

The Effects of Mindfulness Versus Thought Suppression on Implicit and Explicit Measures of Experiential Avoidance

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Abstract

The current study aimed to provide an implicit measure of experiential avoidance (EA). Fifty undergraduate participants were exposed to an implicit (Implicit Relational Assessment Procedure: IRAP) and an explicit (Acceptance and Action Questionnaire II: AAQ II) measure of EA. Subsequently participant's response latencies on viewing a negatively affective IAP image were recorded. Participants were randomly assigned to either a thought suppression, or mindfulness group. The induction for both groups involved a 10 minute audio file that operationalized either suppression or mindfulness as a useful coping strategy for unwanted thoughts about the negatively affective IAP image. In the last stage of the experiment participants were re-exposed to both the AAQ II and the IRAP in order to determine whether the respective inductions had impacted on participant's level of EA (either explicitly or implicitly). The results indicated that the mindfulness group experienced a reduction of EA from pre to postinduction in comparison to those in the thought suppression group on the implicit measure (IRAP) but not the explicit measure (AAQ II). Results are discussed in terms of the utility of an implicit measure of experiential avoidance.

Keywords: experiential avoidance, mindfulness, acceptance, thought suppression

The current study details a preliminary investigation of an implicit versus explicit measure of experiential avoidance (EA). EA has been defined as “when a person is unwilling to remain in contact with particular private experiences (e.g., bodily sensations, emotions, thoughts, memories, and behavioral predispositions) and takes steps to alter the form or frequency of these events and the contexts that occasion them” (Hayes, Wilson, & Strosahl, 1999, p.58). EA has been demonstrated to be a causal or maintaining factor in a number of psychological disorders (Boelen & Reijntjes, 2008). According to acceptance and commitment therapy (ACT), EA is inversely related to “psychological flexibility,” that is, those that are psychologically flexible tend to experience low levels of EA and vice versa (Ruiz, 2010).

Currently, the Acceptance and Action Questionnaire II (AAQ II; Bond, Hayes, Baer, Carpenter, Orcutt, Waltz, & Zettle, 2010) is a self-report questionnaire designed to measure EA/psychological flexibility as defined in the ACT model. The AAQ II has 10 items and aims to measure the individual's tendency to view their thoughts as literally true, to avoid negative experiences, and to be unable to choose how to overtly behave due to covert negative content. A low score on the AAQ II indicates a tendency to engage in higher levels of EA (low psychological flexibility), whereas a higher score on the AAQ II indicates a tendency to be higher in psychological flexibility (and lower engagement in EA). A number of studies have involved comparing scores on the AAQ II with a variety of psychopathological measures. To date, over 30 correlational studies have found that those lower in psychological flexibility record high scores on measures of depression and anxiety (Ruiz, 2010), suggesting that higher levels of experiential avoidance are linked with higher levels of psychopathology. Additionally, the AAQ II has been positively correlated with psychological dysfunction in a number of other areas such as chronic pain (McCracken & Vowles, 2007), poor mental health within a work setting (Bond & Bunce, 2003) stress caused by important life events (Farach, Menin, Smith, & Mandelbaum, 2008) and the mediation of borderline personality disorder (Gratz, Tull, & Gunderson, 2008).

However, the direct questioning technique of the AAQ II renders it prone to weaknesses that are inherent in explicit measures. For example, questionnaires are transparent and thus susceptible to participant manipulation (e.g. Gannon, 2006). In a response to weaknesses in explicit questionnaire measures, there is now a rapidly growing interest in what are referred to as implicit measures (Barnes-Holmes, Barnes-Holmes, Power, Hayden, Milne, & Stewart, 2006; De Houwer, 2006; Fazio & Olson, 2003; Greenwald, McGhee, & Schwartz, 1998; Nosek & Banaji, 2001; Wittenbrink, Judd, & Park, 1997). According to Greenwald and Banaji (1995, p. 8) implicit attitudes are ‘introspective occurrences of past experience that facilitate evaluative feelings, thoughts, or actions toward one's social world.’ The core postulate behind implicit measures suggests that individuals are often unaware of the implicit beliefs that can subsequently influence their behavior (Greenwald & Banaji, 1995).

An initial step into examining nonconscious processes in cognition is the Implicit Association Test (IAT; Greenwald et al, 1998) that was specifically designed to measure associations between concepts and evaluations developed through direct experience (Olson & Fazio, 2001). The IAT is a popular test for examining culturally-bound experience such as education, gender, ethnicity, age, and social class (e.g., Nosek & Hansen, 2005). However, despite the fact that the IAT is arguably the most widely utilized implicit measure, it is subject to several limitations (De Houwer, 2002; Roddy, Stewart, & Barnes Holmes, 2010). For instance, the IAT only allows the measurement of associations between categories. Specifically, it is very useful in measuring stimuli that we categorize as the same as or opposite to each other (e.g., young is the same as good and old is the same as bad). However, the way we evaluate stimuli can involve many different relations, such as more than, less than, and different to (see Barnes-Holmes, Barnes Holmes, Stewart, & Boles, 2010 for detailed discussion). One procedure recently developed from within the behavior-analytic tradition that aims to provide a sensitive measure of such brief and immediate relational responding is the Implicit Relational Assessment Procedure (IRAP; Barnes-Holmes, Barnes-Holmes, Power, Hayden, Milne, & Stewart, 2006). The IRAP involves presenting participants with specific relational terms (e.g., similar, opposite, better than, worse than) so that the relations between and among stimuli can be assessed (Barnes-Holmes et al, 2006). The rationale for the IRAP is that more strongly established relational responses will be produced more quickly than less strongly established ones. Thus, when participants are required to make quick and accurate relational responses, differences in response latencies will become apparent between relational networks that are consistent with established relational responses and those that are contradictory (Barnes-Holmes et al., 2010; O'Toole & Barnes-Holmes, 2009).

