governed form of emotion-regulatory behavior that, by definition, tends to yield insensitivity to prevailing contingencies that demand an approach response. For instance, a person might say, "I want to see my kid's soccer game (*approach*) but am unwilling to have the back pain that my history tells me will occur when sitting and standing at the game" (*avoidance*). This approach-avoidance conflict, in turn, appears to create distress and the kinds of functional impairment seen clinically. It also points to why acceptance may be a vital alternative (i.e., acceptance transforms the approach-avoidance conflict into approach-approach, or no conflict; see Forsyth et al., 2006).

To foster psychological flexibility and to undermine experiential avoidance, ACT therapists often make extensive use of language that is nonlinear, such as paradox and metaphor. The use of metaphor fits rather well with other, more humanistic uses of metaphor in the clinical setting (McCurry & Hayes, 1992), but it is different in that specific ACT-relevant themes are always the focus of such metaphorical talk. For instance, a client suffering from an ongoing struggle with anxiety may be presented in therapy with the metaphorical parallels between her struggle and a set of Chinese finger cuffs (i.e., the harder you struggle the tighter the cuffs become; see Hayes, Strosahl, et al., 1999, p. 105; see also Eifert &

Heffner, 2003, for an illustration of its use). Metaphors expose clients to contingencies operating when emotional control seems crucial and help to teach clients that they might need to approach their problem from an entirely different perspective.

ACT also places considerable emphasis on the client-therapist relationship. Of course, such an emphasis is not, in itself, unique. The relationship between the client and the therapist has received considerable attention for many decades from within and outside of behavior therapy (e.g., Cordova & Kohlenberg, 1994; Rogers, 1951, 1967; Wright and Davis, 1994). With ACT, therapeutic relationships are typically strong, intense, open, confrontational, mutual, and accepting (Hayes, Strosahl, et al., 1999). The therapeutic relationship within ACT is considered important because it is based on; (a) a stance toward oneself and others (e.g., acceptance and openness) that is curative, (b) allows that stance to be modeled, and (c) creates a social context through which important issues can be evoked. Finally, strong, open, loving, and respectful relationships are usually a natural expression of core values held by a client and a therapist.

Of course, the notion of acceptance is not new or unique to ACT, and neither is concern about the therapeutic relationship. What is new is the basic and applied evidentiary-base emerging from within and outside of behavior therapy as applied to concepts such as acceptance, mindfulness, value-guided change, and the like, including manualization of intervention technologies flowing from this work. ACT also emerged from a distinctly different philosophy of science known as functional contextualism (see Hayes, 2004), and has developed in tandem with a behavioral, functional-analytic theory of language and cognition known as relational frame theory (RFT; Hayes et al., 2001). The impact of ACT has been studied with several populations, but until recently the outcome data have been rather limited (see Hayes et al., 2006, for a review). Some small and less well-controlled clinical studies have shown ACT to be an effective treatment for depression (Zettle, 1984; Zettle & Rains, 1989) and anorexia (Heffner, Sperry, Eifert, & Detweiler, 2002). Some well-controlled research provides evidence that ACT is helpful with anxiety-related problems (Carrascoso & Francisco, 1999; Hayes, 1987; Roemer and Orsillo, 2002; Zettle, 2003), chronic drug addiction (Walser & Hayes, 1995), depression in parents with disabled children (Biglan, 1990), chronic pain (Geiser, 1992; Korn, 1997; see also Dahl, Wilson, Luciano, and Hayes, 2005), exhibitionism (Paul, Marx, and Orsillo, 1999), and in reducing rehospitalizations of inpatients suffering from psychotic symptoms (Bach & Hayes, 2002). The empirical analysis of ACT is still in its infancy, however. Before outlining the current study, it is important to consider one relevant empirical study that

has investigated acceptance in a laboratory setting. In that study, Hayes, Bissett, and colleagues (1999) chose cold pressor pain (Hines & Brown, 1932) as an analog of human suffering, in part, because it represents an aversive stimulus that is easy to control in a laboratory setting (Hayes, Bissett, et al., 1999). The authors examined the behavioral and subjective impact of a brief control-based versus an acceptance-based rationale on pain tolerance during the cold pressor task. Brief ACT and control-based rationales were used as the interventions because they represent competing models of the nature of human suffering and how best to alleviate it in psychotherapy, and can be highly refined and targeted in the experimental situation.

There were three coping rationales: acceptance-based, control-based, and attention-placebo. The dependent measures were length of time participants voluntarily kept their hands in the cold pressor, subjective evaluations of pain, unpleasantness, and sensation. Overall, the acceptance group demonstrated greater pain tolerance compared with the other groups. Interestingly, this effect was not accounted for by a concomitant reduction in the subjective experience of pain, a finding that can be interpreted as being consistent with a positive ACT outcome.

The current study represents a replication and extension of the Hayes, Bissett, and colleagues (1999) study with modifications of conceptual and practical interest. Firstly, the current study aimed to assess the impact of an acceptance-based rationale on pain tolerance when the effect of demand characteristics has been removed. This is important, because any empirical assessment of an emerging therapy should begin by eliminating the effects of nonspecific factors that are known to influence therapeutic outcomes. In both the laboratory research context (e.g., Kantowitz, Roediger, & Elmes, 1997) and in the context of therapy (Kanter, Kohlenberg, & Loftus, 2002), demand characteristics are always placed on the subject or client, whether intended or not (see Orne, 1962; Rosenthal, 2002; Rosnow, 2002). In experimental settings, demand characteristics include obvious and subtle cues about the experimental hypothesis that influence subject behavior, whereas in clinical settings demand characteristics include therapist behaviors that influence client behaviors in the expected direction (e.g., therapist authority, wishes, expectations, prescriptions, and worldviews; see Kanter et al., 2002; Orne, 1962).

Experimenters and clinicians alike normally go to great lengths to control for the effects of demand characteristics so that behavior change may be confidently attributed to the independent variable (i.e., intervention or treatment). Given that ACT depends upon a particularly intense therapeutic relationship, it

would not be surprising if some of the effects of ACT were due to demand characteristics placed on clients in the therapeutic setting. Acknowledging that ACT explicitly attempts to undermine client efforts to please the therapist does not negate the importance of quantifying the impact of demand characteristics in the context of acceptance-based coping rationales. Thus, in the current study, the role of demand characteristics in the effectiveness of both an acceptance-based and control-based rationale was addressed by manipulating aspects of the experimenter's interpersonal behavior so as to increase or decrease the intimacy of a social interaction, namely, eye contact, physical proximity, and verbal statements that conveyed therapist expectations about participant behavior.

A second issue requiring consideration in any systematic study of acceptance-based rationales is the relative importance of metaphors used in the therapy context. More specifically, if metaphors have an appreciable impact on therapy outcome (Berlin, Olson, Cano, & Engel, 1991; see McCurry & Hayes, 1992, for a review), then their effect needs to be considered in any therapeutic intervention with which ACT is compared. Specifically, while the context of acceptance- and control-based therapies obviously differ in terms of rationales and approach, they also differ enormously in their presentation of the therapy protocols and the behavior expected of the client. Thus, the abundance of metaphor used within ACT is not inconsequential and may even be crucial. In the current study, therefore, we used metaphors within both the acceptance-based and control-based rationales in an attempt to provide a balanced evaluation of their effects on overt pain tolerance and self-report of pain.

