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Emotional and behavioural reaction to intrusive thoughts

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Abstract

A self-report measure of the emotional and behavioural reactions to intrusive thoughts was developed. The paper presents data that confirm the stability, reliability and validity of the new 7-item measure. Emotional and behavioural reactions to intrusions emerged as separate factors on the Emotional and Behavioural Reactions to Intrusions Questionnaire (EBRIQ), a finding confirmed by an independent stress study.

Test-retest reliability over 30-70 days was good. Expected relationships with other constructs were significant. Stronger negative responses to intrusions were associated with lower mindfulness scores and higher ratings of experiential avoidance, thought suppression and intensity and frequency of craving. The EBRIQ will help explore differences in reactions to intrusive thoughts in clinical and non-clinical populations, and across different emotional and behavioural states. It will also be useful in assessing the effects of therapeutic approaches such as mindfulness.

Keywords: Intrusive thoughts, mind-wandering, intrusive memories, mindfulness, thought suppression, experiential avoidance, self-report measure.

Introduction

Intrusive thoughts occur spontaneously, seemingly without effort or origin. Current definitions describe them as disruptive, difficult to control and unwanted (Klinger, 1978, 1978-1979, 1996; Rachman, 1981). As suggested by their name, intrusive thoughts are disruptive to ongoing cognitive activity, causing interruption to the flow of thought and interference in task performance (Clark, 2005, p.4).

Research into intrusions can have broad implications, for non-clinical and clinical populations. Intrusive thoughts about everyday concerns such as food or work, for example, are an ordinary experience for the majority of the population (Brewin, Christodoulides & Hutchinson, 1996). They are also characteristic of several clinical disorders, for example Generalised Anxiety Disorder, Obsessive Compulsive Disorder, Depression and Post-Traumatic Stress Disorder (Brewin, 1998; Green, 2003; Langlois, Freeston, Ladouceur, 2000a,b; Purdon, 1999; Watkins, 2004). Intrusive thoughts are not merely symptoms of such disorders; they may also contribute to the maintenance of those disorders (e.g., Brett & Ostroff, 1985; Brewin, Watson, McCarthy, Hyman, & Dayson, 1998). Recently, the Elaborated Intrusion theory (EI theory) has given intrusive thoughts a key role in addiction and motivated behaviour more generally (Kavanagh, Andrade & May, 2005). The EI theory argues that a target-related intrusive thought marks the beginning of the conscious experience of craving for an individual, and that if this intrusive thought captures attention, then elaboration of the thought will maintain craving.

There is some consensus that the difference between clinical and non-clinical intrusive thoughts is “one of degree, rather than kind” (Clark, 2005, p.11). Clark goes on to describe a continuum of unwanted intrusions, on which he places clinical

obsessions at the extreme end; these clinical thoughts are described as more frequent and more distressing, highly meaningful to the subject, and causing heightened concern and attempted thought control. Thus the reaction that individuals have to their intrusions can be a contributing factor to clinical disorders. Perhaps surprisingly, then, little research has addressed individual differences in reactions to intrusions.

Previous research has measured intrusions in the laboratory using probe methods and self-report measures (e.g. Antrobus, 1968; Giambra, 1995; Smallwood, Baracaia, Lowe, & Obonsain, 2003b; Smallwood, Obonsawin, & Heim, 2003a; Teasdale, Proctor, Lloyd, & Baddeley, 1993; Teasdale et al. 1995), and outside of the lab with questionnaires (e.g. The Trauma Symptoms Inventory, Briere, Elliot, Harris, & Cotman, 1995). The most notable questionnaire in this respect is the White Bear Suppression Inventory (WBSI; Wegner and Zanakos, 1994), which was designed to measure natural tendencies to suppress unwanted intrusive thoughts, but includes items about the occurrence of intrusions. Höping and de Jong-Meyer (2004) confirmed that the WBSI comprises two related factors: thought suppression and unwanted intrusive thoughts.

Other relevant questionnaires include the Thought Control Ability Questionnaire (TCAQ, Luciano, Algaarabel, Tomás, & Martínez, 2005). The TCAQ aims to assess individual differences in perceived ability to control unwanted intrusive thoughts. This was developed with a view of providing an explanation for the disparate findings in the thought-suppression literature. The pioneering ‘white bear’ experiments (Wegner, Schneider, Carter, & White, 1987) demonstrated that the instruction to suppress thoughts of a white bear resulted in a greater frequency of these thoughts immediately, and when the instruction was relinquished in favour of the instruction to ‘express’ these thoughts. Subsequent studies have replicated these

enhancement and rebound effects to varying degrees of success, for example Lavy and van den Hout (1990) found an immediate enhancement effect, whereas Clark, Ball and Pape (1991) found a rebound effect. One possible reason for these different findings is individual differences that influence the ability to successfully suppress thoughts. For example, Brewin and Beaton (2002) demonstrated that individuals with greater working memory capacity reported fewer thoughts about white bears when asked to suppress them. Brewin and Smart (2005) replicated this finding with thoughts that were personally relevant to the participants. The TCAQ provides a measure of individual differences in the ability to suppress thoughts, i.e. their relative success when engaging in thought suppression as a coping strategy, classifying individuals as 'bad' and 'good' suppressors.

Previous questionnaire measures that focus more specifically on intrusive thoughts have assessed associated distress or emotional response alongside frequency, controllability, coping strategies and triggers. However, the assessment of reaction to intrusive thoughts has in some cases been limited to just one or two items within a questionnaire. The Intrusive Thoughts and Impulses Survey (IT IS; Niler & Beck, 1989) asks participants to rate unwanted thoughts and impulses from the past year and month; reaction is measured by one 'distress' item. More recently, the Responses to Intrusions questionnaire (RIQ; Clohessy & Ehlers, 2005) has a predominant focus on how the individual responds to an intrusion in terms of coping. The items address negative interpretation of intrusive memories (e.g. negative personal implications of them), rumination and efforts to suppress them, dissociative responses, the frequency of intrusive thoughts and again just one item on associated distress.