This basic IRAP effect has been demonstrated in a number of studies and across various domains. Importantly, the IRAP compares favourably to the IAT as a measure of individual differences (Barnes-Holmes, Murtagh, Barnes-Holmes, & Stewart, 2010; Barnes-Holmes, Waldron, Barnes-Holmes, & Stewart, 2009; Roddy et al, 2010) and it is not easily faked (McKenna, Barnes-Holmes, Barnes-Holmes, & Stewart, 2007). The IRAP has been used in studies as a measure of implicit self-esteem (Vahey, Barnes-Holmes, Barnes-Holmes, & Stewart, 2009), socially sensitive attitudes (Power, Barnes-Holmes, Barnes-Holmes, & Stewart, 2009), attitudes to work and leisure (Chan, Barnes-Holmes, Barnes-Holmes, & Stewart, 2009), ageism (Cullen, Barnes-Holmes, Barnes-Holmes, & Stewart, 2009) and deviant attitudes in child sex offenders (Dawson, Barnes-Holmes, Gresswell, Hart, & Gore, 2009) to name a few.

The measurement of specific relations rather than mere associations between stimuli is useful for the current work. Imagine for example, in testing for experiential avoidance associatively pairing “with negative thoughts” idioms of acceptance such as “accept them.” This would only inform the researcher about the direct pairing of negative thoughts and acceptance. Specifically, information is only gained regarding the strength of association between the negative thoughts and acceptance. However, an understanding of the nature or direction of the association is lacking. The IRAP allows the researcher to directly target the relations between stimuli, other than associations.

The current study compared the AAQ II (explicit measure) with the IRAP (implicit measure) in the measurement of EA, pre and postinduction of psychological flexibility/inflexibility. Towards this end, two techniques were employed to induce higher versus lower levels of EA. One widely researched example of EA is thought suppression, which has received a plethora of support suggesting that engaging in thought suppression attempts is counterproductive and futile (e.g., Clark, Ball, & Pape, 1991; Lavy & Van den Hout, 1990; Rassin, Merkelback, & Muris, 1997; Salkovskis & Campbell, 1994; Trinder & Salkovskis, 1994). In the current study a thought suppression induction was used to increase/maintain levels of EA. Mindfulness or contact with the present moment is a core component of the ACT model and has been described as “the awareness that emerges through paying attention on purpose, in the present moment and nonjudgementally to the unfolding of experience, moment to moment” (Kabat-Zinn, 2003, p.145). It involves continuous, clear-sighted attention to ongoing subjective experience together with an attitude of acceptance towards that experience (Ortner, Kilner, & Zelazo, 2007). In the current study a mindfulness induction was used to lower levels of EA (or increase levels of psychological flexibility).

The current study measured EA pre and post the systematic induction of psychological flexibility (via a mindfulness induction) or experiential avoidance (via a thought suppression induction) across both a self-report measure (AAQ II) and an implicit (IRAP) measure. Two groups took part in the study. The thought

suppression group completed the AAQ II and the IRAP. Subsequently, they were exposed to a thought suppression induction as a coping strategy for unwanted thoughts. They then completed the AAQ II and the IRAP for a second time to see if any differences emerged from pre to postinduction. The mindfulness group received the AAQ II and the IRAP both before and after receiving a focused attention (mindfulness) induction as a coping strategy for unwanted thoughts (the focused attention induction was adapted from Arch & Craske, 2006). An exploratory prediction based on research that links thought suppression and mindfulness to psychological flexibility (Ruiz, 2010) was possible; in both the explicit and implicit measures, the mindfulness group should become more psychologically flexible or less experientially avoidant from pre to postinduction, whereas the thought suppression group should increase or maintain their levels of EA after engaging in a thought suppression induction. It was also expected that the mindfulness group would become significantly more psychologically flexible than the thought suppression group postinduction.

Method

Participants and Design

Fifty undergraduates (32 female, 18 male) at Swansea University were paid course credits for their participation in the experiment (Mean age = 22.9 years, SD = 5.98). However, 26 participants did not successfully complete the IRAP both pre and postinduction. Therefore, the analysis could only be conducted on the data of the remaining 24 participants (16 female, 8 male, Mean age = 22.4 years, SD = 4.67). Fifteen participants received the focused attention (mindfulness) induction and 9 participants received the thought suppression induction. The sample was nonclinical. The study employed a 2 (preinduction vs. postinduction) x 2 (thought suppression vs. mindfulness) mixed design. Scores on the IRAP and the AAQ II served as the dependent measure.

Apparatus

The experiment was completed in a laboratory at Swansea University. The laboratory was quiet and free from distraction. It contained a desk, a chair, a standard computer (Processor) with a 14-inch screen and standard computer mouse. The participant's responses were controlled by the IRAP computer program, which was created in Visual Basic TM 6.0. Participants listened to a recorded induction (adapted from Arch & Craske, 2006) via the use of a dictaphone (Olympus, digital voice recorder).