Consistent with Hayes, Bissett, and colleagues (1999), we anticipated that participants who received the acceptance rationale would keep their hands in the cold pressor longer than participants who received the control-based rationale. Moreover, we anticipated increased pain tolerance would not covary reliably with reductions in subjective evaluations of pain, on the grounds that changes in private events are not viewed as central to positive ACT outcomes (see Hayes, Strosahl, et al., 1999). We also expected that demand characteristics would influence pain tolerance across the rationales, and that an interaction between therapeutic rationale and level of demand characteristics would be observed.

Method

Participants

Twenty undergraduate volunteers (14 females, 6 males; $M_{\text{age}}=19.95$; $SD=2.35$) from the National University of Ireland, Maynooth, participated. Participants were recruited via campus announcements and via postings

through the Department of Psychology's research participant pool. They were not remunerated in any way. All volunteers were asked if they suffered from any medical condition, such as Reynaud's disease, diabetes, or high blood pressure, that may preclude exposure to cold water. None of the volunteers reported any of these conditions. They were not screened for drug dependency, the presence of chronic pain conditions, or degree of distress tolerance. In effect, the sample was a random sample of university undergraduates employed for experimental convenience.

Participants were randomly assigned to one of the following four conditions: acceptance rationale under high demand, acceptance rationale under low demand, control rationale under high demand, and control rationale under low demand. No participant had previously participated in a study on pain tolerance.

Apparatus and Materials

Cold pressor task. An ice box (measuring approximately 35.56 cm × 38.09 cm) containing ice water at 1 degree centigrade was used for the cold pressor task. A wire mesh was used to separate the ice from the water, and to keep the ice away from participants' hands. Participants were asked to roll up their sleeve, remove any jewelry on their nondominant hand, and to immerse that hand in the ice water. The duration of each test (i.e., hand immersion until removal) was measured in seconds using a stopwatch.

Intervention protocols. Both the acceptance- and control-based protocols consisted of a brief one-on-one therapeutic intervention delivered by a female experimenter. Due to resource limitations, it was not possible to randomize the gender of the experimenter. For the sake of experimental control, each intervention (approximately 8 minutes in length) was carefully scripted and was read verbatim to participants.

The acceptance rationale attempted to teach participants to accept and acknowledge the presence of negative thoughts and feelings, emphasizing the ineffectiveness of attempts to control private events as a strategy to manage pain (see Appendix A). Consistent with Hayes, Bissett, and colleagues (1999), the control rationale attempted to teach participants that perseverance and determination were important tools for dealing with negative thoughts and feelings, that they should never give in to these negative private events, but rather attempt to master and control them (see Appendix B). That is, control was emphasized as a viable strategy for pain management (see also Caudill, 2002; Philips & Rachman, 1996; Sternbach, 1987; Turk, Meichenbaum, & Genest, 1983). To illustrate the concepts, the "polygraph metaphor" (see Hayes, Strosahl, & Wilson, 1999) was used for the acceptance-based group (see Appendix A). Similarly, to illustrate the

utility of struggle and continued control efforts, the popular metaphorical story of "two mice who fell into a bucket of cream" was used for the control-based group (see Appendix B).

After the administration of a rationale, each participant was provided with a metaphorical exercise (referred to hereafter as a "physical metaphor"). For the acceptance groups, the Chinese handcuffs metaphor was used. Chinese handcuffs consist of a hollow tube of woven straw approximately 5 inches in length. Participants were required to push one index finger into each end, and then to try to pull their fingers out. Typically individuals are unable to remove their fingers unless they give up on the intuitive strategy of pulling and instead nonintuitively push their fingers towards each other to loosen the grip of the handcuffs (see Eifert & Heffner, 2003). The control-based intervention groups were provided with a solvable handheld puzzle as a physical metaphor. The aim of the puzzle was to maneuver a number of small steel balls from an outer maze to a smaller, inner maze. This required continued perseverance (an intuitive strategy) for the puzzle to be solved.

State anxiety. The Spielberger State-Trait Anxiety Inventory Form Y (STAI-S-T; Spielberger et al., 1983) consists of two 20-item questionnaires used routinely to assess state and trait levels of anxiety in clinical and nonclinical populations (alphas = .86 to .95 in adult and college student samples; test-retest reliability ranges from $r = .71$ to $.86$; Spielberger et al., 1983). For the purposes of the current study, only items measuring state anxiety were used.

Evaluative ratings of pain experience. A three-part self-report, based on Melzack and Wall (1965), was used by Hayes, Bissett, and colleagues (1999) to assess self-report of felt pain, unpleasantness, and sensation associated with a cold pressor task. A similar assessment was utilized in the present study. Participants were instructed to rate felt pain (intensity), unpleasantness (degree of adversity of the experience), and sensation (total sensation, not just pain) using three Likert-type visual analog scales (10-unit increments), anchored from 0 = none at all to 100 = extremely unpleasant.

Procedure

Pre-intervention baseline. Participants meeting inclusion criteria were escorted to a dimly lit 1.83 × 4.08 m room and were seated in a comfortable recliner chair in one corner of the room. The experimenter, unless otherwise indicated, sat in a normal desk chair at the opposite corner of the room, so that the participants and the experimenter were diagonally facing one another. Following consent, participants completed the STAI-S, and were then instructed to place their nondominant hand in the container of ice-cold water. They were to let their hand

hang loosely without making contact with the bottom and were instructed to “remove it when it was no longer comfortable.” During the cold pressor task, the experimenter sat approximately 2.4 m away from all participants and made minimal eye contact. The cold pressor task was terminated when participants removed their hand from the container. Participants were then instructed to rate their immersion experience (i.e., intensity, unpleasantness, and sensation) by placing a mark anywhere along the line of each scale. The experimenter then exited the experimental room and informed participants that she would be absent for approximately 10 minutes. During this break, participants were provided with a dry cotton towel and popular periodical reading materials to peruse (e.g., *Time* and *Cosmopolitan* magazines). The purpose of the 10-minute break was to allow time for the nondominant hand to warm and return to baseline levels prior to starting the next phase.

Brief rationale and manipulation of demand characteristics. Following the break, the experimenter reentered the experimental room and delivered either an acceptance-based or control-based rationale. Thereafter, participants were provided with a physical metaphor (i.e., Chinese handcuffs or hand puzzle) and were asked to explore it for approximately 2 minutes. Participants were then asked what (if anything) they had learned from the activity, and were allowed to extemporize the meaning of the physical metaphor for approximately 1 minute, with no additional comments by the experimenter.

Following this period, participants were administered the STAI and the cold pressor task as before. This time, however, extent of demand characteristics placed on participants was manipulated just prior to the cold pressor task. In the high demand condition, the experimenter sat approximately .61–.91 m away from each participant, maintained consistent eye contact, and said, “It is important that you do your best for me.” In the low demand condition, the experimenter sat approximately 2.4 m away from participants, made minimal eye contact, and made no request to “do your best for me.” Upon completion of the second cold pressor task, participants were asked to make their evaluative ratings of pain intensity, unpleasantness, and sensation. A second 10-minute break period followed. During this break, participants were provided with dry cotton towels, reading materials, and their respective physical metaphors. The experimenter encouraged participants to spend the 10-minute period exploring the physical metaphors, while keeping in mind what was discussed during the intervention phase.