A further problem arises throughout the currently available questionnaire measures that aim to assess intrusive thoughts by way of their focus on particular

types of intrusions. The Intrusive Thoughts Questionnaire (Edwards & Dickerson, 1987) includes ten statements that assess associated distress, however this is with reference to one particular unpleasant intrusive thought. In a similar manner, there exist questionnaires that assess sadness, worry, guilt and disapproval of intrusive thoughts; however, these assessments are restricted to anxious and depressive thoughts (Distressing Thoughts Questionnaire; Clark & de Silva, 1985; Cognitive Intrusions Questionnaire; Freeston, Ladouceur, Thibodeau, & Gagnon, 1991). Purdon and Clark (1994) also address emotional responses in their study on intrusions in obsession-prone and non-obsessional individuals. They asked individuals to rate their most “upsetting” obsessional thought on the degree of upset, unpleasantness, guilt, avoidance of situations that may trigger intrusion, uncontrollability, unacceptability and belief the intrusion could be acted upon in real life. However, the questionnaire is again limited by the focus on obsessional thinking, as well as the restriction to rating just one thought. The previously described RIQ and IT IS are also limited by type of intrusion respectively, intrusive memories and obsessions.

Although each of the aforementioned intrusive thoughts questionnaires addresses aspects of emotional and cognitive reactions to intrusive thoughts, they do so in a limited fashion or they restrict their investigation to one particular thought or type of thought. We are aware of no questionnaire that aims to assess how people react emotionally as well as behaviourally to their intrusions in a more general manner that could be widely applicable.

A clear view on the emotional reaction that individuals associate with intrusive thoughts is important to research that looks into ways of coping with these cognitions for both clinical and non-clinical populations. Such information can further understanding of why people engage in ineffective strategies such as thought

suppression (Wegner et al., 1987) and point to alternative, more effective coping strategies. This study aimed to develop an instrument for exclusively assessing an individual's immediate reaction to intrusive thoughts; we also intended for this measure to have the potential for general application rather than be restrictive to just one type of intrusive thought.

In the initial development of this measure we focused on intrusive thoughts related to craving, because in so doing, we were also able to hold the nature of the thoughts relatively constant while addressing individual differences in reactions to those thoughts. As previously mentioned, the EI theory of desire views intrusive thoughts as pivotal in the development of a craving episode. It is proposed that an intrusive thought acts as the gateway to episodes of craving, marking the beginning of the conscious experience of craving for the individual. In support of this, craving-related intrusive thoughts were highly correlated with strength of craving (Berry, Andrade & May, 2007; May, Andrade, Kavanagh & Penfound, 2008).

Emotional and behavioural reactions to intrusive thoughts play an important role in craving and can influence consumption behaviour. Emotion is incorporated into all aspects of the EI theory, which claims that the predominant emotion associated with craving is negative, for example, feelings of frustration and anxiety. The most obvious behavioural response to craving is consumption of the craved target; craving makes target acquisition more likely. According to the EI theory, intrusive thoughts can prompt absent-minded behaviour, like reaching for a cigarette. Along with the compulsion to act on the thought, intrusive thoughts can have other effects on behaviour. One of the key characteristics of these cognitions is that they are disruptive, thus intrusive thoughts can result in interference with concurrent cognitive tasks (e.g. Teasdale et al., 1993, 1995a). These various emotional and behavioural

reactions to craving-related intrusive thoughts can have implications for coping as well as for craving strength and frequency.

Coping with Intrusive Thoughts

It is likely that there exists a mutual relationship between reactions to intrusive thoughts and strategies used to reduce or cope with intrusions, but little research has investigated such a relationship. A common strategy for coping with unwanted experiences, such as intrusive thoughts, is to try to alter the experience, by avoidance or actively suppressing the thoughts (Hayes et al., 2004). The pioneering ‘white bear’ experiments by Wegner et al. (1987) illustrate how this strategy can be counter-productive. The instruction to suppress thoughts can produce an immediate increase in those thoughts, as well as a rebound of those thoughts when participants are later told to ‘express’ those thoughts. Subsequent literature supports the idea that we are drawn to the very item we are trying to avoid, in natural as well as controlled laboratory settings (e.g., Kelly & Kahn, 1994; Lavy & van den Hout, 1990; Rassin, Merckelbach, & Muris, 2001; Salkovskis & Campbell, 1994; Trinder & Salkovskis, 1994), and with clinical as well as non-clinical populations (e.g., Becker, Rinck, Roth & Margraf, 1998; Kuyken & Brewin, 1995; McLaren & Crowe, 2003; Muris, De Jongh, Merckelbach, Postema, & Vet, 1998; Purdon, 2001; Purdon et al., 2005; Wenzlaff & Luxton, 2003). We tested whether an inclination toward thought suppression is associated with stronger reactions to intrusive thoughts.

An alternative coping strategy for intrusive thoughts is one that encourages the individual away from suppression and avoidance and toward acceptance. One therapy that nurtures this technique originates from Buddhist meditation and is called mindfulness. It is defined as a non-judgemental awareness of the present moment, through focusing attention intentionally on the moment-by-moment experience

(Kabat-Zinn, 2003), and trains the individual to deal with intrusions by acknowledging and accepting them. Mindfulness therapies are becoming increasingly popular for a range of clinical conditions. This study investigated whether a tendency to be mindful is associated with milder reactions to intrusive thoughts.