Materials

General Health Questionnaire (GHQ; Goldberg, 1972). This questionnaire was administered to all participants in the study to ensure that no pre-experimental differences in general mental health between the two groups could have served to confound the results. The GHQ comprises 12 items ranging from "have you recently been able to concentrate on what you're doing" to "have you recently been feeling reasonably happy, all things considered." The scale ranges from 0-3. It is a self-administered questionnaire that focuses on two major areas: the inability to carry out normal functions and the appearance of new and distressing psychological phenomena.

Acceptance and Action Questionnaire II (AAQ II; Bond et al, 2010). The AAQ II was employed to provide a pre and postexperimental measure of psychological flexibility/experiential avoidance. The AAQ II is a 10-item scale that has been shown to have good psychometric properties and factorial structure (Ruiz, 2010). Factor analytic findings suggest the AAQ II is a unidimensional measure. Higher scores on the AAQ II indicate greater psychological flexibility; lower scores are equal to greater experiential avoidance.

Treatment adherence measure. The treatment adherence measure, which was created for the purpose of this experiment, was administered to the participants postinduction. The measure aimed to determine the way in which participants interacted with their respective inductions. The first statement, "Was it easy to follow the instructions provided on the dictaphone?" was measured on a Likert scale ranging from 1-7 where 1 represented "yes" and 7 represented "no.". The second statement, "To what extent did you implement the instructions provided on the dictaphone when having thoughts about the picture you previously saw?" was also measured on a Likert scale of 1-7 where 1 was equal to "very much so" and 7 was equal to "not at all."

Implicit Relational Assessment Procedure (IRAP; Barnes-Holmes et al, 2006). The IRAP is a computer based measure written in Microsoft Visual Basic 6.0 and was administered to participants to measure implicit levels of experiential avoidance (software available from http://psychology.nuim.ie/IRAP/IRAP_1.shtml). The program consists of a number of trials that involve presenting relationally opposing labels in conjunction with sets of target words deemed as consistent or inconsistent in relation to the verbal function of these labels. The IRAP has been designed to allow the use of labels and target words that are study specific, and as such, a multitude of relational targets can be employed.

The *label stimuli* in the current IRAP consisted of two phrases, “With negative emotions it is better that I” and “With negative emotions it is worse that I.” The *target stimuli* consisted of twelve nouns; six were acceptance-related words and six were avoidance-related words. The acceptance-related words were “accept them,” “welcome them,” “embrace them,” “allow them,” “acknowledge them,” and “receive them”. The avoidance related words were “avoid them,” “reject them,” “suppress them,” “ignore them,” “replace them,” and “refuse them”. The two relational *response options* consisted of the terms “True” and “False.”

The IAP picture (International Affective Picture Scale; Lang, Bradley & Cuthbert, 1999). The IAP image was a disturbing picture of a dead body that was presented to the participants in order to induce negative thoughts.

Procedure

On arrival at the experimental laboratory, the participants were required to complete the GHQ, the AAQ II and the IRAP. With respect to the IRAP, participants were exposed to a minimum of two practice blocks and a fixed set of six test blocks. Each block involved the presentation of the same number of trials, comprised of what are defined as four different trial types (see Figure 1 for a diagrammatic representation of the IRAP trial types presented in the current study).

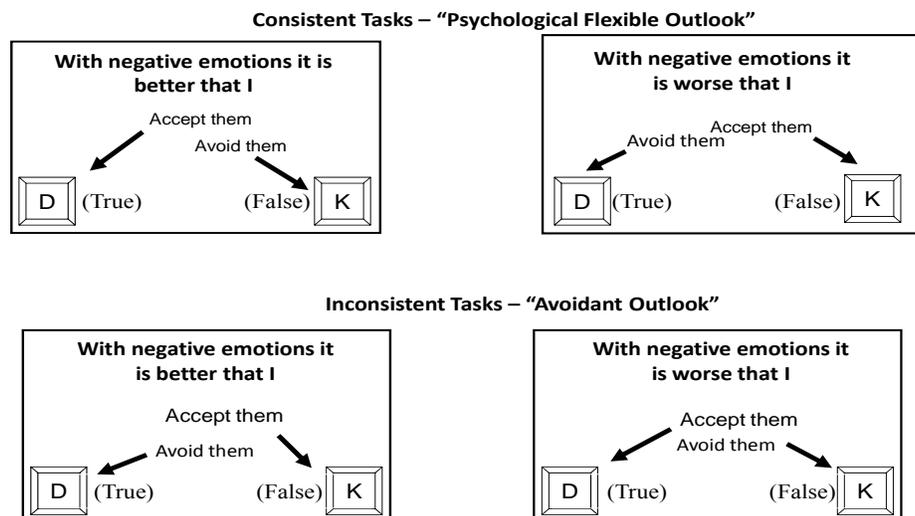


Figure 1. The four trial types used in the IRAP.

