**Examining the Role of Cognitive Fusion and Experiential Avoidance in Predicting Anxiety and Depression**

**Abstract**

Objectives: Acceptance and Commitment Therapy (ACT) proposes that cognitive fusion and experiential avoidance are inter-related processes underpinning distress. This study investigated whether worry, rumination and stressful life events on the one hand and anxiety and depression on the other hand was mediated by cognitive fusion and experiential avoidance (bidirectional serial association).

Design: A questionnaire design was conducted cross-sectionally in a clinical sample (Study 1; N=57) and cross-sectionally and longitudinally in a non-clinical student sample (Study 2; N=106 and N=97 retrospectively).

Methods: Participants completed measures of worry, rumination, stressful life-events (predictors), cognitive fusion, experiential avoidance (mediators), anxiety and depression (outcomes) at T1. In Study 2, anxiety and depression were measured again 6 weeks later.

Results: In the clinical sample, the bidirectional relationship between experiential avoidance and cognitive fusion accounted for a significant proportion of the association between rumination and depression, and stressful life events and anxiety and depression. The association between worry and anxiety was mediated by cognitive fusion🡪experiential avoidance only. In the non-clinical sample, in both cross-sectional and longitudinal analyses, cognitive fusion independently mediated the association between predictors and outcomes, as well as the experiential avoidance🡪cognitive fusion pathway.

Conclusions: The bidirectional association between cognitive fusion and experiential avoidance was most predictive of distress in the clinical sample. In the non-clinical sample, cognitive fusion and the experiential avoidance🡪cognitive fusion pathway demonstrated more explanatory value. Given the cross-sectional nature of most of the data, the findings provide theoretical (as opposed to empirical) support for the models tested.

Practitioner Points:

* Interventions designed to reduce cognitive fusion may be a useful early intervention for subclinical anxiety and depression.
* Interventions focused on reducing both fusion and experiential avoidance may be helpful for individuals presenting with clinical anxiety and depression.
* Individuals presenting with particularly high levels of experiential avoidance may benefit from initial work defusing from difficult thoughts, as an inroad for reducing experiential avoidance, anxiety and depression. Likewise, those with rigid cognitive fusion may benefit from initial work around acceptance skills to create a context that better supports defusion.

**Keywords:** Experiential avoidance; cognitive fusion; anxiety; depression; rumination; worry; stressful life-events

**Introduction**

Anxiety and depressive disorders are one of the largest causes of disability worldwide (Kessler et al., 2005), accounting for a third to a half of the global costs of mental ill-health (World Health Organization, 2008). Whilst disorder-specific interventions have proven efficacy, they have important limitations: depression and anxiety are highly comorbid (Brown, Campbell, Lehman, Grisham, & Mancill, 2001; Kessler et al., 2005), have considerable levels of shared variance, and have similar aetiological and maintenance processes (see Newby, McKinnon, Kuyken, Gilbody & Dalgleish, 2015). Transdiagnostic approaches, such as Acceptance and Commitment Therapy (ACT, S. C. Hayes, Strosahl, & Wilson, 1999) aim to identify and target processes that are common across different disorders with the intention of providing parsimonious interventions.

A range of biological, psychological and social factors have been implicated in the development and maintenance of anxiety and depression. Of these, an expansive literature identifies stressful life events and patterns of repetitive negative thinking as significant risk factors (e.g., Young & Dietrich, 2015). Stressful life events, such as the death of a loved one or divorce, have a substantial causal effect on the onset of depression (e.g., Kendler, Karkowski & Prescott, 1999) and anxiety (e.g., Grant, Compas, Thurm, & McMahon, 2004). Worry and rumination are reliable psychological vulnerabilities, demonstrating a causal and maintaining role in anxiety and depression (Hong, 2007). Both worry and rumination are characterised by repetitive, negatively-toned and unproductive processes of thinking, with worry focusing on negative outcomes of future events (Borkovec, Robinson, Pruzinsky, & DePree, 1983) and rumination focusing on past upsetting events, unresolved concerns and depressive symptoms, their causes and consequences (see Smith & Alloy, 2009). Worry is a common process in many anxiety disorders that precedes and predicts increases in daily anxiety (Dickson et al., 2012), as well as triggering somatic and neural networks associated with anxiety (see Newman et al., 2013). Rumination is a relatively stable trait that is independent of current level of depression (Nolen-Hoeksema, Wisco & Lyubomirsky, 2008) and has been found to causally influence the onset and chronicity of depression (e.g., Nolen-Hoeksema, 2000).