One other factor that is of interest is the confidence that an individual has in not experiencing an intrusive thought. Self-efficacy has been shown to be related to emotion. Kavanagh and Bower (1985) demonstrated that those receiving a happy mood induction reported higher self-efficacy for a wide range of interpersonal and athletic tasks, than did those in a sad condition. Rabois and Haaga (2003) also showed a relationship between emotion and self-efficacy, with greater sadness relating to lower confidence in ability to abstain from smoking. These relations between emotion and self-efficacy make this an interesting area to explore in terms of reaction to intrusive thoughts. The reaction that an individual has to their intrusive thoughts could be related to the confidence that they have in not experiencing this thought.

The main aim of the present study was to develop a measure of an individual's reactions to their intrusive thoughts, to test its reliability, and investigate relationships between reactions to intrusions and techniques used for coping with intrusions. Based on existing literature, we predicted that thought suppression would be associated with worse reactions to intrusions, whereas mindfulness and high self-efficacy would be associated with better (milder) reactions. The final step was to test a prediction of Elaborated Intrusion theory, that strongly negative reactions to intrusive thoughts about craved substances or activities would be associated with more frequent and more intense episodes of craving for those substances or activities.

Method

Scale Development and Procedure

Scale items were rationally derived from personal experience and published research on intrusive thoughts, as well as the respective roles given to emotion and behaviour in craving by the EI theory. The eight items generated were designed to tap the typical emotional and behavioural reactions that people might have to intrusive thoughts. These were statements about how people might feel or act, including distraction, anxiety, and nonchalance (see Table 2). We chose four items for each of these two forms of reaction because Costello & Osbourne (2005) note that factors with fewer than three items are generally weak and unstable. Although they also recommend that five strongly loading items are desirable, they also comment that it may be possible to reduce item number if there is a very large data set. We sought to recruit a larger than typical sample for this study, with a ratio of participants to items in excess of 100:1.

For the purpose of this questionnaire intrusive thoughts were defined as spontaneously occurring thoughts that “pop” into your head without effort or origin and capture your attention. Participants completed the questionnaire with reference to their intrusive thoughts about their previously selected substance (see craving questionnaire below). Participants rated each statement according to how often it applies when they experience an intrusive thought about their chosen substance. Each statement was rated on a 5-point Likert-type scale, from (0) never to (4) every time.

The eight items were made available, along with the measures described below, as an online survey accessible to all members of the University of Sheffield (staff and students), who were made aware of it by announcement on the University website and by email. All completed surveys were entered into a draw with a £25 prize. After

completing the questionnaires, participants were automatically sent an email that thanked them and explained that the purpose of the study had been to explore the relationship between mindfulness, thought suppression, experiential avoidance and substance use and craving. Data were collected over a period of eight weeks from 19/12/06 to 07/02/07. A random subset of respondents were contacted again 30 to 70 days later and asked to complete the scale a second time, to assess its test-retest reliability. The instructions for the second testing remained the same: participants again rated each of the statements with reference to their experience of intrusive thoughts about their chosen substance.

Following the initial data collection, the scale was subjected to confirmatory factor analysis (CFA) with an independent sample, recruited in the same manner via the University of Sheffield web pages. Furthermore, to see if the structure applied to situations other than craving, this time respondents replied to an advertisement asking for volunteers to complete a questionnaire about how people deal with stress; therefore references to craved substances in two items were deleted. Item one was altered to 'It makes me feel I am losing control of my thoughts' (replacing 'efforts to reduce my consumption of this substance' by 'thoughts') and item five was truncated to 'I act on the thought' (omitting 'by seeking out my most-craved substance'). The other five items were unaltered. Respondents were not given explicit instructions to consider a particular thought when completing the scale. Despite no explicit instruction with regard to the type of intrusive thought that the respondents had in mind, they were completing the questionnaire in the context of stress and therefore it was expected that the intrusions they were considering were likely to be unwanted. All of these completed surveys were entered into a draw with a £50 prize.

*Measures and Predictions**Demographic questionnaire.*

This included sex, age, and participants' previous experience of meditation on a 5-point scale, 0 (none) to 4 (a lot).

White Bear Suppression Inventory (WBSI; Wegner and Zanakos, 1994).

The WBSI is a 15-item measure of the tendency to suppress unwanted thoughts; the deliberate attempt to avoid or get rid of unwanted thoughts. Participants rated their agreement with statements on a Likert-type 5-point scale, anchored with (1) strongly disagree and (5) strongly agree. Sample items include "There are things I prefer not to think about" and "I wish I could stop thinking of certain things". The WBSI has demonstrated acceptable temporal stability (test-retest correlation coefficients $>.6$), internal consistency (Cronbach's Alpha for several samples was greater than $.8$), as well as validity, demonstrated by correlations with measures of obsessive thinking and depression (Wegner & Zanakos, 1994). According to Höping & de Jong-Meyer (2004) there are two subscales, measuring Intrusions and Thought Suppression. In the current sample the WBSI demonstrated good internal consistency ($\alpha = .86$). As previously discussed, research suggests that a tendency to suppress unwanted intrusive thoughts can lead to increased distress, therefore positive correlations between the WBSI and reactions to intrusions were predicted.

Brief mindfulness measure (BMM; Berry, 2008)

We developed a brief measure of mindfulness to test the prediction that mindfulness would be negatively associated with reactions to intrusive thoughts, and minimise the questionnaire load imposed on participants. The basis for the brief

measure was a combination of all 39 items from the four factors observe, describe, act with awareness and accept without judgment, of the Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith and Allen, 2004), along with the seven-item fifth factor ‘nonreactivity to inner experience’ from the Five Factor Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), the first four factors of which replicate the KIMS factors. We needed a short set of items that corresponded to these five factors, because the full set was deemed too long to include in a battery of other questionnaires¹.