Each IRAP trial required participants to choose between two response options (i.e., “True” and “False”), by pressing either the ‘D’ or ‘K’ keys, respectively. The response options appeared at the bottom left and right of the screen and switched randomly from trial-to-trial. A block of consistent trials, which reflected a psychologically flexible response on the current IRAP, required the following pattern of responses: “With negative emotions it is better that I” – Accept them – True; “With negative emotions it is better that I” – Avoid them – False; “With negative emotions it is worse that I” – Accept them – False; “With negative emotions it is worse that I” – Avoid them – True. A block of inconsistent trials required the reverse response

pattern. Participants were put through an alternating series of consistent and inconsistent blocks as the IRAP program reversed the feedback contingencies across repeated blocks. The order of sequence, consistent blocks followed by inconsistent blocks or inconsistent blocks followed by consistent blocks, was further counterbalanced across participants.

Participants were informed that they would be required to complete a practice phase and errors were expected for these practice blocks. Onscreen feedback was provided after each block, presenting the percentage of correct responses and median response latency for that block. Following each block of trials, participants were informed that the previously correct and wrong answers would be reversed for the next block, thus removing any need for trial-and-error learning after the first block. The trials were presented quasi-randomly with the constraint that none of the four trial types were presented twice in succession. The positioning of the two response options was also quasi-random in that they could not appear in the same left-right position three times in succession.

The procedure for the test blocks was similar to the practice blocks, except that onscreen instructions informed participants that each block was a test and to “*go quickly,*” although “*a few errors are okay.*” The same alternating sequence employed with the practice blocks was also used with the test blocks. Thus, if a participant was exposed to a consistent-inconsistent sequence during practice, then test blocks 1, 3, and 5 were consistent and test blocks 2, 4, and 6 inconsistent. If practice involved an inconsistent-to-consistent sequence, then test blocks 1, 3, and 5 were inconsistent and 2, 4 and 6 were consistent.

The IRAP required participants to reach a standard of 80% correct responses, and a median response time of less than 3000 ms. These criteria ensured that appropriate behavioral control was exerted over the relational responding being measured. If participants failed to achieve the criteria for either of the two practice blocks, the required standard, along with the standard of responding they had achieved, were presented on the screen, and they were invited to try again. Participants were allowed two attempts to achieve the practice criteria (a total of four practice blocks). If they failed to do so, their data were discarded. Only participants who achieved the practice criteria proceeded to the six test blocks. No performance criteria were applied during the test blocks in order to proceed, but if a participant’s performance fell below the practice accuracy criterion (e.g., 80%) across the test blocks, the data for that participant were normally discarded. When all six test blocks had been presented, the IRAP was complete.

Upon completion of the IRAP participants were then required to look at the IAP image on the computer screen for “*as long as they felt comfortable.*” The latency until the participants removed the picture from the screen was recorded. Thereafter, participants in the thought suppression group received a thought suppression induction while those in the mindfulness group received a focused attention induction. Each induction was matched for length, and consisted of an audio technique reminder every 30 seconds for the duration of a 10 minute audio file. Following their respective inductions, participants had to complete the treatment adherence measure. To complete the study participants were cycled into the postinduction AAQ II and IRAP.

Results

GHQ , Treatment Adherence Measure, and Seconds on the Screen

Participants mean scores on pre-experimental levels of psychological wellbeing (i.e., GHQ scores), self-reported adherence to the strategy induction (i.e., thought suppression or focused attention) and length of time looking at the IAP image are presented in Table 1. In order to determine whether there were any significant differences across these measures, a series of one way ANOVAs were conducted on the data revealing no significant difference between the two groups on each of the measures at the $p < 0.05$ level.

Table 1.

The average scores recorded by both groups on the treatment adherences questions, the amount of time they left the aversive picture on the screen, the GHQ and the AAQ II (pre and postinduction).

	<u>Suppression Group</u>	<u>Mindfulness Group</u>
Treatment Adherence Q1	2 (1.11)	1.93 (1.57)
Treatment Adherence Q2	2.66 (1.22)	3.06 (1.53)
Seconds on screen	8.55 (6.4)	10.73 (7.75)
GHQ	8.55 (3.28)	10.8 (5.18)
AAQ II – Time 1	52.77 (8.05)	51.66 (8.89)
AAQ II – Time 2	54.66 (7.76)	54.66 (7.71)

The Explicit Measure: AAQ II

A higher score on the AAQ II indicates a higher level of psychological flexibility; a lower score indicates a higher level of EA. Participants mean scores on the AAQ II are also displayed in Table 1 and indicate that both groups experienced a slight increase in psychological flexibility from pre to postinduction. A 2 (preinduction vs. postinduction) x 2 (thought suppression vs. mindfulness) mixed ANOVA revealed a significant main effect of induction time, $F(1, 22) = 9.05$; $p < 0.05$, $\eta_p^2 = .29$, but no significant interaction between the induction time and the group, $F(1, 22) = 0.47$; $p > 0.05$, $\eta_p^2 = .02$. Planned comparisons were conducted to determine where the significant differences emerged. Paired sample t -tests revealed that both the thought suppression group, $t(8) = -2.98$; $p < 0.05$, $SE = .63$, and the mindfulness group, $t(14) = -2.52$; $p < 0.05$, $SE = 1.19$, experienced a significant increase in their AAQ II scores from pre to postinduction. Independent sample t -tests then revealed that there was no difference between the thought suppression group and the mindfulness group at either preinduction, $t(22) = 0.31$; $p > 0.05$, $SE = 3.63$, or postinduction, $t(22) = 0.00$; $p > 0.05$, $SE = 3.53$.

