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Abstract

Acceptance and Commitment Therapy (ACT) emphasizes the relationship a person has with their thoughts and beliefs as potentially more relevant than belief content in predicting the emotional and behavioral consequences of cognition. In ACT, 'defusion' interventions aim to 'unhook' thoughts from actions and to create psychological distance between a person and their thoughts, beliefs, memories and self-stories. A number of similar concepts have been described in the psychology literature (e.g. decentering, metacognition, mentalization and mindfulness) suggesting converging evidence that how we relate to mental events may be of critical importance. Whilst there are some good measures of these related processes, none of them provides an adequate operationalization of cognitive fusion. Despite the centrality of cognitive fusion in the ACT model, there is as yet no agreed measure of cognitive fusion. This paper presents the construction and development of a brief, self-report measure of cognitive fusion: The Cognitive Fusion Questionnaire (CFQ). The results of a series of studies involving over 1800 people across diverse samples show good preliminary evidence of the CFQ's factor structure, reliability, temporal stability, validity, discriminant validity, and sensitivity to treatment effects. The potential uses of the CFQ in research and clinical practice are outlined.

Key words: Cognitive-Behavior Therapy, Acceptance and Commitment Therapy, Measurement, Questionnaires, Cognitive Fusion, Mindfulness

Introduction

Acceptance and Commitment Therapy (ACT) is a form of cognitive behavioral therapy (CBT) that emphasizes distancing from thoughts, rather than changing thought content as a key ingredient in therapy. The ACT model has been thoroughly described elsewhere, interested readers are directed to Hayes, Strosahl and Wilson (2011). Briefly, the ACT model describes 6 overlapping processes (willingness, defusion, contact with the present moment, clarity of values, committed actions and a flexible repertoire of perspective taking skills known as 'self as context') that lead to psychological flexibility.

In the ACT model, distancing from thoughts is known as 'cognitive defusion' and its counter process is 'cognitive fusion': the tendency for behavior to be overly regulated and influenced by cognition. When 'fused,' a person acts on thoughts as though they are literally true, cognitive events come to dominate behavior and experience over other sources of behavioral regulation, and he or she becomes less sensitive to direct consequences. An example of this is when a person with social anxiety is dominated by self-focused attention, negative evaluations of the self and such cognitive events have a strong tendency to regulate overt behaviors (such as entering social situations). In contexts of fusion, thoughts are taken literally; the anxious person simply *is* socially inept, rather than seeing these self-evaluations as mental events. Fusion refers to the relationship a person has with his or her own cognitive events, on a continuum from fused (dominated by, entangled, believed, taken literally) to defused (experienced as mental events and not necessarily needing to be acted upon). In ACT, the purpose of defusion is to afford greater choice of behavior, such that the socially anxious person could choose to enter the feared situation, even when they are fearful and their mind is predicting the worst.

Cognitive defusion overlaps with but is distinct from other processes of the ACT model. Willingness describes a behavioral stance that is open to unpleasant private events and a letting go of attempts to control or avoid their form, frequency or intensity. Contact

with the present moment refers to flexible awareness of experience in the here and now, encompassing sensation, emotion, cognition, and kinesthetic awareness. Self-as-context refers to a set of perspective shifting skills in which the self is experienced as hierarchically organized in relation to self-content (e.g., what one believes about oneself). It relies on the more basic process of cognitive defusion, and involves a shift from experiencing self-content and 'the self' in a relationship of equivalence, to the self as 'containing' self-content, be it positive or negative.

Experimental and clinical work in ACT has often operationalized fusion using the proxy construct of 'believability of thoughts'. Such an operationalization suffers from focusing merely on the content of one's thought and so represents only a narrow aspect of fusion. A broader behavioral operationalization includes dominance of cognitive events in a person's experience, inability to view cognitive events from a different perspective, reacting emotionally to thoughts, behavior being highly regulated by cognitive events, attempts to control thinking, over-analysis of situations, evaluating and judging thought content, as well as aspects of literality and believability.

Cognitive defusion is similar to a number of existing concepts within psychological therapies, namely: decentering (Fresco, Moore, van Dulmen & colleagues, 2007; Safran & Seagal, 1990), metacognitive awareness (Teasdale et al., 2002; Wells, 2008), mindfulness (Bishop et al., 2004), and mentalization (Bouchard et al., 2008; Fonagy & Target, 1997) It is also distinct from thought-action fusion (TAF: Shafran, Thordarson & Rachman, 1996), despite the similarity in name.

Decentering or 'metacognitive awareness' refers to the capacity to take a detached view of one's thoughts and emotions (Fresco et al., 2007; Teasdale et al., 2002; Wells, 2008; 2009). Decentering has long been part of cognitive therapy, though initially it was as a precursor to cognitive modification (Hollon & Beck, 1979). Recent analyses of Mindfulness

Based Cognitive Therapy (MBCT: Segal, Williams & Teasdale, 2002) suggest decentering may be a more active ingredient in preventing depressive relapse via the disruption of depressogenic cognitive patterns (Teasdale et al., 2002). Fresco, Segal, Buis, and Kennedy (2007, p. 448) define decentering as "…the capacity to take a present-focused, non-judgmental stance in regards to thoughts and feelings *and to accept them*" (Our italics). Fresco et al. also note (p. 236) that an important "facet" of decentering is self-compassion, and, indeed, there are items representing this facet in Fresco et al.'s measure of decentering, the Experiences Questionnaire (EQ). The ACT model of psychological flexibility separates out the processes of defusion and acceptance, whereas decentering collapses them. In addition, from an ACT perspective, self-compassion is not a quality of defusion, rather, it emerges from four of the psychological flexibility processes described above: defusion, acceptance, self-as-context, and present-moment awareness. Thus, decentering (or metacognitive awareness) is similar to defusion, though fusion is more narrowly defined and more behaviorally operationalized, in that the function of defusion is greater choice of action, rather than the disruption of cognitive patterns.

Despite the similarity in name, Thought Action Fusion (TAF: Shafran et al., 1996) describes biased metacognitive belief content (e.g. thinking of something bad happening will make it more likely to happen) rather than the shift in perspective that is suggested by other terms such as decentering, metacognitive awareness, or fusion / defusion.

Arising from the psychodynamic or developmental tradition in psychology is the notion of reflective function or mentalization (Fonagy & Target, 1997; 2002), which is the capacity of a developing child to understand the mental states of itself and others. Whilst awareness of one's own mental states may overlap with the notion of cognitive fusion / defusion, mentalization is a broader construct related to affect regulation and attachment (see Gumley, 2010 for an overview).

Finally, mindfulness (e.g. Mindfulness Based Stress Reduction, [MBSR] Kabat-Zinn, 1990) shares a degree of overlap with cognitive defusion. Indeed, in the ACT model, present moment awareness is often instigated as a precursor to cognitive defusion. An example is the 'classic' ACT defusion exercise 'Leaves on the Stream' (Hayes et al., 2011, pp. 255 - 258.) This begins with a focus on the present moment (akin to mindfulness of the breath and of the body, sounds etc.) before using imagery (of thoughts as leaves floating on a stream) that deliberately creates a shift in the relation between cognitive events and the self. From an ACT perspective, however, mindfulness is an emergent quality of the four psychological flexibility processes (noted above) that also produce self-compassion. Thus, defusion forms a key component of both decentering and mindfulness, but in order to produce the psychological qualities of those latter two constructs, ACT maintains that additional processes need to occur. In addition, mindfulness is often seen either as a method of stress reduction (as in MBSR) or to facilitate decentering (as in MBCT) or as an end in itself, rather than in the service of potentiating valued, goal directed action, which is the explicit function of defusion in ACT.