A total of 153 undergraduate students (109 female; mean age 21 years) at the University of Sheffield, completed the 46-items online. Each statement was rated on a 5-point Likert-type scale, anchored with (1) Never or very rarely true, and (5) Very often or always true.

Principal components analysis with oblique rotation yielded 12 factors with eigenvalues greater than 1.0, but the scree plot strongly suggested a five-factor solution. A second factor analysis, specifying the extraction of 5 factors, confirmed that all but two of the items load in the same manner as in Baer et al. (2004, 2006): KIMS item 8, ‘I tend to evaluate whether my perceptions are right or wrong’ loaded negatively on ‘Observe’ rather than positively on ‘Accept without judgement’, and KIMS item 11, ‘I drive on “automatic pilot” without paying attention to what I’m doing’, did not load onto any factor (possibly because our UK sample contained relatively few experienced drivers compared with a US sample).

The Brief Mindfulness Measure (BMM; Table 1) consists of two items from each factor: the highest loading item (range: .67 to .83), and the item that explained

¹ During the development of the BMM, a similar brief scale was developed: The Cognitive and Affective Mindfulness Scale-Revised (CAMS-R; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007). The CAMS-R factors are comparable to the BMM factors.

most variance within its factor score after controlling for the first item (partial correlations range: .62 to .85). Split-half reliability analysis confirmed that the items in the questionnaire are measuring the same construct; the first item from each of the factors correlate with the second item from each of the factors, $r = .63, p < .001$.

Insert Table 1 about here

The structure of the 10-item BMM was confirmed on an independent sample of 66 undergraduate students at the University of Sheffield who completed the 46-item questionnaire. The BMM total and factor scores correlated highly with the full 46-item total and factor scores (BMM total-46-item total $r = .87$; Observe $r = .79$; Describe $r = .91$, Act with awareness $r = .83$; Accept without judgement $r = .87$; Non-reactivity $r = .86$).

Cronbach’s alpha for the original sample ($\alpha = .54$) and the confirmatory sample ($\alpha = .58$) was low, however this is unsurprising given the five factor structure of the BMM.

In order to examine the temporal stability of the BMM, a separate sample of 59 students initially completed the BMM online as part of a larger set of questionnaires, and again 30-70 days later. Good test-retest reliability was confirmed by Pearson’s r of .86 ($p < .001$) and a two-way mixed intraclass correlation coefficient (ICC) of .86. Paired sample t tests further confirmed the stability of scores from Time 1 ($M = 30.93, SD = 5.75$) to Time 2 ($M = 31.58, SD = 6.17$), $t = 1.56 (58), p = .13$.

Acceptance and Action Questionnaire (AAQ; Hayes et al., 2004).

The AAQ is a 9-item measure of experiential avoidance, which is defined as the phenomenon that occurs when an individual is unwilling to maintain contact with

particular internal experiences, for example, bodily sensations, emotions and thoughts, memories, urges. Participants rated each statement on a 7-point Likert-type scale, anchored (1) strongly disagree to (7) strongly agree (the anchors were altered for the purpose of this study in order to provide consistency throughout the questionnaires used). The AAQ has demonstrated acceptable temporal stability (test-retest correlation coefficient .64) and internal consistency ($\alpha = .70$), as well as validity, demonstrated by predicted correlations with measures of general psychopathology, anxiety and depression (Hayes et al., 2004). Acceptable internal consistency was demonstrated within the current sample ($\alpha = .71$). A positive correlation was expected with reactions to intrusions.

Craving questionnaire.

For the purpose of these questions craving was defined as an intense desire for something. Participants rated the usual frequency and intensity of their cravings for alcoholic drink, non-alcoholic drink, chocolate, snack food, cigarettes, or another drug. Both frequency and intensity were rated on a 5-point Likert-type scale; frequency from (0) never or very rarely to (4) very often, intensity from (0) no craving to (4) overwhelming craving. Finally, in preparation for the reactions to intrusions questions, participants selected the substance category they most often craved.

From the proposed link between craving and intrusive thoughts, it was predicted that a greater level of distress associated with intrusive thoughts would be associated with greater reported frequency and intensity of cravings (Kavanagh, Andrade and May, 2005).

Self-efficacy with respect to intrusive thoughts.

Participants rated how confident they felt at being able to not experience a craving-related intrusive thought, at the time of day when they most wanted their chosen substance, for a number of time periods (the first fifteen minutes, the first 30 minutes, the first hour, the first two hours and the rest of the day). Participants rated their confidence by writing a number between 0 (not at all confident) and 100 (completely confident). The self-efficacy scale demonstrated acceptable internal consistency within this sample. The minimum corrected item-total correlation was for the 24 hour item, $r = .23$. Split-half reliability analysis confirmed that the items in the questionnaire are measuring the same construct; what would be the odd numbered items (15 mins, 60 mins and 24 hours) correlate with the even numbered items (30mins, 120mins), $r = .73$, $p < .001$. Cronbach's alpha confirmed acceptable internal consistency ($\alpha = .71$).

If intrusive thoughts were experienced frequently and with high associated distress, then confidence in not experiencing an intrusion should have been low. Thus, a negative correlation was predicted between the reactions to intrusions items and the mean ratings of self-efficacy.

Results

The survey was completed by approximately 5% of the university population (455 male, 692 female). The mean age of the 1147 respondents was 23.18 years (range 18 to 60; 11.4% aged 30 or above, 80% aged below 26). 51% reported no previous experience of meditation (0), and only 9.6% reported 3 or 4 (the maximum).