In summary, the thought suppression group and the mindfulness group scored similarly pre and postinduction. That is, there was no difference between groups on their AAQ II score. However, both groups became significantly more psychologically flexible from pre to postinduction. It is important to note, however, that although significant, both groups only increased their AAQ II score by 2 to 3 points, which constitutes a very slight change for this scale.

The Implicit Measure: IRAP

The primary datum from the IRAP is response latency, defined as the time in milliseconds (ms) that elapses between the onset of the trial and a correct response emitted by a participant. The response latency data for each participant were transformed into D_{IRAP} scores using the $D_{IRAP-Algorithm}$, derived from the $D_{Algorithm}$ developed by Greenwald, Nosek, and Banaji (2003). The steps involved in calculating the D_{IRAP} scores were those outlined by Barnes-Holmes, Waldron, Barnes-Holmes, and Stewart (2009). In Figure 2, a D_{IRAP} score below the x-axis indicates that the participant is low in psychological flexibility, a D_{IRAP} score above the x axis indicates that the participant is high in psychological flexibility, and a D_{IRAP} score of 0 suggests that the participant is neither low nor high in psychological flexibility. Any significant increase in the D_{IRAP} score from pre to postinduction would indicate an increase in psychological flexibility, whereas any reduction in D_{IRAP} score from pre to postinduction would indicate a reduction in psychological flexibility. As can be seen

from Figure 2, the D_{IRAP} scores show that the (focused attention) mindfulness group became more psychologically flexible, as indicated by an increase in D_{IRAP} score from pre to postinduction. However, the thought suppression group seemed to experience no increase in psychological flexibility, as indicated by neither an increase nor decrease in D_{IRAP} score from pre to postinduction. A 2 (pre vs. postinduction) \times 2 (thought suppression vs. mindfulness) mixed ANOVA revealed a marginal main effect for induction time, $F(1, 22) = 3.09$; $p < 0.09$, $\eta_p^2 = .12$, whilst a significant interaction was found between induction time and group, $F(1, 22) = 5.37$; $p < 0.05$, $\eta_p^2 = .2$. In order to determine where the significant differences emerged, a series of planned comparisons were conducted. Paired sample t -tests revealed that the mindfulness group became significantly more psychologically flexible from pre to postinduction, $t(14) = -3.14$; $p < 0.05$, $SE = .11$. The thought suppression group, however, did not become more psychologically flexible from pre to postinduction, $t(8) = 0.39$; $p > 0.05$, $SE = .63$. Independent sample t -tests revealed that preinduction, there was no significant difference between the thought suppression group and the mindfulness group in their level of psychological flexibility, $t(22) = 0.81$; $p > 0.05$, $SE = .12$. Postinduction, however, the mindfulness group had become significantly more psychologically flexible than the thought suppression group, $t(22) = -2.35$; $p < 0.05$, $SE = .13$.

In order to determine whether the pre and postinduction D_{IRAP} scores were significantly different from zero, one sample t -tests were conducted for both the thought suppression and mindfulness groups. The results revealed that the thought suppression group scored significantly different from zero both pre, $t(8) = -2.93$; $p < 0.05$, $SE = .11$, and postinduction, $t(8) = -7.08$; $p < 0.05$, $SE = .05$; that is, the thought suppression group experienced higher levels of EA pre and postinduction. The mindfulness group also scored significantly different from zero preinduction, $t(14) = -5.96$; $p < 0.05$, $SE = .07$, indicating that preinduction, they too recorded higher levels of EA. However, postinduction the mindfulness group did not score significantly different from zero, $t(14) = -0.81$; $p > 0.05$, $SE = .09$, indicating that the intervention had reduced their EA D_{IRAP} score.

Overall, the results of the IRAP suggest that the mindfulness group became more psychologically flexible or experienced lower levels of EA than those participants who received the thought suppression induction.

