Comparing a Brief Self-as-Context Exercise to Control-Based and Attention-Placebo Protocols for Coping with Induced Pain

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Abstract

Of the several processes that purportedly contribute to psychological flexibility, that of enhancing self-as-context, or transcendent perspective taking, has been the least investigated. To address this omission, we conducted two analogue studies with college student participants examining the relative impact of a brief exercise for enhancing the contextual self on pain tolerance (n = 22) by comparing it to control-based (n = 22) and attention-placebo (n = 22) protocols. In Study 1, the self-as-context intervention was a generic one that we modified only slightly from the "observer exercise" presented in Hayes, Strosahl, and Wilson (1999, pp. 193-195). Significant, but equivalent, increases in pain tolerance as assessed by the cold pressor were obtained for the three protocols, with the largest effect size noted for the control-based condition. In Study 2, we compared a self-as-context protocol (N = 22) that was contextualized to the experience of pain to data from Study 1. The contextualized intervention significantly increased pain tolerance compared to the generic self-as-context and attention-placebo conditions of Study 1. The increase was statistically equivalent to that obtained for the control-based condition of Study 1, but represented a greater effect size, suggesting that the relative impact of a generic self-as-context exercise is increased when contextualized to a specific psychological challenge. We discuss the implications of these findings for future research investigating the impact of interventions targeting self-as-context within both analogue and clinical research.

Keywords: acceptance and commitment therapy, self-as-context, analogue research

Comparing a Brief Self-as-Context Exercise to Control-Based and Attention-Placebo Protocols for Coping with Induced Pain

Over the last decade an increasingly large body of clinical and research literature has been accumulated concerning acceptance and commitment therapy (ACT; Hayes, Strosahl, & Wilson, 2012). ACT is a transdiagnostic approach based on a unified model of human functioning that promotes psychological flexibility as "the ability to fully contact the present moment and the psychological reactions it produces as a conscious person and to persist or change behavior in the situation in the service of chosen values" (Fletcher & Hayes, 2005, p. 319). Six interrelated processes that purportedly contribute to psychological flexibility within what has come to be referred to as the "hexaflex model" include (a) acceptance, (b) defusion, (c) mindfulness, (d) self-as-context, (e) valuing, and (f) committed action (Hayes, Luoma, Bond, Masuda, & Lillis, 2006).

One common strategy for evaluating the degree to which each of these processes independently contributes to psychological flexibility has been through laboratory-based component studies in which participants are presented with some type of biological or psychological challenge (Levin, Hildebrandt, Lillis, & Hayes, 2012). In such research, fairly brief protocols largely consisting of ACT-related exercises and metaphors designed to activate one or more of the six processes typically have been compared against other analogue conditions. These comparison conditions have most often included control-based protocols in which participants are encouraged to minimize any distressing experiences, such as pain (e.g., Hayes, Bissett, et al., 1999) and physiological arousal (e.g., Feldner, Zvolensky, Eifert, & Spira, 2003), or inactive/placebo-type conditions (Levin et al., 2012).

As recently detailed by Levin and his colleagues (2012), laboratory-based studies have documented significant positive effect sizes for components within ACT that ostensibly target each of the processes within the hexaflex with the exception of self-as-context. This absence results not from any negative findings that have emerged from investigating ACT-related procedures and exercises designed to enhance self-as-context, but from a general absence of any laboratory-based research that has attempted to isolate components that purportedly foster this process. Self-as-context within ACT is defined as witnessing private events from a particular vantage point (Hayes, Strosahl, & Wilson, 1999) and as being integral to perspective taking (McHugh & Stewart, 2012). In particular, it is the perspective from which we are capable of observing the continual flow of thoughts, sensations, feelings, and other private events, while maintaining a distinction between sensing and what is sensed (Hayes, Strosahl, & Wilson, 1999). The behavior of "seeing that I am seeing," for example, ostensibly contributes to psychological flexibility as it promotes contact with the present moment and provides a context for defusion from thoughts and other private events that may otherwise occasion experiential control (Hayes, 1984; Hayes et al., 2012).

It seems pertinent to note that while self-as-context has most often been conceptualized in a somewhat limited way as transcendent perspective taking (Hayes, Strosahl, & Wilson, 1999), it has recently been viewed more expansively as situated within a wider array of related psychological experiences; such as empathy, compassion, and self-compassion; that are thought to emerge from similar types of verbal-social interactions (i.e., deictic relational framing; Hayes et al., 2012). However, insofar as such matters are secondary to the overall purpose of this study, we would refer interested readers to other sources (Hayes et al., 2012; McHugh & Stewart, 2012) for further explication of them.

Our primary purpose of this project was to increase our empirical understanding about how self-as-context may contribute to psychological flexibility by comparing the impact of an exercise designed to enhance it against control-based and attention-placebo protocols in how participants respond to laboratory-induced pain. Several experiential exercises have been incorporated within ACT for the purpose of promoting and strengthening self-as-context (Hayes, Strosahl, & Wilson, 1999, Ch. 7; Hayes et al., 2012, Ch. 8). One of the most widely used of these, the "observer exercise," has been routinely presented within ACT research protocols and manuals (e.g., Forman, Herbert, Moitra, Yeomans, & Geller, 2007; Hayes, Wilson, Afari, & McCurry, 1990; Zettle, 2003) and also has been recommended within practitioner guidebooks (e.g., Harris, 2009; Walser & Westrup, 2007; Zettle, 2007). We adapted this exercise for our self-as-context protocol for this reason and also because, unlike another widely used self-as-context-enhancing intervention (i.e., the "chessboard metaphor;" Hayes et al., 2012, p. 231), it could be presented in a way that minimized interaction with participants and any related experimenter bias. Due to the absence of any previous research examining the impact of exercises targeting the self-as-context process, we viewed this project as more exploratory in nature than hypothesis-guided. However, based on the finding that other ACT-related components typically have yielded better outcomes than control-based and attention-placebo protocols on pain-related measures (Levin et al., 2012), we generally expected that any differences noted across the three conditions would favor the self-as-context protocol.