Compared with females, males scored higher on the BMM (Male $M = 31.31$, $SD = 4.75$, female $M = 30.37$, $SD = 4.56$; $t = 3.35$, $p = .001$), and lower on the WBSI

(Male $M = 48.83$, $SD = 9.63$, female $M = 50.76$, $SD = 9.31$; $t = 3.40$, $p = .001$), the AAQ (Male $M = 34.30$, $SD = 6.11$, female $M = 36.01$, $SD = 6.50$; $t = 4.45$, $p < .001$), and the reactions to intrusions scale (Male $M = 10.26$, $SD = 5.67$, female $M = 12.1$, $SD = 5.88$; $t = 5.34$, $p < .001$)

Factor Structure of the Scale

Inter-item correlations of the eight reactions to intrusions items ranged from .25 to .66, with a mean of .44. Of the 28 pairwise correlations, nine were above 0.5, and a further fifteen between 0.3 and 0.5. Only four fell between 0.25 and 0.3, and three of these were for Item 5 ('I act on the thought by seeking out my most-craved substance'). However, the mean inter-item correlation for this item was 0.34, and so it was retained at this point. The eight-item scale produced an alpha coefficient of .863, which rose to .864 if Item 2 ('It's just a thought, it has no effect on me') were deleted. However, given the small change in alpha, this item was also retained at this point.

An exploratory factor analysis (oblimin, maximum likelihood) extracted a one-factor solution (Initial Eigenvalues for Factors 1: 4.14; 2: 0.98, 3: 0.83; 4: 0.56, all others < 0.50 ; the first factor explaining 51.8% of overall variance), but a scree plot suggested the possibility of a two factor solution. Therefore, a second factor analysis (oblimin, maximum likelihood) was conducted, specifying that two factors should be identified. Factor 1 accounted for 46.3% and factor 2 accounted for 6.9% of the variance. This factor structure made sense in terms of the seven items that loaded on to the factors (see Table 2), which included emotional reaction items and behavioural reaction items, respectively. Item 2, which had not contributed to the internal reliability, loaded weakly on both factors ($r = .33$ and $r = .19$ respectively; $r = .60$ with scale total). This, the only positively phrased item, represented nonchalance toward intrusive thoughts, which is captured adequately by a low score on the scale total, so

this item was omitted from further analysis. The two factors correlated ($r = .66$), showing that distressing emotional reactions to intrusive thoughts were associated with stronger behavioural reactions. This high correlation, and the strength of the single-factor solution, indicates that a combined total from the seven items can be used as an alternative to the two factor scores. Hereafter, we refer to this 7-item score as the EBRIQ (Emotional and Behavioural Reactions to Intrusions Questionnaire).

The two factor scores correlated significantly with the AAQ (Emotional reaction $r = .35$, $p = .001$; Behavioural reaction $r = .25$, $p = .001$), WBSI (Emotional reaction $r = .35$; Behavioural reaction $r = .24$) and BMM (Emotional reaction $r = -.31$, $p = .001$; Behavioural reaction $r = -.25$, $p = .001$), with these other three scales also correlating significantly (AAQ-WBSI, $r = .51$, $p = .001$; AAQ-BMM, $r = -.57$, $p = .001$; WBSI-BMM, $r = -.50$, $p = .001$). Although scores on the reactions to intrusions items scale were related to the other three scales, they were not so close as to be measuring the same thing. In forward stepwise multiple regressions to predict the two factor scores, AAQ, WBSI and BMM entered as predictors for both factors, but only accounted for 17% of the variance in emotional reactions and 9% of the variance in behavioural reactions.

Insert Table 2 about here

Confirmatory Factor Analysis

To test the stability of the two-factor structure, an independent sample of 224 staff and students at the University of Sheffield (158 female, 66 male; aged between 18 and 61 years, $M = 25.34$ years) who had not previously completed the questionnaire completed the seven item EBRIQ scale, excluding item 2 from the original set. A Factor Analysis (oblimin, maximum likelihood) extracted two factors.

The goodness-of-fit statistic indicated that the hypothesized two-factor structure provided a good fit for the data, Chi Square = 8.73 (8, $N = 224$), $p = .37$. The factor loadings of the 7 items and their correlations with scale total were almost identical to the original EFA (Table 3).

To test whether the emotional and behavioural aspects of the scale were distinct or whether a single factor solution provided a comparable fit to the sample data, a second factor analysis (oblimin, maximum likelihood) was conducted, forcing an one-factor solution. The fit of this structure was poor, Chi Square = 148.18 (14, $N = 224$), $p < .001$, confirming that the two-factor structure of the EBRIQ was a much better fit to the data than a single-factor structure.

Insert Table 3 about here

Reliability: test-retest

The temporal stability of the seven item EBRIQ was examined in a subset of 132 of the original sample of 1147, who completed the questionnaire a second time between 30 and 70 days after the first completion. Although they had received an email explaining the purpose of the first study, this had not discussed the content or expected factor structure of the scale. There was good test-retest reliability for the scale total, $r = .68$, $p < .001$. The stability was seen in both subscale scores (Emotional reactivity $r = .69$, $p < .001$; Behavioural reactivity $r = .56$, $p < .001$). Two way mixed ICCs correspond with the Pearson's coefficients: scale total = .67; Emotional subscale = .68; Behavioural subscale = .56.

The stability of the total score over this time period was further confirmed by paired-sample t-tests, which found no significant difference between scores at Time 1 ($M = 9.64$, $SD = 5.3$) and Time 2 ($M = 10.14$, $SD = 4.8$), $t = 1.42$ (131), $p = .16$.

Relationship between EBRIQ factors and other subscales

Having confirmed the factor structure of the seven item EBRIQ, an Emotional Reaction subscale score was computed for the original sample by obtaining the mean of items 1, 3, 6 and 8, and a Behavioural Reaction subscale by finding the mean of items 4, 5 and 7. This allowed a detailed investigation of the relationship between these two aspects of reactions to intrusive thoughts and the WBSI, AAQ and BMM (Table 4).