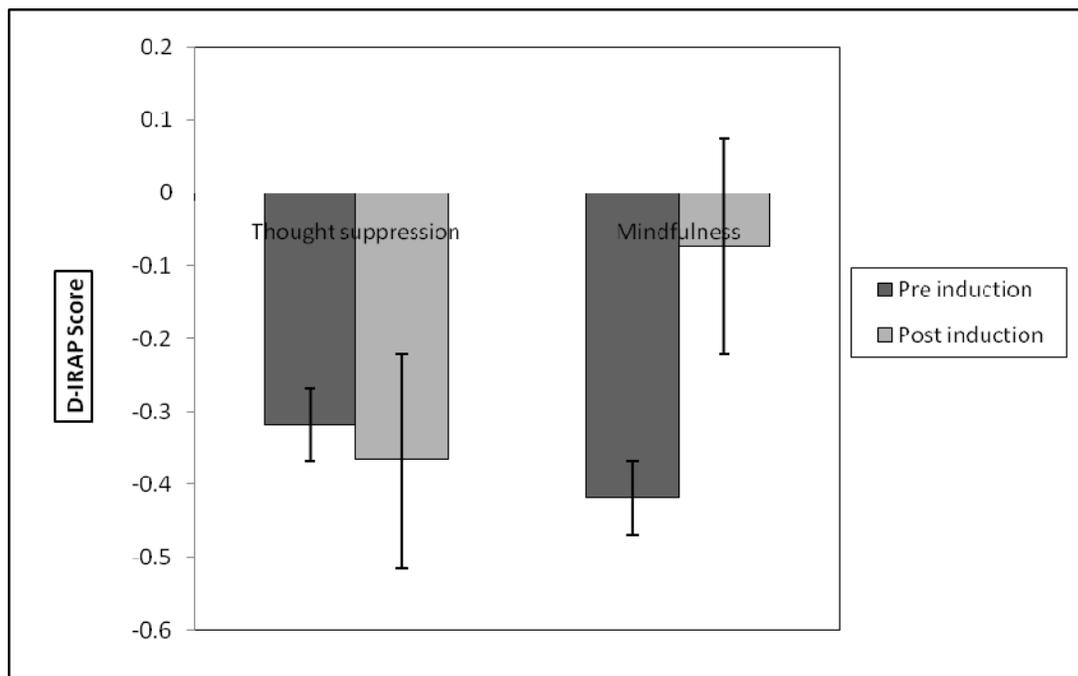


Figure 2. The mean D-IRAP scores and standard errors recorded for each group (i.e., thought suppression and mindfulness) at each time of completion (i.e., pre and postinduction). A negative score indicates a higher level of experiential avoidance/ lower level of psychological flexibility, whereas a positive score indicates a higher level of psychological flexibility/lower level of experiential avoidance.

Explicit -Implicit Relationship

In order to determine whether there was a relationship between participant's scores on the explicit (AAQ II) and implicit (IRAP) measures of psychological flexibility two correlational analyses were conducted. The analyses revealed no significant correlation between the AAQ II and the IRAP at preinduction, $r = 0.18$, $N = 24$, $p > 0.05$ or at postinduction, $r = -0.49$, $N = 24$, $p > 0.05$.

Summary

According to the explicit measure, all participants, regardless of group, experienced a minor increase in their level of psychological flexibility. It is important to note that the increase in levels of explicit EA was so small that it could be interpreted as a maintenance of psychological flexibility from pre to postinduction rather than an induction-related change in psychological flexibility *per se*. However, participants' responses on the implicit measure indicated that the mindfulness group experienced an increase in psychological flexibility while the thought suppression group remained at the same level of EA from pre to postinduction.

Discussion

It was predicted that those participants who received the mindfulness induction would become more psychologically flexible both within subjects (pre to postinduction) and between subjects (when compared to a thought suppression induction group). The results of the current study support this assertion. Specifically, on both the explicit (AAQ II) and the implicit measure (IRAP), participants in the mindfulness group became significantly more psychologically flexible from pre to postinduction. However, the recorded increase in psychological flexibility on the explicit measure was very slight. It was also predicted that those participants who received the thought suppression induction would remain at the same level of psychological flexibility/EA from pre to postinduction. The implicit measure (IRAP) found that participants remained at the same level of experiential avoidance. However, on the explicit measure, participants did not demonstrate this effect. In fact, the data from the AAQ II suggests that the participants became more psychologically flexible/less experientially avoidant from pre to postinduction (it is important to note that this increase was slight and thus could be interpreted as a maintenance effect). Overall, there was little change in self-reported psychological flexibility, in both groups, from pre to postinduction, whereas, an increase in psychological flexibility was clearly demonstrated on the IRAP for the mindfulness group. Thus, the results indicate a discrepancy in sensitivity to the participants' current psychological state between the explicit and implicit measures.

This divergence between self-report and automatic responding is consistent with previous literature on implicit measures. For example, Barnes-Holmes, Murphy, Barnes-Holmes, and Stewart (2010) found racist attitudes emerged on an IRAP even when participants did not explicitly self-report any racial bias. Furthermore, weak correlations between the IAT and explicit measures have been demonstrated across a number of studies (e.g., Dasgupta, McGhee & Greenwald, 2000). As well as adding to the literature on discrepancies that can be found between explicit and implicit measures, the results of the current study are also of clinical importance. According to ACT, experiential avoidance/psychological flexibility are key aspects of psychologically healthy functioning (Hayes et al., 1999). To date the primary method of measuring these processes has been via the AAQ II (Bond et al, 2010). However, in the current study there was no correlation between the explicit (AAQ II) and the implicit (IRAP) measures at pre or postinduction. This is consistent with a meta-analysis of correlations between the IAT and explicit measures that has indicated relatively weak results (a mean effect size of 0.24) (Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005).

The development of an implicit measure of experiential avoidance is of particular interest to ACT clinicians as decreased experiential avoidance/increased psychological flexibility is a desired ACT treatment outcome. Through the course of treatment, clients may falsely respond on the AAQ II measure as a result of a

posttreatment demand characteristic rather than in response to their current psychological state *per se*. The difficulty in faking the IRAP (McKenna et al., 2007) and the clearly divergent nature of responding between the implicit IRAP and the explicit (AAQ II) measures reported in the current study reflects previous findings that have suggested the IRAP is a useful tool in targeting such socially sensitive attitudes (Dawson, Barnes-Holmes, Gresswell, Hart, & Gore, 2009).