Follow-up assessment. Following the break, participants completed the STAI-S for a third time, and were then immediately exposed to the cold pressor task as before.

The manipulation of the level of demand characteristics was maintained as in the previous trial. All participants were again instructed to remove their hand when it was no longer comfortable, and evaluative ratings (i.e., intensity, unpleasantness, and sensation) followed immediately upon participant termination of the task. Participants were then debriefed, and asked not to discuss the study with other individuals.

Data Analytic Strategy

The primary dependent variables (i.e., cold pressor latency, evaluative ratings, and state anxiety) were analyzed separately using a series of 2 (Intervention: Acceptance vs. Control) \times 2 (Demand: High vs. Low) mixed model ANOVAs, with a third repeated measures factor added to evaluate changes over time (i.e., baseline, post-intervention, and follow-up). Geisser-Greenhouse degrees of freedom adjustments are reported for repeated measures analyses in cases where the sphericity assumption was violated. Partial eta-squared (η^2) was adopted as an index of effect size, and specific comparisons of theoretical interest were evaluated using single degree of freedom contrasts for main effects, simple main effects, and the anticipated interaction of Demand \times Intervention (see Jaccard, 1998). When appropriate, a Holm’s modified Bonferroni approach was used to control for experimentwise error (Holm, 1979), as this correction is more powerful than more traditional approaches (i.e., Tukey test and the Bonferroni correction) used routinely to control for artificial inflation of Type I error rates.

Results

Cold Pressor Duration

Table 1 illustrates means and standard deviations of cold pressor duration (sec) as a function of intervention group and demand condition. Though cold pressor duration did not discriminate between groups at baseline, it did increase significantly from baseline to post-intervention and follow-up, as supported by the main effect for Time, $F(2, 32) = 6.51, p < .004, \eta^2 = .29$ (Time 1 < Time 2 < Time 3; all pairwise comparisons, $p < .05$). Yet, extent of increase also varied reliably as a function of the demand condition, as indexed by a significant Demand \times Time interaction, $F(2, 32) = 6.51, p < .034, \eta^2 = .29$ (moderate effect). Follow-up contrasts showed that this interaction resulted from participants in the high demand condition showing a significantly greater increase in cold pressor durations (i.e., more pain tolerance) at follow-up relative to baseline when compared to the flat and stable pattern of responding for participants in the low demand condition (M_{diff} High minus Low Demand = +64.80 sec; $SE = 28.87; t[18] = 2.24, p < .039, \eta^2 = .29; CI = 3.60$ to 125.99). Cold pressor duration

Table 1

Means and standard deviations of cold pressor durations (sec) for the acceptance and control-based intervention groups under conditions of high and low demand

Phases	Intervention							
	Acceptance-based				Control-based			
	High demand		Low demand		High demand		Low demand	
Baseline	68.4	(48.9)	50.8	(61.7)	42.0	(28.2)	37.6	(31.0)
Post-Intervention	143.4 ^a	(121.2)	44.8 ^b	(25.9)	62.2	(26.7)	75.0	(77.8)
10 min follow-up	171.2 ^a	(129.8)	34.2 ^b	(15.8)	85.0	(53.7)	70.4	(82.5)

Note. $N=20$; Standard deviations appear in parentheses. Means with different superscripts differ for pairwise comparisons of high and low demand within intervention conditions.

at post-intervention relative to baseline did not discriminate between demand conditions.

Though the anticipated Intervention \times Time interaction was not significant, there was a modest trend supporting a three-way Intervention \times Demand \times Time interaction, $F(2, 32)=3.24$, $p<.052$, $\eta^2=.17$ (moderate effect). Prior to the intervention, performance for the acceptance- and control-based groups were comparable under conditions of high (M_{diff} Acceptance minus Control = +26.4 sec) and low (M_{diff} Acceptance minus Control = +13.2 sec) demand. Simple main effects analysis showed that under high demand, the acceptance group consistently outperformed the control-based group at post-intervention relative to baseline (M_{diff} Acceptance minus Control = +81.00 sec; $SE=32.70$; $t(18)=2.48$, $p<.025$; $\eta^2=.28$; $CI=11.67$ to 150.33), but not at follow-up. Yet, under low demand, the pattern was reversed, but not significantly so.

Under low demand, the acceptance group showed a worsening pattern at post-intervention (M_{diff} Acceptance minus Control = -17.2 sec) and follow-up (M_{diff} Acceptance minus Control = -49.4 sec) relative to the control-based intervention group. This was borne out by the interaction contrasts (i.e., [Acceptance minus Control] under High Demand minus [Acceptance minus Control] under Low Demand) at post-intervention, and to a lesser extent at follow-up. Under high demand, the post-intervention difference between the acceptance over the control-based group was significantly greater than the difference between groups observed under low demand ($M_{\text{diff}}=+98.2$; $SE=46.25$; $t[18]=2.12$, $p<.05$; $\eta^2=.22$; $CI=.15$ to 196.25). A similar trend also was observed at follow-up ($M_{\text{diff}}=+109.20$; $SE=57.74$; $t[18]=1.81$, $p<.07$; $\eta^2=.18$; $CI=-13.19$ to 231.59).

Given that the above three-way interaction suggests that the effectiveness of the acceptance rationale is more dependent on demand compared to the control-based rationale, we sought to compare performance (i.e., mean response at post-intervention and follow-up relative to baseline) of both intervention groups within

conditions of high vs. low demand. These simple effect analyses showed that tolerance for the cold pressor was significantly greater for the high demand acceptance group ($M_{\text{diff}}=+88.90$) relative to the low demand acceptance group ($M_{\text{diff}}=-11.30$), $t(8)=2.41$, $p<.043$. By contrast, performance of participants in the control-based intervention groups were equivalent under conditions of high ($M_{\text{diff}}=+31.60$) vs. low demand ($M_{\text{diff}}=+35.10$ sec), $p>.05$, and suggestive of overall improvement over time.

Evaluative Ratings of Pain

Evaluative ratings for pain intensity, unpleasantness, and sensation are displayed in Table 2. Contrary to expectation, omnibus tests of pain intensity, sensation, and unpleasantness ratings across the three assessment points did not yield the expected effects for Intervention, Demand, nor their interaction. Using a logic similar to that used for cold pressor performance, we then calculated the difference in post-intervention and follow-up ratings over baseline, as the rationale for the interventions and demand manipulation were not introduced until after the baseline. Using this approach, participants in the acceptance group showed an increase in pain intensity at post-intervention relative to baseline ($M_{\text{diff}}=+11.0$), followed by a subsequent reduction to base-line levels at follow-up ($M_{\text{diff}}=0.0$). Participants in the control-based condition showed attenuated reports of pain intensity from baseline to intervention and a worsening at follow-up ($M_{\text{diff}}=-1.5$ and $M_{\text{diff}}=+9.0$, respectively). This was supported by a significant Intervention \times Time interaction, $F(1, 16)=6.73$, $p<.02$, $\eta^2=.30$ (moderate effect). A similar Intervention \times Time interaction was observed for ratings of pain sensation, $F(1, 16)=6.84$, $p<.019$, $\eta^2=.30$ (moderate effect). This interaction was due, in large part, to the acceptance group showing a large decrease in pain sensation from post-intervention ($M_{\text{diff}}=-2.5$) to follow-up ($M_{\text{diff}}=-18.0$) relative to the control-based intervention group that showed a somewhat stable pattern across both time periods ($M_{\text{diff}}=+4.5$ and