We chose pain as the challenging experience against which to compare the impact of the three protocols for several reasons. First, pain is a rich experience because it has both physiological and psychological properties and constitutes a frequent medical concern (Loeser & Melzack, 1999). Second, because laboratory-induced pain has been one of the more widely used

preparations in assessing the impact of components linked to the other five hexaflex processes (Levin et al., 2012), a fairly extensive data base was available against which to potentially compare our findings. Lastly, ACT has been recognized by the Society of Clinical Psychology (http://www.psychologicaltreatments.org.) as having strong empirical support in the treatment of chronic pain. Accordingly, even though our focus was on acute pain, our hope was that our findings might in some small way further elucidate our understanding of the both the components and processes by which ACT helps alleviate the suffering of those who struggle with pain more generally.

Several different methods have been used to induce acute pain in the laboratory, including the hot (Streff, Kuehl, Michaux, & Anton, 2007) and cold pressors (Hayes, Bissett, et al., 1999), as well as electric shock (Gutiérrez, Luciano, Rodríguez, & Fink, 2004). We opted for the cold pressor as it is the preparation most often used to induce acute pain. This task asked participants to immerse their hand in a container of cold, icy water for up to 5 min. This provided an opportunity to assess any improvement in pain tolerance across two presentations of the task and for the collection of several other pain-related dependent measures such as threshold, intensity, and endurance (Turk, Meichenbaum, & Genest, 1983) against which we evaluated the relative impact of different protocols as our independent variable.

Study 1

In this first study, we conducted a fairly rigorous test of self-as-context by comparing an isolated and only slightly modified or generic version of the observer exercise to control-based and attention-placebo protocols within a pre-post design across two presentations of the cold pressor.

Method

Participants. Participants included college students enrolled in psychology courses who received extra credit for participation. We first prescreened them through an online system with the Acceptance and Action Questionnaire (AAQ; Hayes et al., 2004). The AAQ is a self-report inventory of psychological inflexibility consisting of nine items (e.g., "When I feel depressed or anxious, I am unable to take care of my responsibilities") rated on a 7-point scale. Total scores range from 9 – 63, with higher scores reflecting higher levels of psychological inflexibility. Although an updated version of the AAQ (i.e., AAQ-II; Bond et al., 2011) is now available, it had not yet appeared in print when we began this project. In addition, we opted to use the original AAQ because our familiarity with it in screening participants in similar projects.

Students who received AAQ scores ≥ 26 were invited to participate in this study, with 122 agreeing to do so. This cut-off score falls within one standard deviation of the AAQ mean and was selected based on previous research indicating that individuals with greater levels psychological flexibility (i.e., lower AAQ scores) tend to display higher pain tolerance (Zettle et al., 2005). Accordingly, we used this criterion to minimize any potential ceiling effects resulting from participants immersing their hands for the entire duration of first cold pressor. In addition to being screened based on their AAQ scores, we also interviewed participants to ensure that they had no physical injuries or limitations (e.g., Raynaud's disease) that would prevent them from submerging their hand in cold icy water. No participants were excluded for this reason and all were treated per the "Ethical Principles of Psychologists and Code of Conduct" (American Psychological Association, 2002).

Pain-related measures. We collected four pain-related measures derived from other studies (Hayes, Bissett, et al., 1999; Zettle et al., 2005) during each of two presentations of the cold pressor. We determined *threshold* by measuring with a stopwatch how long participants kept their hand under the icy water before indicating that the experience was painful. We also measured *tolerance* with a stopwatch as the total length of time that participants kept their hand immersed in the water up to 5 min. *Endurance*, a measure of how long participants were able to cope with the painful experience, was calculated as tolerance minus threshold. For the final pain measure, we asked participants to indicate the *intensity* of pain experienced during the cold pressor according to a 10 cm long visual analogue scale.

Protocols. We assigned our 122 participants via a random number generator to one of three protocols until an equal number (n = 22) within each completed both cold pressors and successfully passed manipulation and treatment integrity checks. This yielded an aggregate total of 66 participants after eliminating those who immersed their hands for the entire duration of the cold pressor's initial presentation (n = 46) or failed the checks following its second presentation (n = 10).

Each protocol provided a rationale about pain and its management that participants listened to via headphones for approximately 20 min.[1] The protocols were presented on CDs in order to minimize possible experimenter bias by limiting interactive contact with participants.

Generic self-as-context protocol (G-SAC). We told participants the following before presenting this protocol to them:

> This strategy is designed to explore the possibility of relating to the experience of pain in a way that differs from what you are accustomed to.

> The purpose of this strategy is not to eliminate or somehow control your pain, but rather to see if it is possible to change your experience of pain by viewing it from a different perspective as something that is apart from you.