Of course, there are some methodological limitations of the current the study. A number of participants failed to complete the IRAP. One potential reason for the completion failure may have been an issue with ambiguity of the stimuli. Specifically, “accept them” in lay terms may suggest a tolerance that is more akin to avoidance than acceptance as defined by ACT. Future studies might involve piloting the stimuli with a representative sample in order to determine the stimuli that would best represent the participant’s definitions of the terms “acceptance” and “avoidance.” Additionally, the IRAP is a cognitively challenging task and higher failure rates have been found in previous IRAP related research (Roddy, Stewart, & Barnes Holmes, 2010). It is possible that the undergraduate students who participated lacked motivation and only agreed to participate in the service of receiving course credit. Course credit was contingent on time spent in the laboratory, rather than task completion *per se*. One way to rectify this issue might be to employ a postexperimental measure of participant motivation.

Nevertheless, the results of the current study suggest that the IRAP may be a useful alternative to the AAQ II in the measurement of EA/ psychological flexibility. Indeed the IRAP may serve to provide a more sensitive measure of brief and immediate EA relative to the AAQ II. It must be added, however, that the current study is preliminary, and further research is needed to improve the assessment of experiential avoidance with the IRAP.

References

- Arch, J. J., & Craske, M.G. (2006). Mechanisms of mindfulness: Emotion regulation following a focused breathing induction. *Behavior Research and Therapy*, *44*, 1849–1858.
- Barnes-Holmes, D., Barnes-Holmes, Y., Power, P., Hayden, E., Milne, R., & Stewart, I. (2006). Do you really know what you believe? Developing the Implicit Relational Assessment Procedure (IRAP) as a direct measure of implicit beliefs. *The Irish Psychologist*, *32*, 169-177.
- Barnes-Holmes, D., Barnes-Holmes, Y., Stewart, I., & Boles, S. (2010). A sketch of the Implicit Relational Assessment Procedure (IRAP) and the Relational Elaboration and Coherence (REC) model. *The Psychological Record*, *60*, 527-542.
- Barnes-Holmes, D., Murphy, A., Barnes-Holmes, Y., & Stewart, I. (2010). The Implicit Relational Assessment Procedure (IRAP): Exploring the impact of private versus public contexts and the response latency criterion on pro-white and anti-black stereotyping among white Irish individuals. *The Psychological Record*, *60*, 57-66.
- Barnes-Holmes, D., Murtagh, L., Barnes-Holmes, Y., & Stewart, I. (2010). Using the Implicit Association Test and the Implicit Relational Assessment Procedure to measure attitudes toward meat and vegetables in vegetarians and meat-eaters. *The Psychological Record*, *60*, 287-306.
- Barnes-Holmes, D., Waldron, D., Barnes-Holmes, Y., & Stewart, I. (2009). Testing the validity of the Implicit Relational Assessment Procedure (IRAP) and the Implicit Association Test (IAT): Measuring attitudes towards Dublin and country life in Ireland. *The Psychological Record*, *59*, 389-406.
- Boelen, P. A., & Reijntjes, A. (2008). Measuring experiential avoidance: Reliability and validity of the Dutch 9-item acceptance and action questionnaire (AAQ). *Journal of Psychopathology and Behavioral Assessment*, *30*, 241-251.

- Bond, F. W., & Bunce, D. (2003). The role of acceptance and job control in mental health, job satisfaction, and work performance. *Journal of Applied Psychology, 88*, 1057-1067.
- Bond, F.W., Hayes, S.C., Baer, R.A., Carpenter, K.M., Orcutt, H.K., Waltz, T., & Zettle, R.D. (2010). *Preliminary psychometric properties of the Acceptance and Action Questionnaire – II: A revised measure of psychological flexibility and acceptance*. Manuscript submitted for publication.
- Chan, G., Barnes-Holmes, D., Barnes-Holmes, Y., & Stewart, I. (2009). Implicit attitudes to work and leisure among North American and Irish individuals: A preliminary study. *International Journal of Psychology and Psychological Therapy, 9*, 317-334.
- Clark, D. M., Ball, S., & Pape, D. (1991). An experimental investigation of thought suppression. *Behavior Research and Therapy, 29*, 253-257.
- Cullen, C., Barnes-Holmes, D., Barnes-Holmes, Y., & Stewart, I. (2009). The Implicit Relational Assessment Procedure (IRAP) and the malleability of ageist attitudes. *The Psychological Record, 59*, 591-620.
- Dasgupta, N., McGhee, D. E., Greenwald, A. G., & Banaji, M. R. (2000). Automatic preference for White Americans: Eliminating the familiarity explanation. *Journal of Experimental Social Psychology, 36*, 316-328.
- Dawson, D. L., Barnes-Holmes, D., Gresswell, D. M., Hart, A. J. P., & Gore, N. J. (2009). Assessing the implicit beliefs of sexual offenders using the Implicit Relational Assessment Procedure: A first study. *Sexual Abuse: A Journal of Research and Treatment, 21*, 57-75.
- De Houwer, J. (2002). The implicit association test as a tool for studying dysfunctional associations in psychopathology: Strengths and limitations. *Journal of Behavior Therapy & Experimental Psychiatry, 33*, 115-133.
- De Houwer, J. (2006). What are implicit measures and why are we using them? In R. Wiers & A. Stacy (Eds.), *Handbook of implicit cognition and addiction* (pp. 11-28). New York: Sage.
- Farach, F. J., Mennin, D. S., Smith, R. L., & Mandelbaum, M. (2008). The impact of pretrauma analogue GAD and posttraumatic emotional reactivity following exposure to the September 11 terrorist attacks: A longitudinal study. *Behavior Therapy, 39*, 262-276.
- Fazio, R., & Olson, M. (2003). Implicit measures in social cognition research: Their meaning and use. *Annual Review of Psychology, 54*, 297-327.
- Gannon, T. A. (2006) Increasing honest responding on cognitive distortions in child molesters: The bogus pipeline procedure. *Journal of Interpersonal Violence, 21*(3), 358-375.
- Goldberg, D. P. (1972). *The detection of psychiatric illness by questionnaire*. (Maudsley Monograph No. 21). Oxford, England: Oxford University Press.
- Gratz, K. L., Tull, M. T., & Gunderson, J. G. (2008). Preliminary data on the relationship between anxiety sensitivity and borderline personality disorder: The role of experiential avoidance. *Journal of Psychiatric Research, 42*, 550-559.
- Greenwald, A.G., & Banaji, M.R. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychological Review, 102*(1), 4-27.
- Greenwald, A. G., McGhee, D. E., & Schwartz, J. K. L. (1998). Measuring individual differences in implicit cognition: The Implicit Association Test. *Journal of Personality and Social Psychology, 74*, 1464-1480.