Table 2

Means and standard deviations of evaluative ratings of pain during the cold pressor task as a function of intervention group and demand condition

Pain ratings	Intervention							
	Acceptance-based				Control-based			
	High demand		Low demand		High demand		Low demand	
Intensity								
Baseline	58.0	(13.0)	48.0	(19.2)	68.0	(37.5)	50.0	(24.5)
Post-Intervention	69.0	(19.5)	55.0	(25.5)	61.0	(37.1)	54.0	(34.3)
10 min follow-up	58.2	(28.4)	44.0	(27.0)	70.0	(39.4)	61.0	(25.6)
<i>Unpleasantness</i>								
Baseline	72.0	(19.2)	54.0	(21.9)	68.0	(36.5)	62.0	(31.1)
Post-Intervention	60.0	(21.5)	54.0	(20.7)	57.0	(38.3)	50.0	(31.6)
10 min follow-up	54.0	(24.1)	51.0	(28.4)	39.0	(33.2)	55.0	(39.0)
<i>Sensation</i>								
Baseline	78.0	(16.4)	66.0	(15.2)	87.0	(9.7)	76.0	(18.2)
Post-Intervention	75.0	(19.4)	64.0	(16.7)	90.0	(11.7)	82.0	(24.9)
10 min follow-up	60.0	(25.5)	50.0	(31.0)	88.0	(13.0)	89.0	(16.7)

Note. $N=20$; Standard deviations appear in parentheses. High ratings indicate more negative evaluations of the effects of the cold pressor task.

$M_{\text{diff}}=+7.0$, respectively). Contrary to expectation, ratings of unpleasantness did not vary reliably across time, nor by intervention group or demand condition. No other effects were significant.

State Anxiety

State anxiety ratings across the three assessment periods appear in Table 3. State anxiety varied by Time, $F(2, 32)=9.45$, $p<.001$, $\eta^2=.37$, and Intervention \times Time, $F(2, 32)=4.10$, $p<.026$, $\eta^2=.20$, but not by demand condition. Relative to baseline, post-intervention state anxiety ratings were significantly greater in the acceptance-versus control-based group (M_{diff} Acceptance minus Control= $+7.2$; $SE=2.72$; $t[18]=2.64$, $p<.02$; $\eta^2=.30$; $CI=1.43$ to 12.97). Moreover, simple main effect contrasts showed that state anxiety was significantly elevated in the acceptance group compared to the control-based group, but only within the high demand condition (M_{diff} Acceptance minus Control= $+10.4$; $SE=3.85$; $t[18]=2.70$, $p<.02$; $\eta^2=.31$; $CI=2.34$ to 18.56). Similarly, state anxiety at follow-up (relative to baseline) was greater in the acceptance-compared to the control-based group (M_{diff} Acceptance minus Control= $+6.6$; $SE=2.77$; $t[18]=2.38$, $p<.03$; $\eta^2=.26$; $CI=.73$ to 12.46), and particularly under conditions of high demand (M_{diff} Acceptance minus Control= $+11.6$; $SE=3.91$; $t[18]=2.96$, $p<.009$; $\eta^2=.35$; $CI=3.30$ to 19.89). Overall, reported state anxiety attenuated across time periods. Such attenuation was greatest from baseline to follow-up for those in the control-based intervention group compared to the acceptance group, and particularly under conditions of high demand. No other effects were significant.

Discussion

This preliminary study sought to evaluate the effects of two brief interventions that represent competing models of behavior change (i.e., acceptance- vs. control-based rationales) on overt pain behaviors and self-reported response to an aversive cold pressor task. A related aim was to further disentangle the contribution of therapist demand characteristics to both approaches. The results showed that demand characteristics can significantly influence overt forms of pain behavior. Importantly, such demands appeared to work with the acceptance rationale to exert a positive effect on cold pressor performance, particularly for participants who received the acceptance-based rationale under conditions of high demand. The very large improvements observed for this group suggest that acceptance-based rationales can have a significant impact on pain behavior, even if only under specific conditions.

From these findings it would appear that the acceptance-based rationale was more subject to demand characteristics than the control-based rationale, which produced consistent improvements in cold pressor performance under conditions of both high and low demand. This finding, though preliminary, suggests one of several necessary conditions that may moderate the effectiveness of acceptance-based interventions. Other relevant moderators may include the history of the client or the nature of presenting problems. It may be the case that control interventions are more effective than acceptance interventions in some, but not all, clinical contexts, with some therapists and not others, and for some problems and not others. Without analyses to investigate this possibility, the

Table 3
State anxiety scores for the acceptance- and control-based intervention groups under conditions of high and low demand

Phases	Intervention							
	Acceptance-based				Control-based			
	High demand		Low demand		High demand		Low demand	
Baseline	29.6	(3.2)	33.8	(3.9)	40.0	(11.7)	32.0	(9.8)
Post-Intervention	32.8	(4.9)	38.0	(9.6)	32.8	(12.2)	32.2	(9.8)
10 min follow-up	28.2	(2.9)	31.4	(4.8)	27.0	(8.1)	28.0	(6.4)

Note. $N=20$; Standard deviations appear in parentheses.

study of acceptance-based interventions will amount to little more than a series of demonstration studies outlining its utility in a variety of contexts. What is urgently required, therefore, is a systematic program of research into the optimal conditions for the use of acceptance-based therapeutic strategies and the specific problems and clients for whom it works best.

It is important to acknowledge that there were large and interesting variations in cold pressor performances across time for all groups. For instance, while the acceptance/high demand group showed consistent and large improvements in pain tolerance from baseline to post-intervention to follow-up, the other group did not. In particular, the control-based/low demand group showed large improvements from baseline to post-intervention, but very little improvement thereafter. The reasons for these variations are impossible to disentangle with such a small sample. Nevertheless, these differences point to important variances in the trajectories of intervention effects across the groups. At face value they would appear to suggest that acceptance may lead to sustained improvements, whereas the effects of control may be more acute. Only further research in both laboratory and applied contexts can adequately address this issue.

It could be argued from an ACT perspective that the failure of the acceptance protocol to have a large effect on cold pressor performance under conditions of low demand is not entirely unexpected. More specifically, the ACT literature suggests that clients in therapy may sometimes get worse before they get better. The “dirty glass” metaphor explains this phenomenon in the following manner: The healing process is like cleaning out a dirty glass with sand on the bottom: the only way to do it is to “stir up the dirt.” Thus, one might expect that acceptance-based interventions (as opposed to other interventions) would yield sensitization to aversive stimuli in the early phases of therapy (i.e., when the individual begins to fully confront the aversive properties of the private or public stimuli being avoided; see Wilson & Luciano, 2002). Consistent with the notion of the dirty glass metaphor, participants in the present study may have shown further improvement, following an initial worsen-

ing, had we taken additional assessments over a longer period of time. If this is the case, however, it is unclear why participants under high demand outperformed their low demand acceptance counterparts in the short term. The inclusion of further follow-ups at longer time intervals may indeed help address this issue.