In summary, there are a number of constructs that overlap with cognitive fusion, suggesting that a number of therapy approaches have considered aspects of how we relate to our own mental experience to be important in understanding mental disorder and behavioral function. Whilst there is overlap between these concepts and fusion, the construct of fusion is a more narrowly defined process that contributes to other psychological qualities such as decentering and mindfulness. In addition, central to the construct is that the purpose of stepping back from cognitive events is to facilitate taking action that is consistent with one's values, rather than to disrupt negative thinking styles, change metacognitive beliefs or reduce stress.

There are some existing scales that have been developed to measure cognitive fusion and defusion. The Believability of Anxious Feelings and Thoughts Scale (BAFT: Herzberg et al., 2012) measures the believability of thoughts in anxiety disorders and so, as noted above, measures a relatively narrow conceptualization of fusion. In addition, it is content specific to anxiety disorders, giving it less relevance as a generic measure of cognitive fusion.

The Avoidance and Fusion Questionnaire for Youth (AFQ-Y: Greco, Lambert & Baer, 2008) measures avoidance and fusion in children and adolescents and appears to have adequate psychometric properties in adult populations (Fergus et al., 2012). The scale, though, assesses several ACT processes (notably fusion and avoidance) and so cannot be regarded as a distinct measure of cognitive fusion.

An early ACT study (Zettle & Hayes, 1987) operationalized defusion by incorporating a 'believability' scale into the existing 'frequency' scale of the Automatic Thoughts Questionnaire (ATQ: Hollon & Kendal, 1980). This measure has adequate psychometric properties (Zettle, Rains & Hayes, 2011). It is however, a further example of how cognitive fusion has been operationalized along the relatively narrow dimension of believability. Furthermore, its items reflect cognitive content in depression, limiting its use as a generic measure of cognitive fusion.

Finally, a very recent addition to the available measures of cognitive defusion is the Drexel Defusion Scale (DDS: Forman et al., 2012). It shows a theoretically coherent factor structure, good psychometric properties and a coherent pattern of convergent and divergent validity, in a clinical and non-clinical sample. The DDS has four potential limitations, however. Firstly, the scale provides an extended instruction set that describes what is meant by the term defusion. This could be problematic because it potentially equates the act of fused responding with the understanding of the concept of defusion. Secondly, the scale presents 10 brief vignettes in which respondents rate how likely they imagine they would be

to defuse in various situations, rather than to report on their actual experiences of defusing in their own life. Thirdly, the authors recognize that in providing an extended instruction set, the scale itself may prime defused responding. Finally, the DDS assesses fusion with bodily sensations, emotions and cravings as well as thoughts around specific situations (e.g. social anxiety, loss / sadness and anger) meaning the items are content specific and, thus, lack generality.

In summary, some scales have been developed to measure cognitive fusion but they tend to be content specific, operationalized in a narrow way, may confound measurement with understanding and contain priming effects. The present research therefore aimed to develop a brief, self-report measure of cognitive fusion of sufficient quality and flexibility in terms of item content and psychometric properties to facilitate it's use in a variety of settings (clinical, community, laboratory), with many different populations.

The studies reported here describe the construction and development of the Cognitive Fusion Questionnaire (CFQ), the examination of its factor structure in a non-clinical sample, followed by item reduction (Study 1). Study 2 further examines the factor structure of the CFQ across a wider range of samples, using confirmatory factor analysis (CFA). Study 3 examines the concurrent, divergent and incremental validity of the CFQ via relationships with a wide range of other measures of psychological processes and functioning. Study 4 reports internal and test-retest reliability and the ability of the CFQ to distinguish between different samples of participants. Study 5 reports an evaluation of the CFQ's sensitivity to treatment and mediation of treatment outcome in an intervention designed to reduce cognitive fusion.

Method

Item Development

Items were generated by DG, HB, MD and FB, based on expert knowledge and practice of ACT and Relational Frame Theory (RFT: Hayes, Barnes-Holmes, & Roche, 2001). In addition, FB has developed two previous ACT-based measures (Bond et al., 2011; Bond, Lloyd & Guenole, 2013). Consistent with Hayes, Luoma, Bond, Masuda and Lillis (2006), fusion was considered to be a uni-dimensional construct, representing a continuum from fusion to defusion, with a wide variety of behavioral manifestations. Each item was worded to express a specific instance of fusion or defusion and to be as concrete and behaviorally operationalized as possible. Hence the complete set of items addressed a broad functional definition of fusion made up of the many forms that fusion can take, including: believability of thoughts (two items: e.g. I believe the thoughts that pop into my head); taking thoughts literally (four items: e.g. My thoughts are facts); reacting emotionally to thoughts (three items: e.g. My thoughts cause me distress or emotional pain); behavior being governed by thoughts (five items: e.g. I get so caught up in my thoughts I'm unable to do the things I most want to do); trying to control thoughts (four items: e.g. I need to control the thoughts that come into my head); over analyzing situations (four items: e.g. I overanalyze situations to the point where it is unhelpful to me); evaluating thought content (four items: e.g. I make judgments about whether my thoughts are good or bad); dominance of cognition in a person's experience (six items: e.g. Its such a struggle to let go of upsetting thoughts, even when I know letting go would be helpful); perspective taking (six items: I find it easy to view my thoughts from a different perspective); and detached awareness of thoughts (six items: e.g. My thoughts just come and go and I'm not too attached to them). These later items are examples of defusion responses and are reverse scored. A total of 44 items were generated.

ACT experts (committee members of the British Association for Behavioural & Cognitive Psychotherapy ACT Special Interest Group) were asked to comment on and rate how well these items represented cognitive fusion and defusion. Nine committee members

provided feedback on item clarity and suggested adaptations to some items. A number of items were reworded based on this feedback. Items that received a modal rating of 'Moderately' or 'Highly' representative from the consensus panel were retained in the first draft of the CFQ. This first draft containing 42 items (26 fusion, 16 defusion) was examined in study 1 (see Table 1 for the full list of items).

Samples

Several samples were recruited to test different aspects of the CFQ. In some cases samples were recruited for other projects and where samples shared similar characteristics (e.g. healthy community dwelling adults) these samples were combined opportunistically. These samples are described below.

Sample 1: A young adult sample was recruited (predominantly students and associates of the chief investigators [MD & DG]). The sample comprised 592 participants: 174 were male (29.4%) and 418 were female (70.6%); 381 participants (64.4%) were aged between 17-24 years; 173 (29.2%) were aged between 25-34 years; 21 (3.5%) were aged between 35-44 years; 8 (1.4%) were aged between 45-55years; and, 9 (1.5%) were over 55 years old.

Sample 2: Sample 2 was another convenience sample, collected for 3 different studies, whose data were opportunistically pooled. These were all community dwelling healthy adults and included a sub sample of UK Prison Service Officers recruited for another study by LM and JL. Sample 2 comprised 447 adults. There were 247 women (55.4%) and 200 men (44.6%). Their ages ranged from 18 to 77, with a mean of 38 years (*SD* = 13). The age, gender ratio and CFQ score were not significantly different in any of the three subsamples that make up sample 2 (Mean Age: 34.8 – 39.6 years, *SD*: 11 – 13.5 years, $F_{(3,444)}$ =2.28, *p*=. 08, *ns*; Gender Ratio [% female]: 48% - 58%, λ = 1.06, *p* = .29; Mean CFQ score: 18.92 – 20.17, *SD*: 7.72 – 9.82, $F_{(2,445)}$=.710, *p*=.49, *ns*). One of the subsamples was recruited for a study specifically to examine the test-retest reliability of the CFQ (*n*=82, 58%

female, mean age: 41, *SD*: 13.8) and is equivalent to the other participants in sample 2 in terms of age, gender and CFQ score. In addition some participants completed paper and pencil measures and others (n = 113) completed measures online. There was no difference between these methods of administration on the final CFQ score (Online mean: 20.16 [*SD*: 7.72], Paper mean: 19.71 [*SD*: 8.03], $t_{(255)} = .485$, $p = .63$)

Sample 3: Participants were volunteers for an ACT based worksite psychological skills training / stress management program as part of another study led by PF. They were recruited from two large public sector organizations in the UK: a governmental organization and a healthcare organization. This sample included 242 people, 188 (78%) of whom were female. Age ranged between 20 and 69 years old, with a mean age of 41 years (*SD*: 10 years).