Many individuals experience these vulnerabilities without developing emotional difficulties. Elucidating the nature of the association between putative risk factors and symptoms of anxiety and depression, and in particular identifying common mechanisms that link dissimilar vulnerabilities to similar outcomes, is important for developing theory-driven transdiagnostic interventions. ACT identities two core processes that may help to understand the link between aforementioned vulnerabilities and anxiety and depression. *Cognitive fusion* describes excessive regulation of behaviour by cognition, whereby thoughts (e.g., evaluative and self-descriptive thoughts) are viewed as literal truths that dominate emotional and behavioural regulation to the exclusion of other contextual variables (S. C. Hayes, Strosahl, & Wilson, 2011). Fusion with difficult thoughts is distressing in-and-of itself, but is also thought to foster *experiential avoidance*: an unwillingness to remain in contact with, and all attempts to avoid, aversive private experiences and the situations that trigger them, even when doing so can be harmful, can interfere with our values, and can intensify suffering (S. C. Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). In this way, cognitive fusion is often conceptualized as preceding and enhancing experiential avoidance. However, this link is likely to be bi-directional. Avoiding unwanted internal experiences can paradoxically increases their occurrence (Wenzlaff & Wegner, 2000) and thus reinforce future instances of cognitive fusion (Berghoff, Ritzert & Forsyth, 2018). Furthermore, if one avoids contexts that elicit difficult thoughts and feelings, opportunities for difficult cognitions to be modified through contact with direct experiences (e.g., through exposure) will be limited.

An implication of the ACT model is that cognitive fusion and experiential avoidance are critical *toxic mechanisms* (see Kashdan, Barrios, Forsyth & Steger, 2006) that mediate the influence of risk factors for anxiety and depression on to symptoms of anxiety and depression. From this perspective, inflexible tendencies to become entangled with difficult thoughts, irrespective of the specific context (e.g., recent divorce, death of loved one) or content (e.g., thoughts about the past, fears about the future), coupled with excessive attempts to avoid unwanted experiences, are common mechanisms through which risk factors such as stressful life events, worry and rumination become problematic (i.e., increase anxiety and depression; see mediational model depicted in Figure 1). This is consistent with modern models of worry and rumination, which propose that these processes are harmful when they have avoidant functions (e.g., Borkovec, 1994; Giorgio et al., 2010; Newman & Llera, 2011), with some scholars going so far as to suggest that worry and rumination are content specific forms of the overarching construct of experiential avoidance (Giorgio et al., 2010; Kashdan et al., 2006). In support of this, a few studies have reported that the association between rumination and worry on the one hand and psychological difficulties on the other hand is fully or partially accounted for by avoidance. For example, behavioural avoidance statistically mediated the relationship between rumination and depression in a clinical sample (Brockmeyer et al., 2015); and experiential avoidance statistically mediated the association between rumination and PTSD symptom severity in a trauma-exposed community sample (Bishop, Ameral & Palm Reed, 2017). Longitudinally, Eisma et al. (2013) found that experiential avoidance mediated the association between rumination during bereavement and subsequent depression and Spinhoven et al. (2017) reported that experiential avoidance predicted the maintenance of anxiety disorders over and above the effect of worry and rumination. To the author’s knowledge, only one study has investigated the combined effects of experiential avoidance and cognitive fusion, reporting statistical support for a model in which the association between shame memories and depressive symptoms was mediated by the serial pathway of cognitive fusion🡪 experiential avoidance (Dinis, Carvalho, Gouveia & Estanqueiro, 2015).