Subjective ratings of the pain experience did not reveal any consistent patterns, with both groups showing both increases and decreases in pain ratings from baseline to post-intervention to follow-up. Closer inspection of the patterns suggest that, at best, acceptance yielded account worsening of pain intensity and sensation, followed by improvement, whereas the reverse was true for those in the control-based condition. Interestingly, Hayes, Bissett, and colleagues (1999) also failed to show that subjective evaluations of pain discriminated between intervention groups. However, those researchers interpreted this finding as supportive of the ACT perspective, insofar as the acceptance rationale resulted in greater pain tolerance but not concomitant attenuation of subjective pain experience. Though this outcome has been interpreted as indirect evidence supporting the view that acceptance influences the synchrony between feelings and overt behavior, it is unclear how we might interpret the various increases in negative subjective reports observed for the acceptance-based group in the current study.

While subjective pain reports did not yield any particularly consistent patterns across experimental groups, the STAI did reveal important group differences. Specifically, the control-based intervention group showed greater attenuation of state anxiety across time compared to the acceptance group. However, the observed reduction in state anxiety over time, coupled with the finding that participants collectively kept their hands in the ice water longer over time, suggests that some (not all) of the observed effects may have been due to habituation processes.

Overall, the present findings provide modest support that acceptance rationales confer benefits on managing acute pain behavior without changing the nature of pain-related subjective evaluations, and suggest that the outcome of acceptance-based rationales in laboratory pain

studies, and possibly even in the clinical setting, are subject to significant demand effects. Control-based rationales, by contrast, may be less sensitive to therapist demand.

Although the sample size was limited and the current study was analog in nature, many of the observed effects were quite robust. We anticipate that the observed effects would have been even stronger with a larger sample size. Replications and extensions of this work, with clinical and nonclinical samples, is needed, particularly as ACT is attracting increased attention within the behavior therapy movement, and is being described as an innovative “third wave” alternative to mainstream psychosocial interventions (see Hayes, 2004).

One obvious next step would be to evaluate such treatment rationales coupled with various demand manipulations in the context of other more clinically relevant aversive stimuli. For instance, the cold pressor task is arguably a discrete aversive stimulus, with a clear external source. As such, it is unlikely to induce great emotional concern. On the other hand, ACT is typically used for clients with problems that are highly personal, emotional, and chronic, and for clients that are highly motivated to seek a solution. If this is the case, then commitment to value-based action may be an intrinsic part of the acceptance process, and we should expect that the nature of the aversive stimulus may have a major impact on the suitability of ACT as a treatment paradigm. Future research exploring this notion may wish to vary pain levels or, alternatively, use other provocation procedures (e.g., hyperventilation, loud noise) capable of inducing emotional distress of longer durations. Indeed, analog research designed to arrange contingencies such that even mild levels of emotional or psychological distress are associated with costs, may best function as an analog to the kinds of contingencies clients experience in their natural environment (see Forsyth et al., 2006). Such manipulations would likely have the effect of increasing emotional involvement with the aversive stimulus and/or increasing motivation to respond differently to pain and distress.

Several methodological limitations to the current study merit considerations in light of the potentially clinically significant findings outlined thus far. Firstly, we acknowledge that our manipulation of demand characteristics was, for purposes of experimental integrity, limited to several obvious variables that may not fully capture the relevant components of therapist demands placed on clients, regardless of treatment approach. It might be argued, therefore, that the current study is not a realistic analog of real therapeutic process. Future research of this type may wish to specify how demand characteristics operate alone, or in combination with therapist characteristics (e.g., charisma) and treatment technologies, to influence both analog and clinical therapeutic outcomes.

Another methodological concern relates to the use of a nonstandard cold pressor procedure. More specifically, the cold pressor task traditionally involves bringing all subjects' hands to the same temperature by placing them in a bath of warm water (37C) before immersion in the ice water. This procedure was not followed in the current study. Thus, it remains a possibility that the use of a more standardized procedure may alter outcomes in a significant way. While we are doubtful that this methodological change had a major influence on the results (i.e., all participants were treated the same, short of the interventions), future research should ensure that subjects' hands are at equivalent temperatures prior to immersion in ice water. This will allow systematic study outcomes to be more easily compared.

The use of a gender-biased sample may also have affected on the research findings such as to limit their applicability to the general population. Specifically, given known gender differences in pain tolerance under laboratory conditions (e.g., Robinson, Wise, Riley, & Atchison, 1998), it is possible that our largely adult female subject sample may have responded to experimental manipulations in an idiosyncratic way. Indeed, the use of a female experimenter may also have influenced the cold pressor performance in ways not yet understood. Future research is required to identify if this indeed is the case. If it is the case that acceptance interventions are more effective for one or the other gender, it is crucial that this effect be examined functionally in the attempt to identify the boundary conditions and core processes of acceptance phenomena.

Finally, there are several behavioral measures that could have been employed here to predict the effectiveness of the interventions, one of which was designed to undermine control of private experience and the other of which was designed to encourage further control of them. Specifically, the AAQ (Hayes et al., 2004) and measures of distress tolerance (see Brown, Lejuez, Kahler, Strong, & Zvolensky, 2005) both provide indices of emotional avoidance, a central target of acceptance interventions. Thus, it may have been important to control for these factors in the formation of experimental groups. Such indices require urgent investigation if we are to understand acceptance at a functional level. In the absence of this type of detailed functional-analytic research, especially given the ever-widening range of problems to which ACT is being applied, it may be perceived that acceptance-based approaches such as ACT serve as “one-size fits all” solutions to behavioral problems.

While several theoretical criticisms may be made regarding the ecological validity of the current analog study, it is important to appreciate that analog studies will always be subject to such criticisms. A reliance on post-hoc interpretation of these or other data is always potentially

misleading in the absence of additional supporting data. In ACT, the possibility of interpretive errors is present due to the absence of a clear empirical and laboratory demonstrations of the core behavioral processes involved in both acceptance and commitment (i.e., neither are technical terms within behavior analysis), and the absence of a clear outline of the anticipated trajectory of expected clinical outcomes for both overt problem behaviors and subjective reports. Such issues are important, in part, because they have to do with the value and practical utility of ACT, and subsequent efforts by researchers to provide empirical evaluations of ACT at both the molar and molecular level.

While ACT employed in-vivo may produce powerful behavior change, it is crucial that the relevant operationally defined variables are subject to experimental manipulation. If operational definitions are not forthcoming, then we run the risk of attributing any weak laboratory effects for acceptance-based interventions to an inappropriate application of an acceptance protocol, or to inappropriate protocol content, rather than to the ineffectiveness of an acceptance strategy itself. Clearly such interpretations do not serve the ultimate interests of a truly scientific community.

Possible Implications for Clinical Practice

There are several broader implications that can be derived from this work, and more generally from the growing literature evaluating acceptance-based interventions for persons suffering from chronic pain. For instance, acceptance-based therapies such as ACT emphasize the importance of the therapeutic stance (Hayes & Strosahl, 2004). This therapeutic stance is one whereby therapists model acceptance in a supportive and nonconfrontational fashion. These behaviors may serve as subtle demand characteristics, but they do seem important when delivering ACT (i.e., modeling acceptance vs. modeling struggle and control over undesired private content). This is why it is recommended that therapists using ACT play with the concepts in their own lives.