Sample 4: Participants in sample 4 were recruited from National Health Service Mental Health Services across the UK, as part of other studies by HB, SK, SM, PN and DG. They represent a broad sample of different mental health difficulties. 129 (60%) were recruited from specialist settings, such as services for people with eating disorders, community mental health teams and a personality disorders service, whereas 86 (40%) were recruited from primary care psychological services. All participants were referred by treating clinicians (psychologists, nurses, psychiatrists) who confirmed the presence of psychological disorder. Participants were excluded on the basis of primary problem relating to alcohol or substance misuse, and conditions such as significant learning disability, head injury or dementia. Sample 4 comprised of 215 individuals, aged 17 to 68, with a mean age of 40 years (*SD*: 13); 136 of these participants (63.3%) were female. Despite the diverse sources of recruitment for this sample, the subsamples did not differ in terms of age or CFQ total score (Specialist mean age: 40.35 years, *SD*: 12.89, Primary Care mean age: 38.58, *SD*: 12.69, $t_{(213)} = .933$, $p = .35$, *ns*; Specialist CFQ: 34.57, *SD*: 8.31, Primary care CFQ: 33.91, *SD*: 7.70, $t_{(213)}$

=.59, *p* = .55, *ns*), suggesting equivalence across these diverse samples. Types of psychological disorder represented in this sample included major depression, anxiety disorders, post traumatic stress disorder, eating disorders, interpersonal problems, low self-esteem, complicated grief reactions, personality disorders, recovery from psychotic experiences including bipolar disorder and schizophrenia. These diagnoses were assessed by clinician diagnosis rather than structured clinical interview. Sample 4 was considered a broad sample of the range of mental health problems presenting in United Kingdom NHS mental health services and was designed in this way because of the hypothesized transdiagnostic relevance of cognitive fusion.

Sample 5: Sample 5 comprised 133 people (72% female) recruited for a study of adjustment processes in people with multiple sclerosis by CF and DG. The sample ranged in age from 21 to 75, with a mean age of 49 years (*SD* =11). Participants were recruited from specialist NHS neurological services. Diagnosis of MS was confirmed by the referring physician. Individuals who were deemed by the referring clinician to be too cognitively impaired to provide informed consent or respond to the study questionnaires were not recruited.

Sample 6: Sample 6 was recruited for a separate study of the relationship between cognitive fusion, rumination, metacognitive beliefs and depression by SK and DG. The sample comprises of people with current major depressive disorder (MDD): (*n*=26, 58% female, mean age: 42.35 years, *SD*: 12.8,), people recovered from MDD (*n*= 21, 57% female, mean age: 41.67 years, *SD*: 10.95), and people who have no history of depressive episode (*n*=27, 59% female, mean age: 44.11 years, *SD*: 11.92). Current and lifetime depression status was confirmed by Structured Clinical Interview for DSM [SCID: First, Spitzer, Gibbon, & Williams, 1996]. The three groups were equivalent in terms of age and gender and differed significantly in terms of current mood, as measured by the Centre for

Epidemiological Studies Depression Scale [CESD: Radloff, 1977]. Participants for currently depressed and recovered groups were recruited through General Practitioner (GP) services and Primary Care Psychological Services. Participants for the never depressed group were recruited through community groups and services. Sample 6 was used to test the incremental validity of the CFQ in predicting depression, compared to established predictors such as rumination and metacognitive beliefs.

Sample 7: Sample 7 consisted of 219 caregivers of people with dementia, recruited for a separate study into caregiver distress by LR and DG. 144 (66%) of the caregivers were female, the mean age of sample 7 was 68.6 years (*SD:* 11.5 years), with a range of 31 to 95 years. 87% of the sample were caring for a spouse with dementia, the remainder were adult children of the care recipient. 88% were living with the person with dementia.

Regardless of sample, all participants gave informed consent and all studies followed codes of conduct for research with human participants as detailed by the British Psychological Society (BPS, 2009) and the universities and NHS Trusts that were sponsoring the research. All studies received approval from the relevant university ethics committees (University of Edinburgh, Goldsmiths, University of London, City University, or Southampton University). In addition, Local NHS Research Ethics Committees approved all research that sampled participants from NHS settings and equivalent ethical procedures were followed in other settings.

Data screening and treatment of missing data

In all samples data were screened at the individual item level to confirm that each item had responses covering the full range of the response format, and that responses were normally distributed. Missing data analysis showed low levels of missing data. Where individuals missed less than 3 items on the CFQ, these missing items were prorated based upon their scores for the other CFQ items. Where an individual had 3 or more items missing

on the CFQ, they were excluded from further analysis. Across all samples, only 19 cases were excluded (less than 1% of the total number of participants). A total of 29 individuals had up to 2 items prorated (.2% of the total data). For other measures used in this set of studies, the default list wise deletion option in SPSS was chosen as the most pragmatic way of dealing with missing data. In list wise deletion, cases with missing data are simply removed from that analysis, reducing sample size. Samples were analyzed separately for some studies and combined for other studies, these are described for each of the studies and sample size is given for each analysis.

Study 1: Exploratory Factor Analysis and Item Reduction in a Non-Clinical Sample

Participants

Participants were as described above for Sample 1.

Measures

Participants completed a paper and pencil form of the CFQ, containing 42 items. They answered on a seven point Likert scale with the same instructions and response format as the final version of the CFQ (see appendix).

Analysis

The goal of this exploratory analysis was to identify one or more latent variables underlying the observed variables; as a result, we conducted a common factor analysis (CFA) (Floyd & Widaman, 1995) and determined the number of factors to extract through parallel analysis (Horn, 1965), which is a very accurate factor extraction procedure (Zwick & Velicer, 1986). We used an oblique rotation (Promax), as we expected that these factors would be elements of a higher order factor, cognitive fusion (Nunnally, 1978), and therefore should be significantly correlated.

Results

Prior to exploratory factor analysis (EFA), 11 items with an item-total correlation of less than .04 were omitted (Nunally & Bernstein, 1994). For the remaining 31 items, the Keiser-Meier-Olkin test of sampling adequacy (KMO) was .933, which indicates a good degree of non-unique covariance amongst the set of items (Kaiser, 1974). A significant Bartlett's test of sphericity (χ^2 = 5666.42, *df* = 465, *p*<.001) also indicated that the data were suitable for factor analysis.

Insert Table 1 here

Based upon the results of parallel analysis, we retained three factors. To define the factors, we inspected the matrices and eliminated any item that had a loading below .4 (two items) on any of the three factors or a loading of .4 or above on more than one factor (Ferguson & Cox, 1993).