The current study sought to extend existing literature by testing whether experiential avoidance and cognitive fusion (bidirectional serial association) accounted for variance in the well-established association between stressful life events, worry and rumination on the one hand and symptoms of anxiety and depression on the other hand (see Figure 1). Our conceptualization is in line with, and extends existing theory and research in two main ways. Firstly, unlike existing research that has selectively attended to the mediating effects of experiential avoidance, we propose that the combined effects of cognitive fusion and experiential avoidance drive the association between risk factors and psychological distress. Secondly, rather than focusing on one specific type of repetitive thought processes (e.g., rumination), we broaden the model to consider formally dissimilar risk factors. Identifying mediational pathways that link dissimilar vulnerability factors for distress to the occurrence of distress is important for developing interventions that are applicable to different etiological pathways.

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The current study utilised two adult populations: A treatment-seeking sample of adults with anxiety and depression were recruited to test the hypothesized associations cross-sectionally (study 1) and a larger, non-clinical sample was recruited to test the associations both cross-sectionally and longitudinally (study 2). We predicted that the hypothesised serial pathways would be supported in both samples. Because criticisms have been raised about the way in which experiential avoidance has historically been measured (see Gámez, Chmielewski, Kotov, Ruggero, & Watson, 2011; Rochefort, Baldwin, & Chmielewski, 2017; Wolgast, 2014 for discussions) this study utilised a relatively new measure of experiential avoidance: The Brief Experiential Avoidance Questionnaire (BEAQ, Gámez et al., 2014). We chose this measure because of it has minimal content overlap with measures of psychological distress. Together, these studies aimed to provide a preliminary test of the theoretical model proposed in Figure 1, noting the caveat that cross-sectional methods do not allow for causal inferences. As such, terms such as “effect” and “predict” are meant in a statistical sense only.

**Methods**

**Study 1**

**Design**

This study used cross-sectional design with questionnaire methodology.

**Participants**

Fifty-seven participants (74% female, mean age 42 years [SD = 15.6]) were recruited from the waiting list of a British primary care mental health service for adults experiencing symptoms of anxiety and/or depression. All English-speaking individuals were invited to hear more about the research during their first contact from the triage team. Of the 81 individuals who consented to receiving this information, 86% (N=70) consented to take part and 57 returned completed questionnaires.

The majority of the sample identified as White ethnicity (93%), with 3.5% Asian/Asian British and 3.6% other. Eighty eight percent of participants were experiencing moderate-severe depression (PHQ-9, Mean=14.09, SD=5.95, Range 4-26; Kroenke, Spitzer, & Williams, 2001), 84% were experiencing moderate-severe levels of anxiety (GAD-7, Mean=12.47, SD=5.17, Range=2-21; Spitzer, Kroenke, Williams, & Löwe, 2006) and 86% were experiencing moderate-severe levels of anxiety and depression. Sixty three percent were in full or part-time employment, 12% retired, 7% unemployed and the remainder students (7%) or no information provided (14%). Ten percent had no academic qualifications, a third had GCSE’s of equivalent, 19% had A-Levels, and the remaining 26% had at least an undergraduate degree.

**Procedure**

Following ethical approval, consenting participants completed questionnaires online (72%) or via post (28%), depending on preference. Questionnaire order was informed by recommendations from within meditational analysis (Kenny, 2014): predictor variables, followed by mediating variables, followed by outcome variables.

**Measures**

***Penn State Worry Questionnaire***(PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) is a 16-item measure of worry (range 16-80). Items are rated on a 5-point scale from “1” (not at all typical of me) to “5” (very   typical   of   me) with higher scores indicate greater worry. The PSWQ has evidenced good psychometric properties (Brown, Antony, & Barlow, 1992; Meyer et al., 1990) and in this sample α =.87 (clinical sample) and α =.94 (non-clinical sample).

***Ruminative Response Scale of the Response Styles Questionnaire*- *Reduced 10-item Version***(RRS-10; Treynor, Gonzalez, & Nolen-Hoeksema, 2003**)**is a 10-item measure of ruminative thinking that has minimal overlap with the measurement of depression (range 10-40). Items are rated on a 4-point scale from “1” (almost never) to “4” (almost always) and higher scores indicate greater rumination. The reduced RRS evidenced good internal consistency in the clinical (α= .76) and non-clinical sample (α= .83).