G-SAC was based on the observer exercise presented in Hayes, Strosahl, and Wilson (1999, pp. 193-195), but was altered slightly by adding the following segment:

> Notice that unpleasant experiences, such as pain, that you may struggle with and try to change are not you anyway. No matter how this struggle turns out, you will be there, unchanged. See whether you can take advantage of this connection to let go just a little bit of whatever unpleasant sensations and experiences you may struggle with.

Control-based protocol (CB). We introduced this protocol by saying the following:

> The purpose of this strategy is to introduce you to several techniques that can be used in managing and controlling pain. These techniques may represent an extension and refinement of several things you may already have learned how to do in coping with pain.

CB was developed based on a traditional cognitive-behavioral approach to pain provided by Turk et al. (1983) and presented several strategies designed to help participants control and modify thoughts and emotions related to the experience of pain. Specifically, participants were instructed in and encouraged to use relaxation techniques, such as deep breathing, cognitive restructuring techniques, such as self-talk, and positive imagery.

Attention-placebo protocol (AP). We offered the following rationale before presenting this protocol:

> This strategy is designed to better inform you about the latest scientific theories and findings about how to respond to pain. The purpose of this strategy is to increase your knowledge of pain in order to be better able to manage it.

AP provided a rationale about pain with an educational focus. It informed participants about the nature of pain from a biological perspective and provided an explanation of different types of pain as well as an historical overview about how pain has been viewed.

Procedure. We conducted this study within our university research laboratory. Graduate and undergraduate research assistants under our supervision presented the cold pressor twice and collected all pain-related measures and additional data. The first cold pressor occurred before the presentation of the protocols and the second immediately after. The task included two small containers of water, one with a temperature of 68° F, and the other 40° F. We first had participants submerge their left hand in the 68° F water for 2 min before we presented them with the following instructions:

> I'm going to ask you to place your hand in the cold icy water. I want you to tell me when you first experience the sensation of pain by saying "PAINFUL." Then try to keep your hand in the water until you cannot bear it any longer and remove your hand.

We collected threshold and tolerance measures during the task and, immediately upon its conclusion, we asked participants to indicate the intensity of pain they experienced during it by

completing a visual analogue scale. We instructed any participants who had not withdrawn their hand within 5 min during the first presentation of the cold pressor to do so and, as previously mentioned, excluded them from further participation (38%, $n = 46$). We selected this exclusion criterion after the study by Hayes, Bissett, et al. (1999) to maximize the effects of the protocols and further avoid ceiling effects. This subgroup of dismissed participants did not differ from our final retained sample ($N = 66$) in AAQ scores, but were significantly older ($M = 25$ years) and predominantly male (61% vs. 32%).

Following the initial cold pressor, we presented participants with one of the three previously mentioned protocols for approximately the next 20 min before repetition of the task. We again had participants submerge their left hand in 68° F water for 2 min before placing it in the cold, icy water. After the second cold pressor, we conducted manipulation and treatment integrity checks and also asked participants to complete value and utility scales.

*Manipulation and treatment integrity checks***.** We asked participants following the second presentation of the cold pressor to first identify the purpose of the protocol they had received by selecting one of the following options: (a) our experience of pain can change when we view it from a different perspective as something that is apart from us (G-SAC), (b) the experience of pain can be managed and controlled by techniques such as controlled breathing, attention diversion, and learning new ways of talking to yourself about pain (CB), (c) correct and incorrect information about pain can affect our experience of it (AP), or (d) individual differences in how we experience pain as an adult are largely determined by the experiences we had with pain in childhood (distractor). We next asked the following three additional questions in an interview format to evaluate what participants may have learned throughout the protocol and used during the second cold pressor:

1. Please describe what you did to cope with pain during the second cold pressor.
2. What suggestions, if any, did you use from the CD presented to you?
3. How were the suggestions useful to you while participating in the second cold pressor?

This aspect of the check ensured the fidelity and application of the protocols and also provided qualitative information about their most useful components.

Value and utility scales. We administered two scales to assess any differences across the protocols in their perceived value and utility. Specifically, after the second presentation of the cold pressor, we asked participants to answer the following questions by making a mark on 14 cm analogue scales that ranged from "not valuable/useful" (0 cm) to "extremely valuable/useful" (14 cm).

1. How valuable was the strategy that was presented to you on the CD in changing how you experienced and dealt with the cold-induced pain?
2. After you listened to the CD, but before you placed your hand in the icy water the second time, how useful did you think it would be? That is, how much did you believe that what was presented to you on the CD would help change how you experienced and dealt with the cold induced pain?

Results and Discussion

Manipulation and treatment integrity checks. We excluded from further analyses eight participants (six from G-SAC and two from AP) who failed the first manipulation and treatment integrity check. Among the six G-SAC participants, two identified the description for CB and four selected the distractor item about childhood experiences. One eliminated AP participant identified the G-SAC depiction, while the other chose CB. We excluded two

additional G-SAC participants based on the interview portion of the manipulation check as they reported not having used the strategies provided during the protocol.