Results indicated that no items loaded greater than .4 on the third factor, the highest loading being .266. Additionally, the third factor had an eigenvalue of .83 and explained only 2.67% of the variance. As a result, we forced a two-factor solution, using the same extraction and rotation procedures on the remaining 29 items. The first factor had an eigenvalue of 9.95 and it accounted for 34.3% of the variance; the second had an eigenvalue of 2.67 and it accounted for 9.19% of the variance. Following this second EFA we continued to refine the scale using increasingly stringent factor loadings. Final loadings were >.55 on one factor and no item loading >.25 on the second factor. This resulted in 14 items. Inspection of these items suggested some redundancy in content areas, as well as one item possibly reflecting the ACT process of present moment awareness more than fusion. 4 items were omitted, resulting in a scale of ten items. The KMO measure of sampling adequacy for these items was acceptable at .871, as was Bartlett's test of sphericity (Chi-Square: 1543.42, *df* = 45, *p*<.001) The final EFA of these ten items resulted in Factor 1 having an eigenvalue of 4.145, explaining 41.5% of the variance, and Factor 2 having an eigenvalue of 1.83, accounting for 18.3% of the

variance. Factor 1 comprised 7 positively worded items and Factor 2, three reverse scored items. These factors were interpretable as fusion and reverse scored defusion items. In the initial young adult sample, the fusion factor had a Cronbach's alpha reliability of .88, but the three items making up the second factor had item total correlations of <.3 and were only adequate in terms of their Cronbach's alpha reliability of .71. The factors were relatively weakly correlated (r = -.21). A series of correlational analyses, regression analyses and confirmatory factor analyses (not reported) showed that the three reverse scored items did not significantly add to the overall scale's psychometric properties. The decision was made to omit these three reverse scored items. The 7 items retained in the final scale are highlighted in bold in Table 1; this seven-item scale is used in all other studies reported here. The seven-item scale is scored as a total score, with higher numbers reflecting greater fusion.

Study 2: Confirmatory Factor Analysis and Invariance of Factor Loadings

Sample 2, 3, 4, 5 and 7 were used to explore the CFQ's factor structure.

Analytic Plan

Data were analyzed using AMOS version 19 (Arbuckle, 2006). Our primary goal in conducting CFA was to confirm the unifactorial structure of the CFQ, across a more diverse range of samples. For each sample, covariance matrices were used to analyze the measurement models, and maximum likelihood estimation was used to assess their fit.

As the chi-square (χ^2) statistic is very sensitive to sample size and may overestimate the lack of model fit (Bollen, 1989), we selected 5 additional indicators, based upon Bollen (1989), Hu and Bentler (1999), and Jackson, Gillaspy and Purc-Stephenson (2008). The first was the normed chi-square (NC), which is the chi-square value divided by the degrees of freedom (χ^2/df). Consistent with Bollen (1989), we specified a value of 3 or less as indicating good model fit. The other fit indicators were: the root-mean-square error of approximation (RMSEA), the iterative fit index (IFI), the comparative fit index (CFI) and the

standardized root mean residual (SRMR). Hu and Bentler (1998) suggest that cut off values of less than .06 for RMSEA, less than .08 for SRMR and greater than .95 for the CFI and IFI are indicative of good model fit.

Results

Table 2 shows the results of CFA across these diverse samples. The normed chi-square shows good fit in 3 of 5 samples, with the other two being close to the cut off value of 3 or less. The CFI and IFI show excellent fit across all samples. The RMSEA shows good fit in 2 of 5 samples, with the other three values being within the range described as 'acceptable', and the RMSR shows good fit in 2 of 5 samples. There is no specific pattern suggesting that one sample is poorly fitting the model across each of the indices. The overall pattern of fit indices shows a good fit across diverse samples. Study 2 therefore confirms the CFQ as unifactorial.

Insert Table 2 Here

In order to determine the extent to which the 7 items of the CFQ assess cognitive fusion in a similar manner across the different samples, we compared the relative fit of two models across Samples 2, 3, 4, 5 and 7. The first allowed the 7 unstandardized factor loadings to vary, and the second placed equality constraints on those loadings. If the constrained model does not generate a significantly worse fit than the unconstrained model, the items are likely to be assessing the same construct in a comparable way (Byrne, 2001; 2004). We did not place equality constraints on estimates of the factor variances, since these are known to vary across groups even when the indicators are measuring the same construct in a similar manner (Kline, 2005; MacCallum & Tucker, 1991). As can be seen in the final lines of Table 2, the NC, RMSEA, RMSR, CFI and IFI values of the baseline model suggest a very good solution. When we placed equality constraints on the factor loadings and error covariances, there was a significant decrement in goodness of fit (as assessed by the χ^2_{diff} test) suggesting

that the factor loadings are not strictly invariant across these five very different samples. The other fit indices still suggest that even the constrained model is an adequate fit. Further work is required in future studies to explore responses to the CFQ in different samples.

Study 3: Construct Validity, Divergent Validity and Incremental Validity

The construct validity of the CFQ was assessed via correlation with different measures, across the different samples. Measures were chosen according to four domains, firstly: due to their specific relevance to the ACT model (e.g. the Acceptance & Action Questionnaire II, a measure of psychological inflexibility, [AAQ-II: Bond et al., 2011]; The Valued Living Questionnaire, a measure of success at pursuing valued life goals, [VLQ: Wilson, Sandoz, Kitchens & Roberts, 2010]). Secondly: the relationship of fusion to related constructs such as trait mindfulness, (e.g. Southampton Mindfulness Scale, [SMS: Chadwick et al., 2008], Five Facet Mindfulness Scale [FFMQ: Baer, Smith, Hopkins, Krietemeyer & Tony, 2006; Baer et al., 2008], Kentucky Inventory of Mindfulness Skills [KIMS; Baer, Smith, & Allen, 2004], cognitions and appraisals (Automatic Thoughts Questionnaire [ATQ; Hollon & Kendall, 1980]), thought control strategies and other metacognitive aspects (i.e. Thought Control Questionnaire [TCQ: Wells & Davis, 1994], Ruminative Response Style Questionnaire [RSQ: Nolen-Hoeksema & Jackson, 2001], and Positive Beliefs about Rumination Scale, [PBRS: Watkins & Moulds, 2005]). Thirdly, the relationship of fusion to important outcomes such as distress, symptoms of depression or anxiety (e.g. Beck Depression Inventory II [BDI-II, Beck, Steer & Brown, 1996]; Hospital Anxiety and Depression Scale [HADS: Zigmond & Snaith, 1983]; Centre for Epidemiological Study of Depression Scale, [CESD: Radloff, 1977] Clinical Outcomes in Routine Evaluation [CORE-OM; Evans, 2000], The Symptom Checklist 90 – Revised [SCL-90-R: Derogatis, 1994], The General Health Questionnaire [GHQ-12: Goldberg, 1992], The Personality Diagnostic Questionnaire [PDQ-4: Hyler, 1994], Maslach Burnout Inventory [MBI: Schaufeli, Leiter,

Maslach, & Jackson, 1996], Warr-Daniels Affective Wellbeing Scales [WDAS & WDDS: Warr, 1990; Daniels, 2000; Mäkikangas, Feldt, & Kinnunen, 2007]. Fourthly, the relationship of the CFQ to broader outcomes such as life satisfaction (Deiner's Life Satisfaction Scale [SWLS: Deiner, Emmons, Larsen & Griffin, 1985] and quality of life [WHOQOL-Bref: WHOQOL Group, 1998]. Divergent validity was investigated via correlation with socially desirable responding: Balanced Inventory of Desirable Responding Impression Management Scale [BIDR-IM: Paulhus, 1991].

It was predicted that the CFQ would correlate with measures of related constructs such as psychological inflexibility, use of thought control strategies, metacognition and frequency of negative automatic thoughts. Furthermore, CFQ scores should also correlate with measures of distress, anxiety, low mood, burnout and psychological problems. The CFQ should also correlate negatively with measures of well-being, quality of life, mindfulness, and successful pursuit of important life goals. It was further predicted that CFQ scores would not correlate with social desirability.