The correlations between the AAQ, WBSI and BMM totals and the EBRIQ were based on a stronger relationship with the emotional subscale, compared with the behavioural subscale. In the case of the WBSI, this was true for both subscales. For the BMM, the strongest relationship was between the ‘act with awareness’ subscale and the behavioural reaction, with greater behavioural reactions being negatively correlated with the awareness of actions, suggesting that they were more impulsive or reflexive. Higher scores on the emotional reactions subscale were associated with low scores on being non-judgemental and displaying nonreactivity to events.

Insert Table 4 about here

EBRIQ and Craving

As predicted, individuals with greater frequency of craving episodes, and with craving episodes that were intense, experienced greater reactions to craving-related intrusive thoughts; $r = .36$ ($p < .001$) and $r = .44$ ($p < .001$) respectively. Greater reactions were also observed when cravings for the selected most-craved substance were more frequent, $r = .33$ ($p < .001$).

Participants were classified as craving a substance if they reported craving more frequently than ‘never or very rarely’. The mean intensity score for each

substance was then correlated with EBRIQ total and factor scores for their most craved substance (Table 5). All but one of these correlations was statistically significant, indicating a general trend for those who display strong emotional and behavioural reactions to their most frequent craving to report that all cravings are strong.

Insert Table 5 about here

Self-efficacy in not experiencing intrusions

The mean total self-efficacy score was correlated with EBRIQ factor scores (Emotional subscale, $r = -.28$, $p < .001$, Behavioural subscale, $r = -.34$, $p < .001$). The next highest correlation was with the WBSI total, at $r = -.15$ ($p < .001$). Although smaller, the correlations with the BMM total ($r = .12$) and the AAQ ($r = -.12$) were still significant ($p < .001$).

Experience of Meditation

The 110 (9.6%) of participants who reported a meditation experience of greater than 2 (the midpoint on the scale) were compared with the rest of the participants on all the trait measures. Independent t-tests showed a small but significant difference between the meditators and non-meditators on the BMM total (Meditators: $M = 31.61$, $SD = 5.07$; Non-meditators: $M = 30.65$, $SD = 4.60$; $t(1145) = 2.06$, $p = .04$), due to differences in the ‘act with awareness’ (Meditators: $M = 6.19$, $SD = 1.78$; Non-meditators: $M = 5.71$, $SD = 1.73$; $t(1145) = 2.77$, $p = .006$) and ‘describing’ (Meditators: $M = 6.95$, $SD = 1.87$; Non-meditators: $M = 6.50$, $SD = 1.83$; $t(1145) = 2.45$, $p = .014$) subscales. The difference in WBSI total score (Meditators: $M = 51.59$, $SD = 9.37$; Non-meditators: $M = 49.82$, $SD = 9.48$) approached significance, $t(1145) = -1.86$, $p = .063$, with a significant difference on the

Intrusions subscale (Meditators: $M = 31.95$, $SD = 6.08$; Non-meditators: $M = 29.40$, $SD = 6.33$; $t(1145) = 2.45$, $p = .015$). These differences had no effect upon the pattern of correlations between the EBRIQ, BMM and WBSI. No other differences between meditators and non-meditators were found, with the EBRIQ total being non-significantly higher for meditators ($M = 9.66$, $SD = 6.15$) than non-meditators ($M = 9.36$, $SD = 5.19$; $t(1145) = 0.58$, $p = .56$).

Discussion

We developed a self-report measure of reactions to intrusive thoughts, the Emotional and Behavioural Reactions to Intrusions Questionnaire (EBRIQ). We tested the reliability of the questionnaire, and its validity in relation to measures of mindfulness, thought suppression, experiential avoidance, self-efficacy and craving. We dropped one item that was doing little explanatory work, and confirmed that a two-factor structure of the questionnaire was appropriate, independently measuring the emotional reaction and behavioural reaction to intrusive thoughts. This seven item version of the questionnaire had good test-retest reliability and showed predicted relationships with measures of thought control and craving.

The two-factor structure of the EBRIQ is consistent with the EI theory of craving (Kavanagh, Andrade, & May, 2005) which claims that intrusive thoughts, and priority of craving, can result in distraction and reduced concentration on current tasks. The emotional subscale supports the claim that negative emotion can be a consequence of craving-related intrusive thoughts; the sense of deprivation can result in feelings of frustration and anger, as well as guilt and anxiety during attempts at control of consumption. Thus, deficit awareness as prompted by intrusive thoughts in craving results in a complex emotional response. The behavioural subscale is consistent with the claim that the associative processes involved in intrusive thoughts

can trigger behavioural responses with little cognitive elaboration, which lead to the acquisition of the craved target.

Scores on the EBRIQ were positively associated with avoidant thought control strategies, which is consistent with the view that these strategies are not effective, but rather are associated with increased distress (Beevers & Meyer, 2004; Purdon, Rowa & Antony, 2005; Trinder & Salkovskis, 1994). The generally negative pattern of small correlations between EBRIQ scores and BMM subscales gives some support to the idea that mindfulness techniques could be an effective alternative coping strategy for unwanted intrusive thoughts; those individuals who are naturally mindful tended to show less distress toward their intrusions.

These correlations need to be interpreted with caution, as cause and effect cannot be determined from this study. It could be that intrusive thoughts that are more distressing increase the likelihood of thought suppression being used as a strategy for coping, whereas thoughts that provoke a milder reaction are easier to accept and so mindfulness techniques are easier to employ. This limitation is discussed in more detail later in the discussion.