Thus, as indicated previously, we dismissed a total of 10 participants (13%) for failing the manipulation and treatment integrity checks. They did not differ from our final retained sample on any background variables. However, chi-square analyses indicated significant proportional differences among these dismissed participants across the three protocols; χ^2 (2) = 8.61, p = .01. Specifically, the proportion of G-SAC participants who failed the manipulation check (27%) differed significantly from CB (0%); χ^2 (1) = 5.04, p = .02. In retrospect, such findings are perhaps not surprising given the cultural dominance of the experiential control agenda and the counterintuitive nature of the perspective presented within the self-as-context protocol.

Value and utility scales. Ratings of the value and utility of the protocols are provided in Table 1. A one-way ANOVA indicated no significant differences among the three conditions on either scale. We therefore did not include value and utility ratings as covariates in the analyses of pain related-measures.

Participant characteristics. Demographic and background information for the retained participants (N = 66) is presented in Table 2. Chi-square analyses and ANOVAs on age and AAQ scores revealed no significant differences in characteristics across the 22 participants within each of the three protocol conditions. The majority of participants were White females 18-25 years of age and representative of the student body at our university.

Pain-related measures. As indicated in Table 3, there were no significant differences in these variables across the three protocol conditions at the first (pre) cold pressor. Accordingly, we conducted a series of 2 (measurement occasion) X 3 (protocol condition) repeated measures

(pre-post) ANOVAs on each of the variables. The only significant effects that were detected were for measurement occasion for threshold, $\lambda = .87$, $F(1,63) = 9.64$, $p < .01$, $\eta_p^2 = .13$; tolerance, $\lambda = .73$, $F(1,63) = 23.9$, $p < .01$, $\eta_p^2 = .28$, and endurance, $\lambda = .77$, $F(1,63) = 18.06$, $p < .01$, $\eta_p^2 = .22$, suggesting a possible placebo effect and/or demand characteristic in which all three protocols were equally efficacious in improving the ability of participants to cope with pain. Of these two possibilities, an equivalence in demand characteristics would seem the less probable, given that the expressed purposes of both CB ("managing and controlling pain") and AP ("better able to manage it") explicitly suggested pain reduction, while G-SAC ("not to eliminate or somehow control your pain") deliberately avoided doing so. However, if any such differential demand characteristics were present, they were not reflected in the value and utility ratings.

Alternatively, the overall findings could also reflect a "practice effect" in which all three protocols were inert and participants simply became more tolerant of the pain upon experiencing it a second time. In order to further explore this possibility, we conducted a series of paired-samples, one-tailed *t*-tests within each of the protocol conditions. As can be seen in Table 3, all of the protocols significantly increased pain tolerance, while only CB and AP increased pain threshold and endurance, suggesting that the overall findings could not be simply attributed to either a practice or placebo effect. None of the protocols led to significant reductions in pain intensity. This particular finding is not that unusual as other studies have reported similar results for ostensibly active interventions. For instance, Sharpe et al. (2010) found that brief relaxation and metacognitive attention training conditions were equally ineffective in decreasing the intensity of cold pressor-induced pain.

Another lens through which we viewed differences in the relative impact of the three protocols in increasing pain tolerance involved a comparison of effect sizes. Within-condition effect sizes reported in Table 3 were computed by using separate means and standard deviations from the two administrations of the cold pressor. We opted for this calculation method for two reasons. For one, it allowed us to apply the same formula in comparing the effect sizes of our protocols to related conditions of Hayes, Bissett, et al. (1999). Secondly, a common alternative way of determining within-condition effect sizes that corrects for the correlation between pre and postscores that could have been applied to our data, but not to those of Hayes and his associates, leads to overestimation of such effect sizes (Dunlop, Cortina, Vaslow, & Burke, 1996). As can be seen in Table 3, we obtained a large effect size on pain tolerance for CB (d = 0.80) but only small effect sizes (d = 0.34) for both G-SAC and AP.

For comparative purposes, we also calculated effect sizes for the three conditions of the Hayes, Bissett, et al. study. The control-based protocols in both studies produced equivalently large effect sizes (d = 0.80), while the attention-placebo conditions in each yielded small (d = 0.34) ones. Because both were derived from and ostensibly targeted processes within the hexaflex model, we compared our G-SAC to the acceptance-based protocol of Hayes, Bissett, et al. The G-SAC only displayed a small effect size (d = 0.34) that was not comparable to the large effect size (d = 1.55) associated with their acceptance-based protocol. In short, in this study CB was relatively more effective than both G-SAC and AP in increasing pain tolerance, which in turn, were equivalent to each other. The relative difference between the control and placebo-based protocols of this study was expected as it essentially replicates findings reported for similar conditions by Hayes and his colleagues.

We, however, had not expected that the G-SAC would be so inefficacious, given that all of the other ACT-related elements and components have demonstrated significant positive effect sizes when compared to various other conditions (Levin et al., 2012). Even though G-SAC was associated with a significant increase in pain tolerance over the two administrations of the cold pressor, its overall impact was clearly weaker than a control-based approach and functionally indistinguishable from an apparent placebo effect. In retrospect, the most plausible explanation for these overall findings, and that also served as the impetus for Study 2, was that the self-as-context protocol in this first study may have been too generic and not sufficiently contextualized to the experience of pain. A pattern that parallels this possibility has increasingly been documented in the development of paper-and-pencil measures of the hexaflex processes. For example, several measures of psychological flexibility that have been contextualized to specific presenting problems (e.g., obesity, Lillis & Hayes, 2008; Lillis, Hayes, Bunting, & Masuda, 2009; tinnitus, Westin, Hayes, & Andersson, 2008) have been shown to be better mediators of treatment outcome than the AAQ.