The emerging literature on acceptance-based interventions for persons with chronic pain suggests that acceptance of pain is a much more robust predictor of pain-related functional impairment than pain intensity (McCracken, & Eccleston, 2005, 2006; Wicksell, Melin, & Olsson, 2007; see also Dahl, Wilson, & Nilsson, 2004). The tendency toward experiential avoidance is associated with more pain severity and poorer functional outcomes. Moreover, acceptance-based strategies such as those described herein tend to yield better functional outcomes compared with strategies teaching pain management and control (Gutiérrez-Martínez, Luciano-Soriano, Rodríguez-Valverde, & Fink, 2004).

More broadly, the emerging basic and applied literature points to the following more practical recommendations.

1. Therapists ought to explore strategies that foster greater flexibility and acceptance of pain.
2. Acceptance-based strategies, including use of metaphor and experiential exercises such as those used in the present study, ought to be integrated seamlessly into the therapeutic interaction as opposed to being delivered in a canned fashion (e.g., “Here is a metaphor ...”).
3. Therapists ought to introduce and enact metaphors experientially with clients versus verbally or imaginatively (e.g., Chinese finger cuffs, chess board, thought cards, tug of war; see Dahl et al., 2005; Eifert & Heffner, 2003). Such an approach allows clients to make fuller contact with the exercise while providing an opportunity for new learning
4. Interventions designed to foster acceptance of pain ought to be broadly contextualized in the service of client values and goals. This is a strategy that was not modeled in the present study. Values reflect aspects of life that the client cares deeply about. Living in accordance with these values is, in turn, associated with a good quality of life, or more colloquially, a life lived well. Placing values front and center in a therapeutic intervention should serve to dignify the treatment and make the hard work of therapy worthwhile. Therapists will likely find that value-guided interventions for chronic pain also serve an important motivational function. Thus, we recommend that therapists weave client values and aspirations into any therapeutic strategy.
4. Though acceptance-based strategies for chronic pain have yet to qualify as empirically supported treatments (at least by Division 12 Task Force standards), there are nonetheless several practical clinical guides available for clinicians wishing to apply ACT in working with chronic pain patients; namely, Dahl and Lundgren’s (2006) *Living Beyond Your Pain: Using Acceptance and Commitment Therapy to Ease Chronic Pain* (for clients) and Dahl et al.’s (2005) professional guide, *Acceptance and Commitment Therapy for Chronic Pain*. Both books are excellent resources for therapists wishing to apply acceptance-based strategies, such as those outlined in ACT, with clients suffering from chronic pain.

Appendix A. Acceptance-Based Protocol

We all encounter problems and difficulties in our lives. If you think about the reasons you may give for the problems you have, they can be categorized as having to do with a thought or a feeling. So, what strategies do we use when a thought or feeling gets in the way? Well, often

we struggle with them, try pushing them away, or try to control them. Perhaps this is not a good idea, as trying to control our thoughts and feelings only serves to intensify them. For example, suppose I asked you not to think about pink elephants for the next few minutes—do you think you could do this? You see, if you try to distract yourself by thinking of something else, then the whole distractor becomes one big “don’t think about pink elephants.” So, maybe *not* struggling with our thoughts and feelings, and instead, accepting them and acknowledging their presence, is a better option. Let me give you some examples to illustrate what I mean.

Suppose I had you hooked up to a polygraph—one of those machines that measures your blood pressure, heart rate, respiration, and sweating—in short, how anxious you are. And imagine this is the most sensitive machine ever made. When you are all wired up to it there is no way you can be aroused or anxious without the machine knowing it. So, I tell you that you have a very simple task here: All you have to do is stay relaxed. If you get the least bit anxious, however, I will know it.

I want to give you an extra incentive, so I also have a loaded gun, which I will hold to your head. If you just stay relaxed, I won’t shoot you, but if you get nervous, I’m going to kill you. In this scenario, what do you think would happen? The tiniest bit of anxiety would be terrifying. Of course you’d naturally be saying, “Oh my god I’m getting nervous and anxious! Here it comes! BAMM!” How could it work otherwise? So in other words, if I say, “Relax or I’ll shoot you,” not only will it not work, but it’s the other way around—the very fact that I would ask you to do this would make you damn nervous.

The same principle works with feelings. It’s unmotivating to try to increase motivation and fail. Getting angry over not being able to get rid of anger further perpetuates the feeling. It’s like a microphone feedback screech—you know, that horrible screech a public address system sometimes makes? It happens when a microphone is positioned too close to a speaker. Then if someone taps the microphone, the noise goes into the microphone; the sound comes out of the speakers amplified and goes back into the mike even louder than it was the first time it went in.

Being caught in the middle of a feedback screech is like what I said about struggling with your thoughts and feelings—the mechanism that amplifies negative thoughts and feelings is our attempts to try to control them. So what do you do? Well you try to live your life tiptoeing around, hoping that if you are very quiet there will be no feedback. But this isn’t feasible—you cannot live without making noise. But what you have to notice here is that, it’s not the amount of noise you make that’s the problem. It’s the amplifier. So, the trick to preventing further screeching (or, in other words, to help you live your life quietly, free from negative thoughts and feelings)

isn’t to move around the microphone more quietly, but to unplug it from the amplifier.

So what I’m really trying to get at here is that in order to deal with your problems, your negative thoughts or feelings, simply acknowledge the fact they are there and let go. Do not try to control what is happening or the problem will just become more intensified.

Appendix B. Control-Based Protocol

We all encounter problems and difficulties in our lives. If you think about the reasons you may give for the problems you have, they can be categorized as having to do with a thought or a feeling. So, what strategies do we use when a thought or feeling gets in the way? Well it is often the case that we want to push the thoughts or feelings away or even struggle with them, and usually this is a good idea. When we have a problem that is especially difficult or baffling, there is one basic principle to apply and keep applying. It is simply this: Never give up, because to give up is to invite defeat. The key is to come at your problems from a different way if the methods you are using are not working. Keep searching and searching until you find the solution to your problem.

Let me just give you an example to illustrate what I mean here. Imagine you are standing facing an enormous mountain. How are you going to get on the other side? You might go around it, but it is too wide. You might then decide to burrow underneath it, but it’s too deep. Then you think to yourself, here’s the way: You rise above the mountain mentally. If you can devise a mechanism that can fly 40,000 ft high above mountains you can come up with a type of thinking that can lift you above any mountainous difficulty.

So, the idea is to hold a basic principle that it is always too soon to quit. Always persevere in trying to reach a solution to your problems. Always struggle and fight with those negative thoughts or feelings. The affirmation of strong perseverance, of keeping at it, of continuous, undeviating effort is bound to pay off if you have the inner compulsion to visualize it and stick with it.

Often a situation that may seem completely hopeless will work out if you just keep trying. Let me tell you of a little story that perfectly captures the power of the never-give-up spirit and how perseverance can have unexpected positive outcomes.

The story goes that there once were these two mice that fell into a cup of cream. They struggled and struggled, swimming around, trying to get out, but could not. Eventually, one of the mice saw that it was no longer worth its while and believed he was wasting his time struggling, so he gave up and drowned, but the other kept swimming and swimming, never giving up. As she continued to struggle she had every reason to believe that she was wasting her time. She could never have

imagined what happened next. With all her swimming the cream began to turn to butter and soon it was thick enough for her to walk to safety.