***Social Readjustment Rating Scale***(SRRS; Holmes & Rahe, 1967) lists 43 commonly reported stressful life-events (e.g., death of a spouse, marital separation) and participants indicate any they have experienced in the last year. Each event has an associated value, based on the relative degree of readjustment necessary for each life-event, and values are summed to form an overall score (maximum score: 1214). The SRRS is a widely cited questionnaires in stress literature and is significantly associated with psychological and physiological symptoms of stress (Scully et al., 2000).

***Cognitive Fusion Questionnaire***(CFQ; Gillanders et al., 2014) is a seven-item measure of cognitive fusion (range 7-49). Items are rated on a 7-point scale, ranging from “1” (never true) to “7” (always true). The CFQ’s psychometric properties have been tested across non-clinical and clinical samples, evidencing good internal consistency (α=.88-.90), test-retest reliability (r=.80), and construct and incremental validity (Gillanders et al., 2014). Internal consistency in the present study was good (clinical: α=.89, non-clinical = α=.91).

***Brief Experiential Avoidance Questionnaire***(BEAQ; Gámez et al., 2014)is a 15-item measure of experiential avoidance with items rated on a 6-point scale (“1” (strongly disagree) to “6” (strongly agree)) and ranging from 15-90. The BEAQ has evidenced good psychometric properties, showing expected associations with measures of avoidance, psychopathology and quality of life as well as being distinguishable from measures of negative affectivity and neuroticism (Gámez et al., 2014).  In the current sample, Cronbach’s alpha was α = .66 (clinical sample) and α = .81 (non-clinical). In the clinical sample, item 3 was most detrimental to the internal consistency item (‘When unpleasant memories come to me, I try to put them out of my mind’). Removing item 3, the internal consistency of the scale improved to α = .70. Data analyses were run with and without item 3, which did not affect findings and therefore results are reported using the full-item scale.

***Generalised Anxiety Disorder Assessment***(GAD-7; Spitzer et al., 2006) is a brief self-report measure commonly used in British primary care services to assess anxiety disorders (IAPT National Programme Team, 2011). Participants rate the occurrence of seven symptoms of anxiety over the past two weeks, using a 4-point scale ranging from ‘not at all’ to ‘nearly everyday’. Cut-off scores of 5, 10, and 15 represent mild, moderate, and severe levels of anxiety respectively. Internal consistency in this study was good (α=.87).

***Patient Health Questionnaire***(PHQ-9; Kroenke et al., 2001)is a nine-item measure of depression, based on the DSM-IV diagnostic criteria (American Psychiatric Association, 2013). Participants rate the occurrence of nine symptoms of depression over the past two weeks, using a 4-point scale ranging from ‘not at all’ to ‘nearly everyday’. Cut-off scores of 5, 10, 15, and 20 represented mild, moderate, moderately severe, and severe depression, respectively. Internal consistency was good in the present sample (α=.85).

**Study 2**

**Design**

The first part of study 2 replicated the cross-sectional design of study 1. A longitudinal component was also included: participants re-completed measures of anxiety and depression 6-weeks later (T2) to enable the prediction of anxiety and depression over time.

**Participants**

One hundred and six university students (87% female, mean age 19.3 years [SD=2.7 years]) were recruited in exchange for course credits or entrance into a prize draw. All English-speaking students were eligible to participate. Of the 111 individuals who expressed initial interest in completing the study, 106 (95%) consented and completed the T1 questionnaires and 97 participants additionally completed longitudinal T2 data. The majority of the sample identified as white ethnicity (69%). Sixteen percent identified as Asian/Asian British, 8.5% Multiple/Mixed Ethnic Group, 4.7% Black/African/Caribbean/ Black British and 1.8% other.

 **Procedure**

Following ethical approval, consenting participants completed questionnaires online following the same format as Study 1. Six-weeks after completing baseline questionnaires, participants received an email inviting them to complete the T2 questionnaire online, meaning six-weeks formed the minimum time elapsed since baseline (average: 48 days; range=42-97).

**Measures**

The same measures were used as those reported for Study 1, except the measure of stressful life events, anxiety, and depression differed so as to be sensitive to a nonclinical sample.