Study 2

We only slightly modified the observer exercise presented in our first study from its presentation within the first edition of Hayes, Strosahl, and Wilson (1999) by adding a single sentence that addressed coping with pain (i.e., “Notice that unpleasant experiences, such as pain, that you may struggle with and try to change are not you anyway.”). Doing so provided an especially rigorous test of the impact of this self-as-context component, but in retrospect, perhaps one that was too stringent. To investigate this possibility, we presented participants in Study 2 with a version of the observer exercise that was modified to more specifically address the experience of pain.

Because the collective findings of Study 1, as well as effect size comparisons to those of Hayes, Bissett, et al., (1999) adequately established the relative impact of control-based and attention-placebo conditions, we opted to only present participants in this second study with a contextualized, pain-specific version of the observer exercise.

Method and Procedure

We followed the same procedures and selection criteria for recruiting and screening participants as used in Study 1. A total of 60 college students were initially screened into the study and agreed to participate in it until we obtained a final sample size (i.e., $N = 22$) equal to that within each of the three conditions of Study 1. As can be seen in Table 2, the demographic (e.g., gender and age) and other characteristics (e.g., AAQ scores and class) of this sample did not differ significantly from the aggregate sample ($N = 66$) of Study 1.

We collected the same pain-related measures analyzed in Study 1 during the two administrations of the cold pressor and conducted the same manipulation and treatment integrity checks following the second one. We also administered the same value and utility scales. Between the two presentations of the task, participants listened via headphones to a CD of a contextualized version of the observer exercise that was equivalent in length (i.e., 20 min) to the protocols of Study 1.

Contextualized self-as-context protocol (C-SAC). We presented participants with the same rationale provided for G-SAC prior to introducing the observer exercise itself. Some of the pain specific statements provided in this protocol to contextualize the exercise included the following:

> Although sensations like pain may come, they will pass in time. Yet while these sensations come and go, notice that in some deep sense that "you" does not change. Allow yourself to realize this as an experienced event, not as a belief. . . Every time you have experienced pain, you've been there noticing it. . . You have had many experiences of physical pain in the past and the part of you that was able to notice those sensations then, is the same part of you that is here now and able to notice pain. . . No matter what pain you may experience, there is a part of you that will remain aware witnessing the experience.

Participants in effect were encouraged to contact an enduring and transcending perspective from which they were aware of their painful sensations and experiences. As such, C-SAC differed from the more generic version of the observer exercise of G-SAC by focusing solely on the experience of pain and associated private events rather than speaking to a broader array of more general psychological experiences.

Results and Discussion

Manipulation and treatment integrity checks. As with Study 1, we eliminated an equivalent proportion of participants (33%, $n = 20$) following the first cold pressor because they reached the 5 min tolerance ceiling. However, unlike Study 1, this dismissed subgroup did not differ from our final retained sample on age, gender, or any other participant characteristics. We excluded another 10 participants who failed the first manipulation and treatment integrity check. Among these participants, five incorrectly identified the description for CB, three selected AP, and two chose the distractor. Finally, we also dismissed eight additional participants who

reported during the interview portion of the manipulation check that they had not used the strategies presented on the CD. Thus, a total of 38 participants (63%) were eliminated from further analyses with nearly half of them (47%, $n = 18$) due to a failure to pass the manipulation check or apply the protocol. We had not expected such a high proportion of dismissed participants, although it did not differ significantly from that obtained for G-SAC of Study 1, $\chi^2(1) = 1.74$, $p = .19$. While not statistically significant, $\chi^2 (1) = 1.90$, $p = .17$, a higher proportion of those who failed the C-SAC manipulation check (9 of 18, 50%) spoke English as their second language compared to G-SAC participants from Study 1 who failed the same checks (1 of 8, 12.5%). Ostensibly the most parsimonious interpretation for the higher rate of manipulation check failures in Study 2 is that participants relatively unfamiliar with English found it more difficult to both apply and distinguish a self-as-context protocol that was contextualized to pain relative to one that was more generic in its focus.

Value and utility scales. Participants rated the value ($M = 8.68$) and utility ($M = 7.66$) of the intervention in the moderate range. As can been seen in Table 1, one-way ANOVAs found significant differences among the C-SAC and the three protocols on value ratings alone. Paired comparisons indicated the contextualized observer exercise was appraised by participants as significantly more valuable than the attention-placebo protocol ($M = 5.80$) in helping them deal with the induced pain.

Pain-related measures. We conducted a series of one-tailed, paired samples *t*-tests with the results reported in Table 3. There was statistically significant improvement in all four measures with effect sizes that ranged from large ($d = 0.96$) for tolerance to small ($d = 0.46$) for pain intensity. The effect sizes were higher than any of those obtained during the protocols of Study 1, reflecting that the observer exercise was rendered appreciably more powerful when

contextualized to pain. Unlike all of the protocols of Study 1, C-SAC was also unexpectedly associated with a significant decrease in pain intensity. Although the effect size was only modest (d = 0.46) and the smallest among the pain-related measures, it still strikes us as noteworthy, given that such reductions previously have been reported rather infrequently. We are not quite clear how to interpret this finding other than that it suggests that the intensity of induced pain may be lessened when it is experienced from the type of transcending perspective fostered by the contextualized observer exercise.