- Greenwald, A. G., Nosek, B. A., & Banaji, M. R. (2003). Understanding and using the Implicit Association Test: I. An improved scoring algorithm. *Journal of Personality and Social Psychology*, 85(2), 197-216.
- Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (1999). *Acceptance and commitment therapy: An experiential approach to behavior change*. New York: Guilford.
- Hofmann, W., Gawronski, B., Gschwendner, T., Le, H., & Schmitt, M. (2005). A meta-analysis on the correlation between the Implicit Association Test and explicit self-report measure. *Personality and Social Psychology Bulletin*, 31, 1369–1385.
- Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice*, 10, 144–156.
- Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (1999) *International affective picture system (IAPS): Technical manual and affective ratings*. Gainesville, FL: University of Florida, Center for Research in Psychophysiology.
- Lavy, E. H., & Van den Hout, M. (1990). Thought suppression induces intrusions. *Behavioral Psychotherapy*, 18, 251-258.
- McCracken, L. M., & Vowles, K. E. (2007). Psychological flexibility and traditional pain management strategies in relation to patient functioning with chronic pain: An examination of a revised instrument. *Journal of Pain*, 8, 339-349.
- McHugh, L., Simpson, A., & Reed, P. (2010). Mindfulness as a potential intervention for stimulus over-selectivity in older adults. *Research in Developmental Disabilities*, 31, 178-184.
- McKenna, I. M., Barnes-Holmes, D., Barnes-Holmes, Y., & Stewart, I. (2007). Testing the fake-ability of the Implicit Relational Assessment Procedure (IRAP): The first study. *International Journal of Psychology and Psychological Therapy*, 7, 253-268.
- Nosek, B. A., & Banaji, M. R. (2001). The go/no-go association task. *Social Cognition*, 19, 625–66.
- Nosek, B. A., & Hansen, J. J. (2005). *The associations in our heads belong to us: Searching for attitudes and knowledge in implicit evaluation*. Unpublished manuscript, University of Virginia, Charlottesville.
- O'Toole, C., & Barnes-Holmes, D. (2009). Three chronometric indices of relational responding as predictors of performance on a brief intelligence test: The importance of relational flexibility. *The Psychological Record*, 59, 119-132.
- Olson, M. A., & Fazio, R. H. (2001). Implicit attitude formation through classical conditioning. *Psychological Science*, 12, 413-147.
- Ortner, C. M. N., Kilner, S., & Zelazo, P. D. (2007). Mindfulness meditation and emotional interference in a simple cognitive task. *Motivation and Emotion*, 31, 271-283.
- Rassin, E., Merckelbach, H., & Muris, P. (1997). Effects of thought suppression on episodic memory. *Behaviour Research and Therapy* 35, 1035–1038.
- Roddy, S., Stewart, I., & Barnes-Holmes, D. (2010). Anti-fat, pro-slim, or both? Using two reaction time based measures to assess implicit attitudes to the slim and overweight. *Journal of Health Psychology*, 15, 416-425.

- Ruiz, J. (2010). A Review of acceptance and commitment therapy (ACT) empirical evidence: Correlational, experimental psychopathology, component and outcome studies. *International Journal of Psychology and Psychological Therapy*, 10, 125-162
- Salkovskis, P. M., & Campbell, P. (1994) Thought suppression induces intrusion in naturally occurring negative intrusive thoughts, *Behaviour Research and Therapy*, 32,1-8.
- Trinder, H., & Salkovskis, P. M. (1994). Personally relevant intrusions outside the laboratory: long-term suppression increases intrusion. *Behaviour Research and Therapy*, 32, 833-842.
- Vahey, N. A., Barnes-Holmes, D., Barnes-Holmes, Y., & Stewart, I. (2009). A first test of the Implicit Relational Assessment Procedure (IRAP) as a measure of self-esteem: Irish prisoner groups and university students. *The Psychological Record*, 59, 371-388.
- Wittenbrink, B., Judd, C.M., & Park, B. (1997). Evidence for racial prejudice at the implicit level and its relationship to questionnaire measures. *Journal of Personality and Social Psychology*, 72, 262-74.

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