Incremental validity was examined in three studies, using the methods outlined by Haynes and Lench (2003). In the first of these (Kerr, 2011), the CFQ was added as the final step in a multiple regression predicting depressed mood (Centre for Epidemiological Study of Depression Scale, [CESD: Radloff, 1977]) after first adding constructs that are well established in the prediction of depression such as positive metacognitive beliefs about rumination (Positive Beliefs about Rumination Scale, [PBRS: Watkins & Moulds, 2005]) and rumination, (Response Styles Questionnaire [RSQ: Nolen-Hoeksema & Jackson, 2001]), in a sample of people with major depression, people recently recovered from depression and people who have never been depressed. In the second study (Ferenbach, 2011), the CFQ was added as the final step in a multiple regression predicting distress (Hospital Anxiety & Depression Scale, [HADS: Zigmond & Snaith, 1983]) in people with multiple sclerosis, after

first adding well-established predictors of distress such as appraisals of helplessness (Illness Cognitions Questionnaire - Helplessness Scale [ICQ-H: Evers et al., 2001]) and psychological inflexibility (Acceptance and Action Questionnaire, [AAQ-II: Bond et al., 2011]). In the third such study, we used the data from the sample of UK Prison Service Officers to investigate the incremental validity of the CFQ to predict scores on a standardized measure of distress [GHQ12: Goldberg, 1992] in the second step of a regression, after the AAQII had been added.

It was predicted that the CFQ would demonstrate incremental validity by adding to the variance explained by well-established constructs in predicting key outcomes.

Participants

The different samples and subsamples described above completed different packages of measures. The sample size involved in each correlation is provided.

Insert Table 3 here

Results

Table 3 shows the correlations between the CFQ and other study measures. The CFQ correlated highly and in predicted directions with measures of psychological inflexibility, mindfulness, rumination, distress, burnout and frequency of automatic thoughts. The CFQ also showed moderate correlations with measures of quality of life and life satisfaction, and showed small yet significant correlations with positive beliefs about rumination, use of thought control strategies and with successful valued living. Although a small sample, the CFQ did not correlate significantly with socially desirable responding, indicating preliminary divergent validity. These results indicate that the CFQ has good construct validity and preliminary evidence for divergent validity. Given the strong correlations between the CFQ and the AAQII, and the CFQ and the RSQ, these relationships deserved further investigation. Firstly, we would predict that the CFQ would be a better predictor of thinking related

constructs than the AAQII. This was tested by examining dependent correlations between CFQ, AAQII and Thought Control Strategies in the student sample. The difference in strength of correlations between these variables showed that the CFQ was a better predictor than psychological inflexibility of the use of thought control strategies (CFQ - TCQ r = .26; AAQII - TCQ r = .14; CFQ - AAQII r = .75, $t_{(163)}$ = 2.251, p =.0129). The relationships between these constructs were also explored in a series of incremental validity analyses (Table 4).

Insert Table 4 here

In the sample of Prison Officers, psychological inflexibility (AAQII) is strongly predictive of psychological distress (GHQ12). The CFQ shows additional incremental validity, predicting an additional 5% of the variance in distress. Table 4 also shows the investigation of the relationship between rumination, metacognitive beliefs, CFQ and depression, Interestingly, although positive beliefs about rumination correlate with depression (r = .23, p <.05), the metacognition construct no longer has predictive value when rumination is added at step 2. Cognitive fusion by contrast does significantly improve prediction of depressive symptoms, even after much of the variance has been predicted by known constructs. In people with multiple sclerosis, appraisals of helplessness are a strong predictor of distress. Psychological inflexibility as measured by the AAQ-II further adds to the prediction of distress. The CFQ continues to significantly improve prediction of distress in MS, even after much of the variance has been accounted for by helplessness beliefs and psychological inflexibility.

Study 4: Criterion Validity, Internal Consistency, and Test-Retest Reliability

The CFQ was predicted to differ significantly between psychologically distressed and non-distressed samples. Samples 1 – 7 were used to compare the means between the different

samples, adding to its validity and providing normative data for future comparisons in clinical and research settings.

Results

Table 5 shows that the combined student and community sample is not significantly different from the multiple sclerosis sample, or the dementia caregivers sample and that all other groups are significantly different from each other. This demonstrates that the CFQ can discriminate between people who have psychological disorders and those who do not and can distinguish between people seeking help for work related stress and those with more diagnosable psychological disorders.

Insert Table 5 here

A subset of sample 2 (n = 82) completed the CFQ on two occasions separated by an average of 4 weeks. There was a strong correlation between CFQ total scores on these two occasions (Mean T1: 19.38 [*SD*:8.41], Mean T2: 18.49 [*SD*: 8.87], r = .81, p <.001), suggesting good temporal stability for the CFQ in a community sample. Table 5 also shows the excellent internal reliability of the CFQ in each of the different samples.

Study 5: Sensitivity to Treatment

A subset of participants from sample 3 who completed a well validated ACT-based workplace training program (led by PF) was used to investigate sensitivity to treatment. The intervention is as described in Flaxman and Bond (2006; 2010a&b). Participants in the ACT and control groups completed the CFQ and a well-validated measure of psychological distress (the GHQ-12) at the same three time points over a five month evaluation period: immediately prior to the intervention, two months after two initial ACT sessions, and three months after the final ACT session.

The program used mindfulness and defusion exercises to strengthen present moment awareness, reduce struggle with unwanted thoughts and emotions, defuse from unhelpful

cognitive content (particularly thoughts that interfere with personally valued behavior), and contact a sense of self that is distinct from psychological content. These strategies were used to help participants to pursue increasingly larger patterns of valued action, even in the presence of difficult thoughts, feelings, and sensations. The program incorporated a range of recognized ACT defusion exercises and metaphors, including the milk, milk, milk exercise; passengers on the bus; I'm having the thought that....; and practicing awareness of the process of thinking as it unfolds.

For the present study, we first analyzed data provided by 49 ACT participants and 70 waitlist control participants who completed the CFQ and GHQ-12 at all three time points. Next, we examined CFQ scores at each time point for a subset of participants (27 ACT, 33 controls) identified as probable cases of minor psychiatric disorder (based on their pre-intervention GHQ-12 caseness score). Finally, we employed a bootstrapping procedure (Preacher & Hayes, 2008) to examine the degree to which any observed improvements in mental heath in the ACT group were statistically mediated by a reduction on the CFQ. For the mediation analysis, change on the CFQ was assessed between pre and post intervention while change on the GHQ-12 was assessed from preintervention through to follow-up.

Results

Table 6 shows that the CFQ is sensitive to the effects of an ACT intervention that targets cognitive fusion.

Insert Table 6 Here

The effect of ACT treatment on the CFQ was statistically significant, with an effect size (partial η^2) of .150, representing a large effect (Cohen, 1988, p. 283) For the subgroup of participants who were classified as probable cases of minor psychiatric disorder prior to receiving the ACT intervention, it is notable that the effect of ACT treatment was even stronger (partial η^2 = .355). This finding supports the view that ACT interventions may be

particularly beneficial for those individuals who are more distressed (Flaxman & Bond, 2010c)

To examine whether change on the CFQ mediated the impact of the ACT intervention on psychological distress, we applied Preacher and Hayes' (2008) procedure to request 10,000 bootstrap resamples from the obtained data, along with 95% bias-corrected and accelerated confidence intervals (BCa CIs). A statistically significant indirect (i.e. mediation) effect is indicated when the upper and lower bound of these corrected CIs do not contain zero. Age, gender, employing organization, and pre-intervention GHQ-12 scores were entered as covariates. To avoid duplication, we report the results of the mediation test conducted on the entire sample only (ACT = 49, control = 70).