After verifying the absence of any significant differences in pain-related measures among the four protocols at the first (pre) cold pressor, we also conducted further analyses of change scores to compare the C-SAC effects to the findings of Study 1. The first consisted of a series of one-way ANOVAs with the only significant omnibus finding occurring for tolerance. As indicated in Table 4, paired comparisons with Tukey's HSD test indicated that the increase in pain tolerance associated with C-SAC exceeded that for the G-SAC and AP protocols of Study 1. Of necessity we included more explicit references to pain in the C-SAC protocol in order to contextualize the observer exercise. The possibility that the difference in increased tolerance between the two versions of the exercise can be attributed to demand characteristics, therefore, cannot be completely dismissed. However, a similar explanation could not apparently account for the difference between the C-SAC and AP protocols. While the AP protocol suggested that increased knowledge about pain might enable participants to "better able to manage it," both SAC protocols explicitly indicated that their purpose was "not to eliminate or somehow control your pain."

Protocol differences did not hold when we conducted a further analysis of pain tolerance change scores while controlling for differences in value ratings as a covariate across our two

study samples. However, we don't see these findings as negating our overall assessment that the impact of the observer exercise evidently is enhanced by contextualizing it to the experience of pain, This is because of the way the values rating question was worded and when it was administered. Specifically as may be recalled, participants were asked to indicate how valuable the protocol "was in changing how you experienced and dealt with the cold-induced pain" immediately *after* the second cold-pressor. One possibility is that the higher ratings reported by C-SAC participants in Study 2, nonetheless, indicated greater expectations they had prior to the second cold pressor about the benefits of the protocol they had been presented. In effect, evaluating the protocol as highly valuable even before it was implemented may have accounted for its greater impact, suggesting a type of "self-fulfilling prophecy." This interpretation, however, is undermined by the lack of any difference between the two sets of participants in how useful they believed what they heard on the CD would be to them "before you placed your hand in the icy water the second time." As a consequence, we believe that a much stronger case can be made that C-SAC participants rated the protocol they received as more valuable afterwards simply because it was.

While our C-SAC protocol was not significantly more effective than our control-based condition in increasing pain tolerance, a consideration of both within and between-condition effect sizes clearly documents that it was the most powerful of the four protocols evaluated within the two studies. The large within-group effect size for C-SAC on pain tolerance (d = 0.96) was less than the acceptance-based condition of Hayes, Bissett, et al (1999), but exceeded those for the control-based (d = 0.80) and attention-placebo (d = 0.34) protocols in our project and in that of Hayes and his colleagues. This occurred despite apparent demand characteristics associated with C-SAC being lower than those for both CB and A-P.

It seems less clear to us why the large effect size for C-SAC on pain tolerance was still appreciably smaller than what Hayes, Bissett, et al. (1999) reported for their acceptance-based condition (d = 1.55). One possibility is that acceptance is simply a more powerful influence in increasing tolerance of pain than is viewing it from a transcendent perspective. Methodological rather than strategic differences between the two conditions, however, may provide an alternative and seemingly more plausible explanation. Our C-SAC condition was only presented for 20 min over headphones with minimal interaction with the experimenter. By contrast, the acceptance-based protocol of Hayes and his colleagues was presented for 90 min in an interactive manner within a small group. A study in which each protocol is presented in a similar manner for an equivalent length of time may be necessary to further clarify the relative contribution of self-as-context-enhancing versus acceptance-focused components in increasing pain tolerance.

In order to further compare our findings with the Levin et al. (2012) meta-analysis of laboratory-based component studies, we also calculated between-group effect sizes using Hedge's g. Specifically, we examined the increase in pain tolerance for our two self-as-context and control-based conditions relative to that attained by our attention-placebo protocol. A small negative effect size (g = -0.13) was obtained for G-SAC. The between-group effect size for CB (g = 0.46) fell just short of the medium range, while that for C-SAC (g = 0.79) approached the large range. Perhaps even more importantly, the effect size for the contextualized version of the observer exercise exceeded the average (g = 0.68) on targeted outcomes, such as pain tolerance, calculated by Levin et al, across the 28 studies of their meta-analysis, suggesting that our C-SAC protocol evidently contributes as much to psychological flexibility as ACT-related components directed to the other five processes.

Summary and Concluding Discussion

Our major purpose in conducting this project was to examine the degree to which efforts to enhance self-as-context may appreciably and independently contribute to psychological flexibility. To do so, we compared the impact of the observer exercise within ACT in increasing pain tolerance relative to control-based and attention-placebo protocols. In retrospect, we should perhaps not have been surprised by our Study 1 findings that a generic version of the exercise was relatively ineffective and functionally equivalent to our attention-placebo condition. By contrast, our Study 2 results suggest a stronger effect for the observer exercise when it is tailored specifically to the experience of pain. As pointed out earlier, we believe this preliminary finding is given some added credibility by parallel reports that paper-and-pencil measures of other hexaflex processes also often "behave" more as expected when contextualized to specific concerns (e.g., Lillis & Hayes, 2008: Lillis et al., 2009: Westin et al., 2008).