So, really what I'm trying to get at here is that the glib excuse about circumstances being beyond our control is too often used to rationalize a feeble giving up too soon. The people who get on in this world are those who get up and look for the circumstances they want, and if they can't find them, make them. That is the attitude that works wonders in dealing with your problems, and your negative thoughts and feelings. So hold to the thought that it is always too soon to quit. Don't quit. You can if you think you can.

References

- Bach, P., & Hayes, S. C. (2002). The use of acceptance and commitment therapy to prevent the rehospitalization of psychotic patients: A randomized controlled trial. *Journal of Consulting and Clinical Psychology, 70*, 1129–1139.
- Berlin, R. M., Olson, M. E., Cano, C. E., & Engel, S. (1991). Metaphor and psychotherapy. *American Journal of Psychotherapy, 45*, 359–367.
- Biglan, A. (1990). A contextual approach to treating family distress. In G. Singer, & L. Irvin (Eds.), *Supporting the family: Enabling a positive adjustment to children with disabilities* (pp. 299–311). Baltimore: Paul H. Brookes.
- Blackledge, J. T., & Hayes, S. C. (2001). Emotion regulation in Acceptance and Commitment Therapy. *JCLP/In session: Psychotherapy in Practice, 57*, 243–255.
- Brown, R. A., Lejuez, C. W., Kahler, C. W., Strong, D. R., & Zvolensky, M. J. (2005). Distress tolerance and early smoking lapse. *Clinical Psychology Review, 25*, 713–733.
- Carrascoso, L., & Francisco, J. (1999). Acceptance and commitment therapy (ACT) in panic disorder with agoraphobia: A case study. *Psicothema, 11*, 1–12.
- Caudill, M. (2002). *Managing pain before it manages you*, 2nd ed. New York: The Guilford Press.
- Clark, D. M., Ball, S., & Pape, D. (1991). An experimental investigation of thought suppression. *Behaviour Research and Therapy, 29*, 253–257.
- Cordova, J., & Kohlenberg, R. (1994). Acceptance and the therapeutic relationship. In S. C. Hayes, N. S. Jacobson, V. M. Follette, & M. J. Dougher (Eds.), *Acceptance and change: Content and context in psychotherapy* (pp. 125–142). Reno, NV: Context Press.
- Dahl, J. C., & Lundgren, T. L. (2006). *Living beyond your pain: Using acceptance and commitment therapy to ease chronic pain*. Oakland, CA: New Harbinger.
- Dahl, J., Wilson, K. G., Luciano, C., & Hayes, S. C. (2005). *Acceptance and commitment therapy for chronic pain*. Reno, NV: Context Press.
- Dahl, J., Wilson, K. G., & Nilsson, A. (2004). Acceptance and commitment therapy and the treatment of persons at risk for long-term disability resulting from stress and pain symptoms: A preliminary randomized trial. *Behavior Therapy, 35*, 785–802.
- Eifert, G. H., & Heffner, M. (2003). The effects of acceptance versus control contexts on avoidance of panic-related symptoms. *Journal of Behavior Therapy and Experimental Psychiatry, 34*, 293–312.
- Feldner, M. T., Zvolensky, M. J., Eifert, G. H., & Spira, A. P. (2003). Emotional avoidance: An experimental test of individual differences and response suppression using biological challenge. *Behaviour Research and Therapy, 41*, 403–411.
- Forsyth, J. P., Eifert, G. H., & Barrios, V. (2006). Fear conditioning in an emotion regulation context: A fresh perspective on the origins of anxiety disorders. In M. G. Craske, D. Hermans, & D. Vansteenwegen (Eds.), *Fear and learning: From basic processes to clinical implications* (pp. 133–153). Washington, DC: American Psychological Association.
- Geiser, D. (1992). *A comparison of acceptance-based and control-focused interventions in a chronic pain treatment center*. Unpublished doctoral dissertation, University of Nevada, Reno.
- Gold, D. B., & Wegner, D. M. (1995). Origins of ruminative thought: Trauma, incompleteness, nondisclosure, and suppression. *Journal of Applied Social Psychology, 25*, 1245–1261.
- Gross, J. J., & Levenson, R. W. (1997). Hiding feelings: The acute effects of inhibiting negative and positive emotion. *Journal of Abnormal Psychology, 106*, 95–103.
- Gutiérrez-Martínez, O., Luciano-Soriano, C., Rodríguez-Valverde, M., & Fink, B. C. (2004). Comparison between an acceptance-based and a cognitive-control-based protocol for coping with pain. *Behavior Therapy, 35*, 767–783.
- Hayes, S. C. (1987). A contextual approach to therapeutic change. In N. Jacobson (Ed.), *Psychotherapists in clinical practice: Cognitive and behavioral perspectives* (pp. 327–387). New York: The Guilford Press.
- Hayes, S. C. (1994a). Content, context, and the types of psychological acceptance. In S. C. Hayes, N. S. Jacobson, V. M. Follette, & M. J. Dougher (Eds.), *Acceptance and change: Content and context in psychotherapy* (pp. 13–32). Reno, NV: Context Press.
- Hayes, S. C. (1994b). Relational frame theory: A functional approach to verbal events. In S. C. Hayes, L. J. Hayes, M. Sato, & K. Ono (Eds.), *Behavior analysis of language and cognition* (pp. 9–30). Reno, NV: Context Press.
- Hayes, S. C. (2004). Acceptance and commitment therapy, relational frame theory, and the third wave of behavior therapy. *Behavior Therapy, 35*, 639–665.
- Hayes, S. C., Barnes-Holmes, D., & Roche, B. (2001). *Relational frame theory: A post-Skinnerian account of human language and cognition*. New York: Kluwer.
- Hayes, S. C., Bissett, R. T., Korn, Z., Zettle, R. D., Rosenfarb, I. S., Cooper, L. D., & Grundt, A. M. (1999). The impact of acceptance versus control rationales on pain tolerance. *The Psychological Record, 49*, 33–47.
- Hayes, S. C., & Gifford, E. V. (1997). The trouble with language: Experiential avoidance, rules, and the nature of verbal events. *Psychological Science, 8*, 170–173.
- Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: Model, processes and outcomes. *Behaviour Research and Therapy, 44*, 1–25.
- Hayes, S. C., & Strosahl, K. D. (2004). *A clinician's guide to acceptance and commitment therapy*. New York: Springer.
- Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (1999). *Acceptance and commitment therapy: An experiential approach to behavior change*. New York: The Guilford Press.
- Hayes, S. C., Strosahl, K., Wilson, K. G., Bissett, R. T., Pistorello, J., Toarmino, D., et al. (2004). Measuring experiential avoidance: A preliminary test of a working model. *Psychological Record, 54*, 553–578.
- Hayes, S. C., & Wilson, K. G. (1993). Some applied implications of a contemporary behavior-analytic account of verbal events. *The Behavior Analyst, 16*, 283–301.
- Hayes, S. C., & Wilson, K. G. (1994). Acceptance and commitment therapy: Altering the verbal support for experiential avoidance. *The Behavior Analyst, 16*, 283–301.
- Hayes, S. C., Wilson, K. G., Gifford, E. V., Follette, V. M., & Strosahl, K. (1996). Experiential avoidance and behavioral disorders: A functional dimensional approach to diagnosis and treatment. *Journal of Consulting and Clinical Psychology, 64*, 1152–1168.
- Heffner, M., Sperry, J., Eifert, G. H., & Detweiler, M. (2002). Acceptance and commitment therapy in the treatment of an adolescent female with anorexia nervosa: A case example. *Cognitive and Behavioral Practice, 9*, 232–236.
- Hines, E. A., & Brown, G. E. (1932). A standard stimulus for measuring vasomotor reactions: Its application to the study of hypertension. *Proceedings of the Staff Meetings of the Mayo Clinic, 7*, 332.
- Holm, S. (1979). A simple sequentially rejective multiple test procedure. *Scandinavian Journal of Statistics, 6*, 65–70.
- Jaccard, J. (1998). *Interaction effects in factorial analysis of variance*. Thousand Oaks, CA: Sage.
- Kanter, J. W., Kohlenberg, R. J., & Loftus, E. F. (2002). Demand