The results of this analysis showed that the beneficial effect of the ACT program on mental health was statistically mediated by a reduction in cognitive fusion. Specifically, the bootstrapped confidence intervals confirmed the presence of a statistically significant indirect effect of Group (i.e., ACT vs. control) on pre-intervention to follow-up decrease on the GHQ-12 via the pre to post intervention reduction found on the CFQ: boot estimate = 1.28, *SE* = .57, *BCa CI* = .40, 2.68. To fully test the directionality of this mediation model, we also performed an equivalent analysis, in which the change in CFQ was entered as the dependent variable, with change in the GHQ as the mediator. Changes in distress (GHQ-12) did mediate the effect of ACT intervention on the CFQ, showing that the causal status of cognitive fusion as a mediator of ACT intervention is yet to be fully established.

Discussion

The results from this series of studies demonstrate that the CFQ is a brief and psychometrically sound measure of cognitive fusion. Unlike the population-specific measures of fusion found in the ACT literature, the CFQ offers an assessment of fusion with cognition in general. Given the wide application of ACT-based interventions, we believe the generic

nature of the CFQ holds considerable potential for clinicians and researchers interested in assessing this core psychological process.

The CFQ demonstrated excellent internal consistency and good test-retest reliability. Moreover, the CFQ has a coherent, simple, and theoretically consistent factor structure that appears to be stable across diverse samples. Validity of the scale was demonstrated via predicted patterns of relationships with a range of other relevant constructs. Preliminary findings suggest the CFQ possesses adequate divergent validity, in that it is not associated with socially desirable responding. Incremental validity was demonstrated in three studies. The CFQ predicted distress in prison officers, over and above the contribution of psychological inflexibility. In predicting depressive symptoms the CFQ added to variance explained by rumination and metacognition. The CFQ also added to the prediction of distress in people with multiple sclerosis, compared to helplessness beliefs and psychological inflexibility. These studies suggest the CFQ has adequate incremental validity in relation to cognitive content measures and existing measures of related constructs from the ACT model. Finally, there is preliminary evidence that the CFQ is sensitive to changes occurring from a skills-based intervention that targets the process of cognitive fusion and that such changes may mediate the intervention's effect on distress.

The correlation between the CFQ and other constructs deserves some further consideration. For instance, the CFQ and AAQ-II are highly correlated (ranging from .72 to .87). This may be due to item overlap, as the AAQ-II contains items that may be representative of cognitive fusion (e.g. 'I worry about not being able to control my worries and feelings'). In addition, the AAQ-II has been described as a measure of psychological inflexibility (Bond et al., 2011, p. 678), and cognitive fusion is one component of psychological inflexibility. Thus we would expect strong correlations between the component processes and a general measure of psychological inflexibility such as the AAQ-II. The

observed strong correlations between the CFQ and the AAQ-II are therefore consistent with the predictions of the ACT model.

An alternative interpretation is of course, that the process of cognitive fusion and the overarching process of psychological inflexibility are so interdependent that these two measures are in fact measuring the same underlying construct, but in different contexts: the CFQ measuring psychological inflexibility in relation to cognitions, and the AAQ-II measuring that same construct in relation to a broader range of psychological events. Measures of the same construct can have different utility in different contexts. For example, the AAQ-II and the Work AAQ are seen as measuring the same construct (psychological inflexibility), but the latter predicts work-related variables (e.g., job motivation) better than does the former (Bond, Lloyd & Guenole, 2013). The CFQ should therefore be a stronger predictor than the AAQ-II in contexts where psychological inflexibility is assessed with regards to cognition (e.g. around intrusive thoughts, beliefs about the self, repetitive thinking etc.). The dependent correlations around use of thought control strategies and the incremental validity analyses in relation to rumination would suggest preliminary support for this interpretation.

As part of our investigation of the relationship between the CFQ and the AAQ-II we undertook exploratory factor analysis of the CFQ and AAQ-II items in samples 1, 2, 3, 4, and 5. In samples 1, 2 and 4 the items of the CFQ and AAQ-II load onto two separate factors, according to their scale of origin. In samples 3 and 5, all the items load onto a single factor. This suggests that in some samples these two measures may be aspects of the same construct, whilst in other samples the two constructs are more clearly separable. Though the relationship between the AAQ-II and the CFQ remains open to further study, what is clear at this early stage is that the development of the CFQ will make on-going investigation into the

nature of relationships within the ACT model feasible in a way that has not been the case to date.

The CFQ also showed strong correlations with depressed mood (r = .85) particularly in the sample of depressed, recovered and never depressed participants (sample 6). Further analysis showed that these strong correlations were most evident for the currently depressed group, with the recovered and never depressed groups showing more modest correlation between these measures (r = .23 - .58). It is also of note that in sample 7, caregivers of people with dementia, the correlation between CFQ and CESD is more modest (r = .66). This suggests that the strong correlation between CFQ and depression is only evident at levels of depressed mood that meet diagnostic criteria for Major Depression. ACT theory suggests that cognitive fusion is the dominance of verbal relations over direct experience in controlling behavior, and its function in the context of depressed mood is to 'fix the problem of depression'. Paradoxically, this overthinking and lack of action would be predicted to intensify depressed mood and the correlational data presented is consistent with these theoretical predictions.

There was also a strong correlation between the CFQ and ruminative response style [RSQ: Nolen-Hoeksema & Jackson, 2001]; again this was most evident for the currently depressed group. Rumination is a 'passive focus on one's symptoms of distress and on the possible causes and consequences of these symptoms,' (Nolen-Hoeksema & Jackson, 2001, p. 37) It has been shown to be a construct of particular importance to the onset and maintenance of depression, though has also been related to binge eating (Nolen-Hoeksema, Stice, Wade and Bohon, 2007) and to alcohol misuse (Nolen-Hoeksema and Larson, 1999; Nolen-Hoeksema and Harrell, 2002) (for a review see Nolen-Hoeksema, Wisco and Lyubomirsky, 2008). Given the well-established body of research on the importance of rumination, it is important to understand how the constructs of rumination and cognitive

fusion relate to each other and how they might relate to and influence other variables, such as behavior and mood. As part of that effort, and in addition to the incremental validity analysis reported, we also used data from a Spanish translation study of the CFQ (Romero-Moreno, Márquez-González, Losada, Gillanders, and Fernández-Fernández, under review) to factor analyze the items of the CFQ and the RSQ together. This exploratory factor analysis showed that the items of the CFQ and RSQ clearly loaded onto two separate but correlated latent factors according to their scale of origin. This would suggest that these items are measuring related but different constructs. We anticipate that the same pattern would be seen in the English language CFQ.

What further distinguishes cognitive fusion from rumination is that the CFQ has shown its consistent pattern of associations with a wide range of constructs (mindfulness, psychological flexibility, use of thought control strategies, distress, successful valued living, quality of life, life satisfaction, burnout, job satisfaction) and across very diverse populations and contexts (work site stress management interventions, prison officers, students, healthy adults, dementia caregivers, people with multiple sclerosis, people with common mental health problems, people with severe mental illness, and people with personality disorders). Future research should continue to investigate how the CFQ relates to important and well established constructs such as rumination and how they each influence other variables.

The CFQ may have an important role to play in future model testing and clinical research. According to the ACT model, fusion is a key mediator in the relationship between cognitive content and action. The CFQ provides a means for testing this hypothesis. In addition, the ability to specifically track changes in fusion in response to interventions may be useful to clinicians monitoring treatment progress and to researchers in testing hypotheses relating to the proposed mediating mechanisms of therapies.