We would be remiss if we did not acknowledge several limitations to both the internal and external validity of this project. The most apparent concern about internal validity is that participants were not randomly assigned across all four protocols of the two studies. As noted, because the relative impact of control-based and attention-placebo conditions on experimentally-induced pain tolerance had already been established by our Study 1 and related findings (Hayes, Bissett, et al., 1999), we felt it was redundant and unnecessary to repeat the three protocols of Study 1 with our second sample of participants. We recruited our participants for Study 2 from the same pool of college students as Study 1, and the fact that the two samples did not differ significantly from each other on their AAQ scores or any other characteristics, suggests that they can be regarded as functionally equivalent to each other.

A second threat to internal validity involves possible experimenter bias. As mentioned, we tried to minimize experimenter bias by presenting all protocols via CDs and deliberately

selecting a self-as-context-related component that could be presented in this manner. However, more could have been done as our assistants were not blind to protocol assignment in administering the postintervention cold pressor, the manipulation and treatment integrity checks, and the value and utility scales. It would be desirable in future research to further minimize potential bias effects by ensuring that those who interact with participants remain blind to the protocols presented to them.

The most obvious limitations to external validity are hardly unique to our project, but apply to analogue research in general. As with the majority of other laboratory component studies (Levin et al., 2012), our participants were college students who may not be representative of other nonclinical populations. Consequently, it may be useful to determine if our overall findings are replicable with community samples that may differ from ours in age and educational background, for example. Perhaps a more germane concern regarding the generalizability of our findings is whether they would extend to presenting a contextualized version of the observer exercise to those faced with other psychological and biological challenges. For instance, because pain is a more ubiquitous experience, contextualizing the observer exercise for use with the cold pressor may prove to be more viable than modifying it to assist participants about to encounter induced panic-like symptoms (e.g., Feldner et al., 2003).

The ability to generalize our overall findings to clinical populations who struggle with pain more generally, and chronic pain, in particular, may also be restricted. Pain induced by the cold pressor is more analogous to acute pain inherent in certain medical procedures, such as injections and changing of wound/burn dressings. Traditional cognitive-behavioral therapies that incorporate many of the same strategies included in the CB protocol of Study 1; such as relaxation techniques, imagery, and use of coping self-statements; represent an empirically

supported approach for acute, procedure-related pain (e.g., Powers, 1999). While cognitive-behavioral interventions have also been shown to be efficacious in targeting chronic pain (Morley, Eccleston, & Williams, 1999), those receiving ACT have reported greater satisfaction with their treatment (Wetherell et al., 2011). The degree to which ACT for chronic pain is appreciably enhanced by components focused on self-as-context, such as the observer exercise, however, is an empirical question that cannot be adequately addressed by merely extending our findings, but only through further research.

A final limitation on the external validity of our findings that is more specific to our project and not endemic to analogue research more broadly, concerns the relatively higher proportion of participants (i.e., 30% of the total participant pool) who were excluded for failing the manipulation and treatment integrity checks of Study 2. Participants in general found it easier to understand and apply the control-based protocol than those dealing with self-as-context, and had relatively more difficulty with C-SAC than G-SAC. On first consideration, such findings might suggest that control-based therapeutic approaches to pain management may have wider applicability and utility than those, such as ACT, that seek to enhance flexible perspective taking. The strong empirical support that ACT has received in treatment of chronic pain, however, would argue against such an interpretation, as would we believe some further reflection on how the observer exercise was presented within our two studies compared to how it is introduced and presented clinically.

Because of the cultural dominance of the experiential control agenda and the counterintuitive nature of the perspective the observer exercise seeks to foster, it does not seem surprising that college students, particularly those less fluent in English as suggested by some of the findings of Study 2, would find grasping and applying it to be a challenge. However, when

the exercise has been presented within ACT treatment protocols (e.g., Hayes et al., 1990) and recommended within clinician guidebooks (e.g., Zettle, 2007), it is not done so "out of the blue," but only after clients have been "socialized" to the hexaflex by previous exposure to exercises and procedures that target other processes contributing to psychological flexibility. In short, components within ACT designed to enhance self-as-context may be received differently by those with long-standing clinical problems, such as chronic pain, than college students facing an acute, transitory challenge, such as laboratory-induced pain.

While we are reasonably confident in attributing our overall findings to the specific effects of tailoring the observer exercise to the pain experience, we are admittedly less sanguine that they can be unambiguously ascribed to a change in the process of flexible perspective taking alone. It is widely acknowledged that each process within the hexaflex is related to the others and that self-as-context and present moment awareness, in particular, may together contribute to a "centered response style" (Hayes et al. 2012, p. 67). The degree to which the observer exercise also "pulls" for present moment awareness, or even other processes such as acceptance that contribute to psychological flexibility, can perhaps be most readily addressed empirically by directly comparing C-SAC to a mindfulness exercise that is also contextualized to the experience of pain. At present we unfortunately, however, lack easily administered microlevel measures capable of taking such research a step further by tracking, for example, whether perspective taking and present moment awareness do indeed at least momentarily change to varying degrees during and following the presentation of the observer exercise. The development of such process measures represents a formidable challenge, but one that seems worth pursuing.