Individuals who reported greater emotional and behavioural reaction to intrusions felt less confident of their ability to control those thoughts. This could be a consequence of their naïve use of counter-productive thought suppression strategies. Although the correlations between self-efficacy and the trait measures of experiential avoidance and thought suppression were small, the relationships were negative, indicating that people who employ those strategies for coping with intrusive thoughts do not feel confident about not experiencing an intrusion. Research into self-efficacy related to the experience of intrusive thoughts is very limited, but we hope that the findings presented here will lead to further research in this area. The causal

relationship between these constructs cannot be determined from the current study. Future research could determine whether an intervention that lessens the distress experienced in reaction to intrusive thoughts could in turn see an increase in related self-efficacy, and a lesser reliance upon thought suppression. Alternatively, aiming to increase self-efficacy in relation to coping may decrease the distress that an individual feels when they experience an intrusive thought.

Because of our large sample sizes, these correlations can be statistically significant despite in some cases reflecting a small effect size. For example, the correlation of .08 between the BMM measure 'Describe' and behavioural reactions is statistically significant at $p = .005$, despite accounting for just 0.6% of the variance. However, of the 32 correlations in Tables 3 and 4, 22 equal or exceed 0.20, each accounting for at least 4% of the variance. We have focussed on these stronger relationships in our discussion.

To test the generality of the questionnaire, we conducted a confirmatory factor analysis on data collected with a seven-item version of the questionnaire targeted at intrusive thoughts in the context of stress. This component of the study confirmed the two-factor solution that emerged from the initial exploratory factor analysis, and suggested that the EBRIQ could provide a useful measure of reactions across a range of everyday and clinical situations in which intrusive thoughts are experienced. Although both our samples were drawn from University staff and students, the data potentially relate to clinical phenomena (craving for addictive drugs, self-harm). We look forward to future research testing the validity and reliability of the EBRIQ in clinical populations.

The use of the EBRIQ with clinical populations could provide insight into the difference between clinical and non-clinical intrusions, for example obsessive

thoughts. David Clark (2005) suggested that the difference between these intrusions may be quantitative rather than qualitative. Thus the content of the intrusive thought may not differ, but rather other variables. For example, a number of studies have shown that the main differences in obsessional intrusions between non-clinical and clinical populations are frequency, distress associated with the thought, and perceiving these thoughts as unacceptable and uncontrollable (Janeck & Calamari, 1999; Rachman & de Silva, 1978). The EBRIQ addresses this issue of reaction to intrusive thoughts and thus could help to explore this difference in clinical and non-clinical related intrusive thoughts.

One limitation of the EBRIQ is the lack of any reverse-coded items in the scale. The one reverse-coded item from the original set of eight, “It’s just a thought, it has no effect on me”, was excluded from the final seven item scale, due to the poor loadings on each of the factors. It may be that it is more common to experience distress in terms of intrusive thoughts, which could be due to their intrusive and spontaneous nature. Therefore, it may be easier for respondents to relate to negative reactions to intrusive thoughts, e.g. anxiety, rather than positive ones, e.g. nonchalance. For this reason also, the content of the EBRIQ is limited in terms of the emotions that it covers; specifically, there is a lack of positive emotions in the items. The EBRIQ aims to assess reactions to unwanted intrusive thoughts: it was assumed that positive emotions, such as delight, may not be very common reactions to unwanted thoughts. Positive emotions toward intrusive thoughts may occur more frequently in day-dreaming, where the intrusions are welcomed.

The medium retest coefficients raise interesting questions about the extent to which responses to intrusive thoughts are a stable trait and the extent to which they reflect a temporary state. The same questions apply to the mindfulness and thought

suppression measures we used. For instance, for a particular individual, intrusive thoughts about chocolate may normally be irritating because they distract from other cognitive activity, but it may be fairly easy to accept those thoughts and move on under those circumstances. However, if that individual is dieting to lose weight, then thoughts about chocolate may threaten their self-esteem and perceived control. In that case, emotional and behavioural reactions to intrusions will be stronger, maintaining a state of mindfulness will be harder, and the temptation to try and suppress thoughts will be greater. An issue for future research is the sensitivity of the EBRIQ to such changes in emotional or behavioural state. Does it, for example, pick up effects of mindfulness training, of trying to quit smoking, or of cognitive behavioural therapies aimed at coping with intrusive thoughts?

A related issue is that of cause and effect, as previously mentioned. EBRIQ scores correlated positively with intensity and frequency of craving and tendency to suppress unwanted thoughts, and correlated negatively with thought acceptance. Individuals who experience strong negative reactions to intrusive thoughts may be more likely to try and suppress those thoughts and, because of the ironic effects of thought suppression, may experience more intense or frequent cravings or other unwanted effects as a result. However, it is also plausible that episodes of strong craving, stressful life events, or increased attempts at behavioural control (e.g. dieting) will trigger stronger reactions to intrusive thoughts; thoughts with more negative content will cause more negative reactions.

These implications lead naturally to research that looks at what can alter EBRIQ scores. One interpretation of the positive correlations between avoidant strategies for coping with thoughts and negative emotions is that employing avoidant strategies could increase the distress that individuals experience as a reaction to

intrusive thoughts. A reduction in the use of avoidant strategies might also improve EBRIQ scores. Similarly, increased mindfulness ability would be expected to reduce distress on the EBRIQ. The negative correlation found here suggests that a natural ability to be mindful is associated with reduced distress in reaction to intrusions, although our subsample of experienced meditators did not differ substantially in their scores on the EBRIQ. Indeed, the only scores that did differ with meditation experience were two subscales from the Brief Measure of Mindfulness, ‘acting with awareness’ and ‘describing’, and one from the WBSI, ‘Intrusions’. This suggests that meditators, being more aware of their private experiences and better able to put them into words, were more aware of intrusive thoughts. As well as this, the strongest correlations observed between the BMM factors and the EBRIQ were for ‘act with awareness’ and ‘non-judging’. The ability to act with awareness is associated with less emotional and behavioural distress; as well as this, a non-judgmental stance is negatively related to emotional distress.