In the development of the CFQ we generated items based on a broad conceptualization of fusion and defusion, reflecting the many ways in which this process manifests. The final CFQ is relatively narrow in comparison, though this has been derived by the empirical data. The CFQ still represents a broader conceptualization of fusion than the more narrowly defined proxy measures of 'believability' that have been used in investigating fusion in the ACT literature thus far.

A number of methodological limitations should be taken into consideration. In terms of sample limitations, all of the study samples had a majority of female participants, and no children or adolescents. All participants were residents of the United Kingdom. Test-retest reliability with a clinical sample is not yet established and longitudinal studies are needed to determine the predictive value of the CFQ in the development and course of psychological disorder. In sample 4 (the mixed mental health sample), treating clinicians confirmed the presence of a psychological disorder, based on clinical evaluation rather than standardized diagnostic interviews and therefore we do not know the exact forms of psychological or psychiatric disorders present in that sample.

Whilst these studies show preliminary evidence of the CFQ's construct and incremental validity, it is of note that its relationship to constructs such as decentering has not yet been investigated. This is a limitation of the current set of studies and future research should address the incremental validity and the predictive value of the CFQ in comparison to measures such as the Experiences Questionnaire [EQ: Fresco et al., 2007] for a range of outcomes. We would predict that the theoretical focus in fusion on behavioral regulation by cognitive events would suggest that the CFQ might more successfully predict behavioral responses to cognitive events whilst the EQ may be a better predictor of depressive relapse than the CFQ.

The CFQ instructions were deliberately written to be generic and not time specific, in order to produce a broad, general measure of fusion. However, lack of contextual cues for responding might limit the measure in other ways, making it less sensitive to change over shorter time periods. Development of an alternative version of the CFQ with different time instructions may be useful for some laboratory contexts.

Whilst we have deliberately made the CFQ generic to thoughts, it might also be useful to develop versions where a specific form of thoughts could be inserted in the instructions, for example thoughts about cancer, heart disease or other focus. Whilst adequate investigation of the psychometric properties of such adaptations would be required, the CFQ would be likely to be a good basic structure upon which to develop such new scales.

A further limitation of the current studies is that we have not yet shown that CFQ scores alter in response to specific defusion interventions and do not change to the same degree in response to interventions that are not designed to target fusion. Similarly, our initial studies show that the CFQ is responsive to an intervention that contains defusion elements, within a typical multi-faceted ACT intervention. We do not yet know how specifically these interventions target fusion or other ACT processes. The development of the CFQ, however, does now help the scientific and clinical community to design studies that can test such component dismantling hypotheses. In addition, future research should determine the relationship between the CFQ and other experimental methods of assessing fusion behaviorally and implicitly, such as the Implicit Relational Assessment Procedure (IRAP: Barnes-Holmes, Barnes-Holmes, Stewart and Boles, 2010). Finally, the results of the mediation study do not conclusively demonstrate that the ACT stress management intervention works via defusion. It is possible that reductions in distress led to reductions in fusion, rather than vice versa. Future intervention studies with more frequent assessment would be required to establish causal mediation.

The CFQ has a wide range of potential uses. In clinical practice it's brevity allows it to be included in an intake assessment with ease, and to be used repeatedly to track changes, whilst it's simplicity of language makes it accessible to a wide range of people. The generic aspect of the measure allows it to be used in a wide range of settings, such as mental health, physical health, guidance and coaching as well as training settings. The CFQ performs well with non-clinical and clinical samples, which makes it an ideal measure for inclusion in a broad range of research studies.

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Table 1: Initial Exploratory Factor Analysis Factor Loadings and Communalities in a young adult sample (*n* = 592)

	Item	Communalities	Factor 1 Loading	Factor 2 Loading
1.	**My thoughts cause me distress or emotional pain**	.530	.671	-.013
2.	I tell myself I shouldn't be thinking the way I'm thinking	.561	.774	.174
3.	Even when I am having distressing thoughts, I know they may become less important eventually	.379	.168	.565
4.	I find myself preoccupied with the future or past	.440	.608	-.030
5.	I make judgements about whether my thoughts are good or bad	.437	.692	.295
6.	Even when I am having upsetting thoughts, I can see that those thoughts may not be literally true	.495	.362	.832
7.	**I get upset with myself for having certain thoughts**	.589	.826	.202
8.	I feel like my thoughts need to change before I can have a good life	.598	.742	.011
9.	I find it easy to view my thoughts from a different perspective	.331	.175	.650
10.	**I tend to get very entangled in my thoughts**	.584	.652	-.055
11.	I think some of my thoughts are bad or inappropriate	.480	.692	.177
12.	I do not over-analyse my thoughts			
13.	My thoughts are facts			
14.	**Its such a struggle to let go of upsetting thoughts even when I know that letting go would be helpful.**	.506	.529	-.233
15.	My thoughts just come and go and I'm not too attached to them	.406	-.330	.358
16.	**I get so caught up in my thoughts that I am unable to do the things that I most want to do**	.567	.690	-.059
17.	**I over-analyse situations to the point where it is unhelpful to me**	.589	.664	-.093
18.	I can watch my thoughts from a distance without getting caught up in them	.428	-.093	.563
19.	There are certain areas of my life where my thoughts are rigid or inflexible			
20.	I get so caught up in my thoughts that I don't see other people's point of view	.313	.397	-.101

21. I am able to do what is important in life even when I have upsetting thoughts	.340	-.374	.366
22. **I struggle with my thoughts**	.578	.733	-.045
23. I am my thoughts			
24. I can be aware of my thoughts without necessarily reacting to them	.434	-.094	.495
25. I take the content of my thoughts to be the truth			
26. If I think I cannot do something then I will not try to do it			
27. I am able to stand back from thoughts that are overwhelming me	.486	-.292	.480
28. I get so caught up in my thoughts that I forget what I'm actually doing	.419	.575	.055
29. I tend to react very strongly to my thoughts	.396	.486	-.085
30. I am able to move on from troubling thoughts relatively easily	.522	-.330	.476
31. My thoughts are who I am			
32. I believe the thoughts that pop into my head			
33. My mind is capable of having upsetting thoughts, but I can live with them			
34. I need to control the thoughts that come into my head	.376	.515	-.016
35. Once I've thought about something upsetting its difficult for me to focus on anything else	.465	.467	-.246
36. When I catch myself dwelling on things, I am able to let go of dwelling relatively quickly	.427	-.281	.396
37. I brood over past events	.388	.406	-.145
38. I can do difficult things even if my thoughts say they are impossible to do			
39. I can think about something stressful without getting stressed	.285	-.211	.355
40. There is more to me than my thoughts			
41. I worry a great deal	.444	.458	-.190
42. Its possible for me to have negative thoughts about myself and still know I am an OK person	.264	-.360	.202

Items with blank loadings were removed prior to the EFA due to low item total correlations (<.4) Items in bold are the 7 items retained in the final scale

Table 2: Confirmatory Factor Analyses in Different Samples

Sample	χ^2	*df*	*p value*		NC (χ^2/df)	CFI	IFI	RMSEA	SRMR
2: Community (n=448)	40.857	14	<.001		2.918	.986	.986	.065	.049
3: Stress management (n = 242)	44.388	14	<.001		3.171	.971	.971	.095	.072
4: Mixed Mental Health (n = 215)	20.333	14	.120		1.452	.991	.991	.046	.060
5: Multiple sclerosis (n = 133)	25.852	14	.027		1.847	.983	.983	.080	.086
7: Dementia caregivers (n=219)	45.024	14	<.001		3.216	.962	.963	.101	.081
Measurement invariance across samples 2, 3, 4, 5 and 7									
	χ^2	*df*	χ^2_{diff}	Δ*df*	NC (χ^2/df)	CFI	IFI	RMSEA	RMSR
Baseline	176.522	70			2.522	.979	.979	.035	.071
Constrained model	225.888	94	49.366 *	24	2.403	.974	.974	.033	.165