Until further progress is made in this endeavor, perhaps the most useful perspective to take on our preliminary findings is to view them not only within the results other laboratory-

based component studies (e.g., Levin et al., 2012), but more broadly in the context of limited clinical research that nonetheless provides some converging evidence of the important role played by "self-work" in increasing psychological flexibility. For example, a PTSD client treated by Orsillo and Batten (2005) with ACT "reported that the observer exercise was very powerful for him" (p. 118), enabling them to subsequently work more directly on traumatic memories that he had avoided talking about. Their positive evaluation of efforts to enhance self-as-context is also supported in part by a dismantling study by Williams (2007) that compared a version of ACT that eliminated the observer exercise and other "discovering the self" phase work (Hayes, Strosahl, & Wilson, 1999, Ch. 7) to a full protocol in treatment of PTSD. While both conditions demonstrated significant improvement over the course of treatment, the truncated version of ACT was associated with significantly less continued symptomatic improvement during 3 month follow-up.

Obviously, more component analyses with clinical samples as well as analogue research is required to more fully document the possible impact of fostering the type of flexible perspective taking that characterizes enhanced self-as-context. For example, it may be worthwhile in further addressing this matter to develop an analogue preparation incorporating more than two presentations of laboratory-induced pain to more closely parallel the experience of those who struggle with chronic pain. Our rather modest findings, however, suggest to us that the degree to which exercises and related techniques within ACT that target self-as-context make a unique contribution to the enhancement of psychological flexibility is an intriguing conceptual and empirical question that warrants further investigation. To sufficiently address this question, further research employing a variety of research designs, and focusing on various clinical, as well as subclinical forms of human suffering, would seem to be required.

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Footnotes

[1]Copies of CDs used in both studies may be obtained by contacting the first author.

Table 1

Means and Standard Deviations for Value and Utility Scale Ratings of Protocols

	Value		Utility	
Protocol	*M*	*SD*	*M*	*SD*
1. G-SAC[a]	6.15	4.13	6.41	3.62
2. CB	8.00	2.66	8.13	2.91
3. AP	5.80	3.32	6.02	3.74
4. C-SAC[b]	8.68	3.76	7.66	3.76
Statistical Analyses				
F	3.51		1.77	
p	0.02		0.16	
n_p^2	.11		.06	
Comparisons	4 > 3		N/A	

[a]Denotes generic self-as-context protocol of Study 1.
[b]Denotes contextualized self-as-context protocol of Study 2

Table 2

Characteristics of Participants in the Two Studies

Variable	Study 1 (*N* = 66)		Study 2 (*N* = 22)	
	M	*SD*	*M*	*SD*
AAQ	35.36	6.37	33.00	4.32
Age	21.58	5.79	21.27	4.14
	N	%	N	%
Ethnicity				
White	38	58	13	59
Black	10	15	1	4
Hispanic	6	9	3	14
Other	12	18	5	23
Gender				
Male	21	32	8	36
Female	45	68	14	64
Class				
Freshman	30	45	14	64
Sophomore	8	12	4	18
Junior	13	20	3	14
Senior	15	23	1	4
Language				
English	62	94	17	77
Other	4	6	5	23

Table 3

Descriptive Statistics and Analyses of Pain-Related Measures at Pre and Postintervention for the Two Studies

	Pre		Post		Statistical Analyses		
Measure	*M*	*SD*	*M*	*SD*	*t*	*p*[a]	*d*
Threshold							
G-SAC[b]	17.77	16.93	20.73	21.68	1.42	0.09	0.15
CB	20.55	14.92	28.35	24.63	1.77	0.05	0.38
AP	26.06	33.55	31.95	40.92	2.62	< 0.01	0.16
C-SAC[c]	16.82	9.80	40.27	58.35	2.07	0.03	0.56
Tolerance							
G-SAC	57.41	50.47	81.32	84.72	1.98	0.03	0.34
CB	62.41	52.05	124.82	97.55	3.29	< 0.01	0.80
AP	77.14	77.33	107.41	99.36	3.80	< 0.01	0.34
C-SAC	76.18	73.12	172.64	121.24	4.40	< 0.01	0.96
Endurance							
G-SAC	39.64	46.66	60.59	82.84	1.66	0.55	0.31
CB	41.86	46.03	96.45	93.41	3.03	< 0.01	0.74
AP	51.05	68.87	75.45	93.49	2.91	< 0.01	0.30
C-SAC	59.36	72.02	132.04	111.65	3.61	< 0.01	0.77
Intensity							
G-SAC	5.76	1.30	5.72	2.01	0.14	0.45	0.02
CB	5.61	1.66	5.44	1.92	0.65	0.26	0.09
AP	5.67	1.54	5.86	2.02	0.80	0.22	0.11
C-SAC	5.18	2.00	4.34	1.67	2.33	0.02	0.46

[a]All reported *p* values are based on one-tailed tests of statistical significance.
[b]Denotes generic self-as-context protocol of Study 1.
[c]Denotes contextualized self-as-context protocol of Study 2.

Table 4

Results of Change Score Analyses

	Mean Change Scores			
	Threshold[a]	Tolerance[a]	Endurance[a]	Intensity[b]
Protocol				
1. G-SAC	2.96	23.91	20.95	0.04
2. CB	7.80	62.41	54.59	0.17
3. AP	5.69	30.27	24.40	-0.19
4. C-SAC	23.45	96.46	72.68	0.84
	Statistical Analyses			
F	2.14	4.24	2.57	2.41
p	0.10	< 0.01	0.06	0.07
n_p^2	.07	.13	.08	.08
Comparisons	N/A	4 > 1*	N/A	N/A
		4 > 3*		

[a]Higher scores reflect improvement; post minus pre.
[b]Higher scores reflect improvement; pre minus post.
*$p < .01$