***Life Events Scale for Students*** *(LESS, Clements & Turpin, 1996; Linden, 1984)* is a student specific, adapted version of the SRRS. The LESS lists 36 stressful life-events (e.g. death of a parent, failing a course) and participants indicate whether they have occurred in the last year. Each event has an associated value that is summed for a maximum score of 1849. The scale has demonstrated acceptable test-retest reliability and good construct validity (Clements & Turpin, 1996).

***Depression Anxiety Stress Scale*** *(DASS-42, S. Lovibond & Lovibond, 1996)* is a 42-item questionnaire assessing symptoms of depression, anxiety and stress over the past week. Each sub-scale includes 14 items, rated on a 4-point scale ranging from “0” (did not apply to me) to “3” (applied to me very much/most of the time). Cronbach’s alphas in the present study were .96 (Depression) and .89 (Anxiety).

**Data analytic strategy**

The data was analysed using SPSS (version 21). Serial multiple mediation analyses (see Figure 1) with bias-corrected bootstrapping (PROCESS model 6, A. F. Hayes, 2013; Preacher & Hayes, 2008) were computed to examine the unique and serial mediating roles of cognitive fusion and experiential avoidance in the relationships between rumination and depression, worry and anxiety, and stressful life events and anxiety and depression. In the longitudinal analysis (study 2), the same analytic strategy was used as in the cross-sectional analysis; however, T2 measures of anxiety and depression were entered as the dependent variable. Following recommendations of A. F. Hayes (2013), path “a” denotes the relationship between the independent variable and mediator, path “b” denotes the relationship between the mediator and dependent variable, controlling for the independent variable, and path “c’ ” denotes the direct relationship between the independent variable and dependent variable, controlling for the mediator. Path “ab” denotes the indirect mediation effect. Figure 1 illustrates additional paths in the serial multiple mediation analysis.

**Results**

**Study 1**

**Descriptive statistics**

All variables were normally distributed. Table 1 reports means, standard deviations and Pearson’s correlations between variables. As expected, anxiety was significantly positively associated with worry and stressful life events, and depression was significantly positively associated with rumination and stressful life events. Cognitive fusion and experiential avoidance were significantly related to each other and to anxiety and depression. Cognitive fusion was significantly associated with stressful life events, rumination and worry. Experiential avoidance was associated with rumination, but not worry and stressful life events.

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In the first set of models, we specified worry/rumination/life events 🡪 cognitive fusion 🡪 experiential avoidance 🡪 anxiety/depression and in the second set we reversed cognitive fusion and experiential avoidance such that worry/rumination/life-events 🡪 experiential avoidance 🡪 cognitive fusion 🡪 anxiety/depression. Mediation pathway statistics are reported in Table 2. Neither cognitive fusion nor experiential avoidance independently mediated the effect of the predictors on anxiety and depression (see Table 2). However, consistent with a prior predictions, the serial mediation effect of cognitive fusion 🡪 experiential avoidance was significant in all cases. That is, a significant proportion of the association between vulnerability factors (worry, rumination and stressful life-events) and anxiety and depression was accounted for by the serial relationships of predictor 🡪 cognitive fusion 🡪 experiential avoidance 🡪 anxiety/ depression. Reversing the serial path, experiential avoidance 🡪 cognitive fusion did not mediate the association between worry and anxiety, but serial mediation was found in all other cases. In all cases, direct effects were also found between all predictor and outcome variables (worry🡪anxiety: β = .125, SE=.058, *t=*2.14, *p=*.037; rumination🡪depression: β = .411, SE=.162, *t=*2.533, *p=*.014; stressful life events🡪anxiety: β = .016, SE=.006, *t=*2.591, *p=*.012; stressful life events🡪depression: β = .018, SE=.007, *t=*2.650, *p=*.011).