*NC = Normed Chi Square, CFI = Comparative Fit Index, IFI = Iterative Fit Index, RMSEA = Root Mean Square Error of Approximation, SRMR = Standardised Root Mean Residual; * significant at p < .05, n.s. = not significant at p < .05.*

Table 3: Correlations Between CFQ and Other Constructs

Measure	Sample	*n*	*r*	*p*
Acceptance and Action Questionnaire (AAQ2)	2	513	.72	<.001
	3	242	.86	<.001
	4	132	.76	<.001
	5	133	.87	<.001
Southampton Mindfulness Scale (SMS)	1	167	-.70	<.001
Five Facets Mindfulness Questionnaire Total (FFMQ)	2	47	-.50	<.001
Kentucky Inventory of Mindfulness Skills Total (KIMS)	4	78	-.59	<.001
Thought Control Questionnaire (TCQ)	1	167	.26	.001
Positive Beliefs about Rumination Scale (PBRS)	6	74	.39	.001
Automatic Thoughts Questionnaire (ATQ)	4	78	.61	<.001
Ruminative Response Style Questionnaire (RSQ)	6	74	.84	<.001
Hospital Anxiety & Depression Scale – Anxiety (HADSa)	2	144	.63	<.001
	5	133	.75	<.001
Hospital Anxiety & Depression Scale – Depression (HADSd)	2	144	.45	<.001
	5	133	.62	<.001
Beck Depression Inventory (BDI-II)	4	77	.69	<.001
Symptom Checklist 90 General Severity Index (SCL90-GSI)	4	77	.62	<.001
Centre for Epidemiological Studies Depression Scale (CESD)	6	74	.85	<.001
	7	217	.66	<.001
Clinical Outcomes in Routine Evaluation (CORE-OM)	2	107	.58	<.001
Personality Diagnostic Questionnaire (PDQ-4)	4	63	.42	.001
Burnout (MBI)	2*	144	.56	<.001
General Health Questionnaire (GHQ-12)	3	242	.54	<.001
Warr-Daniels Affective Wellbeing Scale – Anxiety (WDAS)	3	242	.64	<.001
Warr-Daniels Affective Wellbeing Scale - Depression (WDDS)	3	242	.61	<.001
Deiner's Life Satisfaction Scale (DLSS)	1	167	-.39	<.001
	5	133	-.45	<.001
Valued Living Questionnaire (VLQ) - success	2	109	-.21	.03
WHO Brief Quality of Life Scale (WHOQOL-Bref)	2	113	-.45	<.001
Job Satisfaction	2*	144	-.42	<.001
Divergent Validity				
Balanced Inventory of Desirable Responding (BIDR-IM)	2	47	-.19	*ns*

Samples: 1 = Student Sample, 2 = Healthy community adults, 2 = Prison Service Officers, 3 = Work based stress management, 4 = Mixed mental health, 5 = Multiple sclerosis 6 = Currently depressed, recovered depressed and never depressed adults, 7 = Dementia Caregivers.*

Table 4: Incremental Validity

Step	Variable	β	t	p	R^2	R^2 change	p
Prediction of Distress in Prison Officers (GHQ12)							
1	Psychological inflexibility (AAQ2)	.752	13.37	<.001	.56	.56	<.001
2	Psychological inflexibility (AAQ2)	.352	3.249	.001	.61	.05	<.001
	Cognitive fusion (CFQ)	.460	4.245	<.001			
Prediction of depression in currently depressed, recovered and never depressed (CESD)							
1	Positive beliefs about rumination (PBRS)	.232	2.02	.047	.054	.054	.047
2	Positive beliefs about rumination (PBRS)	-.098	-1.247	.216	.628	.575	<.001
	Ruminative response style (RSQ)	.827	10.48	<.001			
3	Positive beliefs about rumination (PBRS)	-.141	-2.156	.035	.752	.123	<.001
	Ruminative response style (RSQ)	.543	2.653	.010			
	Cognitive fusion (CFQ)	.760	5.899	<.001			
Prediction of Distress in Multiple Sclerosis (HADS Total)							
1	Helplessness beliefs (ICQ-H)	.426	5.384	<.001	.181	.181	<.001
2	Helplessness beliefs (ICQ-H)	.130	2.328	.021	.655	.474	<.001
	Psychological inflexibility (AAQ2)	.749	13.37	<.001			
3	Helplessness beliefs (ICQ-H)	.116	2.098	.038	.670	.015	.017
	Psychological inflexibility (AAQ2)	.561	5.897	<.001			
	Cognitive fusion (CFQ)	.229	2.416	.017			

Method: Enter

Table 5: Summary of Properties and Normative Data

CFQ Psychometric Summary							
	Student and Community Samples (Sample 1 & 2) (total *n* = 1040)	Work Stress Sample (Sample 3) (*n* = 242)	Mixed Mental Health Sample (Sample 4) (*n*= 215)	Multiple Sclerosis Sample (Sample 5) (*n* = 133)	Dementia Care Givers Sample (Sample 7) (*n* = 219)	*F* (*df*)	*p*
Mean (*SD*)	22.28[a] (8.30)	25.84[b] (8.52)	34.31[c] (8.06)	21.22[a] (10.36)	23.48[a] (8.24)	96.87 (4, 1844)	<.0001
Cronbach's α	.90	.92	.88	.93	.90		
test - retest reliability	*r* = .80 *p* <.001 *n* = 82						

Means with different superscripts are significantly different at Bonferroni adjusted p<.05

Table 6: Sensitivity to ACT Intervention in an Organisational Setting

Whole sample

	ACT (n = 49)	Control (n = 70)	Group x Time Interaction[a]		
			$F_{(df)}$	p	partial η^2
Pre intervention CFQ	28.10 (8.75)	24.23 (8.75)	9.998 (2, 113)	<.001	.150
Post intervention CFQ	24.98 (7.70)	24.78 (9.10)			
Follow-up CFQ	23.33 (8.85)	25.33 (9.21)			

Subset of initially distressed participants

	ACT (n = 27)	Control (n = 33)	Group x Time Interaction[a]		
			$F_{(df)}$	p	partial η^2
Pre intervention CFQ	30.86 (7.77)	27.03 (8.11)	14.859 (2, 54)	<.001	.355
Post intervention CFQ	26.67 (7.02)	27.58 (8.75)			
Follow-up CFQ	23.52 (9.04)	29.76 (8.43)			

Note. [a]after controlling for age, gender, and employing organization.

CFQ

Below you will find a list of statements. Please rate how true each statement is for you by circling a number next to it. Use the scale below to make your choice.

1	2	3	4	5	6	7
never true	very seldom true	seldom true	sometimes true	frequently true	almost always true	always true

1.	My thoughts cause me distress or emotional pain	1	2	3	4	5	6	7
2.	I get so caught up in my thoughts that I am unable to do the things that I most want to do	1	2	3	4	5	6	7
3.	I over-analyse situations to the point where it's unhelpful to me	1	2	3	4	5	6	7
4.	I struggle with my thoughts	1	2	3	4	5	6	7
5.	I get upset with myself for having certain thoughts	1	2	3	4	5	6	7
6.	I tend to get very entangled in my thoughts	1	2	3	4	5	6	7
7.	It's such a struggle to let go of upsetting thoughts even when I know that letting go would be helpful	1	2	3	4	5	6	7

Thank you for completing this questionnaire