- characteristics, treatment rationales, and cognitive therapy for depression. *Prevention and Treatment*, 5 (np).
- Kantowitz, B. H., Roediger III, H. L., & Elmes, D. G. (1997). *Experimental psychology: Understanding psychological research*, 6th ed. St. Paul, MN: West Publishing.
- Karekla, M., Forsyth, J. P., & Kelly, M. M. (2004). Emotional avoidance and panicogenic responding to a biological challenge procedure. *Behavior Therapy*, 35, 725–746.
- Korn, Z. (1997). *Effects of acceptance/commitment and cognitive behavioral interventions on pain tolerance*. Unpublished doctoral dissertation, Hofstra University.
- Lavy, E. H., & van den Hout, M. A. (1990). Thought suppression induces intrusions. *Behavioural Psychotherapy*, 18, 251–258.
- Marx, B. P., & Sloan, D. M. (2002). The role of emotion in the psychological functioning of adult survivors of childhood sexual abuse. *Behavior Therapy*, 33, 563–577.
- McCracken, L. M., & Eccleston, C. (2005). A prospective study of acceptance of pain and patient functioning with chronic pain. *Pain*, 118, 164–169.
- McCracken, L. M., & Eccleston, C. (2006). A comparison of the relative utility of coping and acceptance-based measures in a sample of chronic pain sufferers. *European Journal of Pain*, 10, 23–29.
- McCracken, L. M., Spertus, I. L., Janeck, A. S., Sinclair, D., & Wetzel, F. T. (1999). Behavioral dimensions of adjustment in persons with chronic pain: Pain-related anxiety and acceptance. *Pain*, 80, 283–289.
- McCurry, S. M., & Hayes, S. C. (1992). Clinical and experimental perspectives on metaphorical talk. *Clinical Psychology Review*, 12, 763–785.
- Melzack, R., & Wall, P. D. (1965). Pain mechanisms: A new theory. *Science*, 150, 971–979.
- Orne, M. T. (1962). On the social psychology of the psychological experiment, with particular reference to demand characteristics and their implications. *American Psychologist*, 17, 776–783.
- Paul, R. H., Marx, B. P., & Orsillo, S. M. (1999). Acceptance-based psychotherapy in the treatment of an adjudicated exhibitionist: A case example. *Behavior Therapy*, 30, 149–163.
- Philips, H. C., & Rachman, S. (1996). *The psychological management of chronic pain*. New York: Springer.
- Purdon, C. (1999). Thought suppression and psychopathology. *Behavior Research and Therapy*, 37, 1029–1054.
- Robinson, M. E., Wise, E. A., Riley, J. L., & Atchison, J. W. (1998). Sex differences in clinical pain: A multisample study. *Journal of Clinical Psychology in Medical Settings*, 5, 413–424.
- Roemer, L., & Orsillo, S. M. (2002). Expanding our conceptualization of and treatment for generalized anxiety disorder: Integrating mindfulness/acceptance-based approaches with existing cognitive-behavioral models. *Clinical Psychology: Science and Practice*, 9, 54–68.
- Rogers, C. R. (1951). *Client-centered therapy*. Boston: Houghton Mifflin.
- Rogers, C. R. (1967). *On becoming a person*. London: Constable.
- Rosenthal, R. (2002). Experimenter and clinician effects in scientific inquiry and clinical practice. *Prevention and Treatment*, 5 (np).
- Rosnow, R. L. (2002). The nature and role of demand characteristics in scientific inquiry. *Prevention and Treatment*, 5 (np).
- Spielberger, C. D., Gorsuch, R. L., Lushene, R. E., Vagg, P. R., & Jacobs, G. A. (1983). *Manual for the State-Trait Anxiety Inventory (Self-Evaluation Questionnaire)*. Palo Alto: Consulting Psychologists Press.
- Sternbach, R. A. (1987). *Mastering pain: A 12-step program for coping with chronic pain*. New York: G.P. Putman.
- Turk, D. C., Meichenbaum, D., & Genest, M. (1983). *Pain and behavioral medicine*. New York: The Guilford Press.
- Walser, R. D., & Hayes, S. C. (1995, November). Acceptance and Commitment Therapy: Innovative treatment of drug and alcohol abuse. *Paper presented at the annual meeting of the Association for Advancement of Behavior Therapy, Washington, DC*.
- Wegner, D. M., Schneider, D. J., Knutson, B., & McMahon, S. R. (1991). Polluting the stream of consciousness: The effect of thought suppression on the mind's environment. *Cognitive Therapy and Research*, 15, 141–152.
- Wicksell, R. K., Melin, L., & Olsson, G. L. (2007). Exposure and acceptance in the rehabilitation of children and adolescents with chronic pain. *European Journal of Pain*, 11, 267–274.
- Wilson, K. G., & Luciano, C. (2002). *Terapia de aceptación y compromiso: Un tratamiento conductual orientado a los valores (Acceptance and commitment therapy: A values-oriented behavioral treatment)*. Madrid: Editori Psicología Pirámide.
- Wright, J. H., & Davis, D. (1994). The therapeutic relationship in cognitive-behavioral therapy: Patient perceptions and therapist responses. *Cognitive and Behavioral Practice*, 1, 25–45.
- Zettle, R. D. (1984). *Cognitive therapy of depression: A conceptual and empirical analysis of component and process issues*. Unpublished doctoral dissertation, University of North Carolina at Greensboro.
- Zettle, R. D. (2003). Acceptance and commitment therapy (ACT) vs. systematic desensitization in treatment of mathematics anxiety. *Psychological Record*, 53, 197–215.
- Zettle, R. D., & Raines, J. C. (1989). Group cognitive and contextual therapies in treatment of depression. *Journal of Clinical Psychology*, 45, 438–445.

Preparation of this report was supported, in part, by a grant from the National Institute of Mental Health (MH6010701) to John P. Forsyth. Address correspondence to Bryan T. Roche, National University of Ireland, Maynooth, Ireland; e-mail: bryan.t.roche@nuim.ie or John P. Forsyth, University at Albany, SUNY, Department of Psychology, Social Sciences 369, 1400 Washington Ave., Albany, NY 12222; e-mail: forsyth@albany.edu.

Received: March 7, 2006

Accepted: October 29, 2006

Available online 24 October 2007