These observations may point toward specific facets of mindfulness that could be particularly useful in reducing negative reactions to intrusive thoughts. Acting with awareness, “engaging fully in one’s current activity with undivided attention” (p. 193, Baer et al., 2004) could help prevent automatic engagement in ineffective behavioural and coping strategies, as well as reduce the distress associated with intrusions. In addition, not evaluating experiences, but rather letting them be as they are, could reduce the emotional distress that accompanies such judgements. Perhaps, as Brown & Ryan (2003) have suggested, acceptance may be encapsulated as acting with awareness and non-judging. The close relationship between the concepts is consistent with Baer et al.’s (2004) description of non-judging as accepting and allowing experience to be as it is. Future work should investigate the effects of mindfulness

training on EBRIQ scores, and of particular aspects of mindfulness to see if there are any that can be effective as stand alone strategies for coping. The current 8-week Mindfulness-Based Cognitive Therapy (Segal, Williams & Teasdale, 2002) course offers training in meditations that are designed to increase one's tendency to be mindful. A reduction in EBRIQ scores would be expected as a result of participation in the course.

In summary, these findings suggest that the EBRIQ may be a useful tool for researchers and clinicians working with populations in which intrusive thoughts feature. The increased interest in intrusions and the role that they play in clinical and non-clinical phenomena called out for a measure of emotional and behavioural reactions to intrusive thoughts, and research that uses this tool to further our understanding of intrusions.

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Table and Figure Captions

Table 1. Items included in the Brief Measure of Mindfulness

Table 2: Factor analysis of 8-item reaction to intrusions scale, with loadings on each factor and correlation with scale total.

Table 3: Confirmatory Factor Analysis of 7-item Emotional and Behavioural Reaction to Intrusions Questionnaire, with loadings on each factor and correlations with scale total

Table 4: Correlations between EBRIQ and other measures

Table 5: Correlations between EBRIQ and craving intensity

Table 1. Items included in the Brief Measure of Mindfulness

Factor 1: Describe

Even when I'm feeling terribly upset, I can find a way to put it into words

It's hard for me to find the words to describe what I'm thinking

Factor 2: Accept without judgement

I tell myself I shouldn't be thinking the way I am thinking

I think some of my emotions are bad or inappropriate and I shouldn't feel them

Factor 3: Nonreactivity to inner experience

When I have distressing thoughts or images, I am able just to notice them without reacting

When I have distressing thoughts or images, I just notice them and let them go

Factor 4: Act with awareness

When I do things, my mind wanders off and I'm easily distracted

I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise
distracted

Factor 5: Observe

I intentionally stay aware of my feelings

I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing

Table 2: Factor analysis of 8-item reaction to intrusions scale, with loadings on each factor and correlation with scale total.

<i>Item number and content</i>	<i>Factor loadings</i>		
	<i>1</i>	<i>2</i>	<i>r</i>
<i>Factor one: Emotional reaction to intrusive thoughts</i>			
3. It makes me feel miserable	.90	-.12	.76
6. It makes me anxious	.83	-.02	.77
8. It makes me irritable	.67	.10	.75
1. It makes me feel I am losing control of my efforts to reduce my consumption of this substance	.65	.06	.75
<i>Factor two: Behavioural reaction to intrusive thoughts</i>			
4. It distracts me from what I am doing	.02	.85	.75
5. I act on the thought by seeking out my most-craved substance	-.03	.62	.58
7. It interferes with how well I carry out what I'm doing	.30	.53	.77
<i>Not loading:</i>			
2. It's just a thought, it has no effect on me	--	--	.60

Table 3: Confirmatory Factor Analysis of 7-item Emotional and Behavioural Reaction to Intrusions Questionnaire, with loadings on each factor and correlations with scale total

<i>Factor one: Emotional reaction to intrusive thoughts</i>		
<i>Load</i>	<i>r</i>	<i>Item</i>
.61	.74	It makes me feel I am losing control of my thoughts
.85	.75	It makes me feel miserable
.88	.76	It makes me anxious
.70	.76	It makes me irritable
<i>Factor two: Behavioural reaction to intrusive thoughts</i>		
<i>Load</i>	<i>r</i>	<i>Item</i>
.74	.72	It distracts me from what I am doing
.51	.43	I act on the thought
.77	.76	It interferes with how well I carry out what I'm doing

Table 4: Correlations between EBRIQ and other measures

Scale	EBRIQ	
	<i>Emotional</i>	<i>Behavioural</i>
<i>AAQ</i>	.36	.25
<i>WBSI</i>	.35	.24
Intrusions	.33	.24
Thought suppression	.31	.19
<i>BMM</i>	-.30	-.25
Nonreactivity	-.15	-.12
Observe	.05 ns	.11
Act with awareness	-.20	-.27
Describe	-.10	-.08 *
Nonjudgement	-.21	-.15

All correlations have N = 1147 and $p \leq .001$ except * ($p = .005$), ns ($p > .05$)

Table 5: Correlations between EBRIQ and craving intensity

Substance craved	N	Emotional	Behavioural
<i>Alcohol</i>	810	.21	.18
<i>Non-alcoholic drink</i>	1055	.08	.20
<i>Chocolate</i>	1012	.22	.19
<i>Snack Food</i>	1044	.23	.30
<i>Cigarettes</i>	263	.34	.30
<i>Other drugs</i>	184	.21	.12 ns

All $p \leq .001$ except ns ($p > .05$)