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**Study 2**

**Descriptive Statistics**

All variables were normally distributed other than anxiety (T1 and 2), depression (T1 and 2) and stressful life-events, which were positively skewed. Square route transformations corrected skew. For bootstrapping analyses, untransformed data were used because bootstrapping does not assume normality. Table 1 reports means, standard deviations and Pearson’s correlations between variables. Significant positive relationships existed between predictors of anxiety (worry and stressful life-events) and anxiety symptomology at T1 and 2, and between predictors of depression (rumination and stressful life-events) and depressive symptomology at T1 and 2. Cognitive fusion and experiential avoidance were significantly related to each other and to anxiety and depression at T1 and 2. They were also related to all predictor variables (worry, rumination, stressful life-events) except the association between stressful life-events and experiential avoidance. As one would expect, levels of cognitive fusion, experiential avoidance, worry and rumination were all significantly lower in this sample as compared to the clinical sample (*t*(1, 161)=5.16, *p =* .000; *t*(1, 161)=3.66, *p =* .000; *t*(1, 161)=3.32, *p =* .000; *t*(1, 161)=4.48, *p =* .000 respectively; see Table 1 for Descriptives).

**Cross-sectional Analyses**

Testing the serial mediational models (see Table 2) indicated that cognitive fusion significantly mediated the association between all predictors and outcome variables (i.e., i) worry and anxiety, ii) rumination and depression and iii) stressful life-events and anxiety and depression). The serial pathway of experiential avoidance 🡪 cognitive fusion was also significant in all cases, but the reverse pathway of cognitive fusion 🡪 experiential avoidance was not. Significant direct effects were found for all models except for worry🡪anxiety (worry🡪anxiety: β = .050, SE=.051, *t=*.977, *p=*.331; rumination🡪depression: β = .476, SE=.181, *t=*2.623, *p=*.010; stressful life events🡪anxiety: β = .008, SE=.003, *t=*2.400, *p=*.018; stressful life events🡪depression: β = .013, SE=.005, *t=*2.978, *p=*.004).

**Longitudinal Analyses**

In keeping with the cross-sectional findings in the non-clinical sample, the longitudinal analyses (See Table 2) indicated that cognitive fusion mediated the relationship between all predictor variables and T2 anxiety and depression. Also in keeping with the cross-sectional analyses in the nonclinical sample, the serial pathway of experiential avoidance 🡪 cognitive fusion was significant in all cases, but the reverse pathway was not. In all the models tested, there were no direct effects of the predictor variables on T2 anxiety / depression (worry🡪T2 anxiety: β = .046, SE=.061, *t=*.760, *p=*.449; rumination🡪T2 depression: β = .375, SE=.228, *t=*1.646, *p=*.103; stressful life events🡪T2 anxiety: β = .008, SE=.005, *t=*1.723, *p=*.088; stressful life events🡪depression: β = .008, SE=.007, *t=*1.131, *p=*.261).

**Discussion**

The current study offers unique contributions to the literature on transdiagnostic processes in symptoms of anxiety and depression, as well as the interplay between cognitive fusion and experiential avoidance. Focusing first on the clinical data, consistent with the idea that cognitive fusion and experiential avoidance are critical toxic mechanisms (see Kashdan et al., 2006), we found that their bidirectional relationship accounted for a significant proportion of the association between rumination and depression, and stressful life events and anxiety and depression. For the case of worry, we found support for the pathway of cognitive fusion🡪 experiential avoidance, but not for the reverse pathway. Our clinical data are therefore consistent with the proposition that inflexible tendencies to become entangled with difficult thoughts, coupled with excessive attempts to avoid unwanted experiences, may be a common pathway to distress. Anxiety and depression have many etiological pathways and identifying common pathways is fundamental to developing focused and theory driven interventions. This being said, in all cases the risk factors continued to have a significant direct effect on depression and anxiety, indicating that only partof their association with anxiety and depression was accounted for by cognitive fusion and experiential avoidance. Interestingly, our clinical data suggested that it was the combined effects of cognitive fusion and experiential avoidance that mediated the pathways in the clinical group, and not the unique effects of either process. If replicated, these findings suggest that existing theories and research could be broadened out from an almost exclusive focus on experiential avoidance, to models that consider the interplay between experiential avoidance and cognitive fusion.

Different results emerged in the non-clinical study, however. Here, cognitive fusion appeared to be more useful for understanding symptoms of anxiety and depression than experiential avoidance. Contrary to previous research (e.g., Blakey, Jacoby, Reuman, & Abramowitz, 2016; S. C. Hayes et al., 2006; Kashdan et al., 2013; Kumpula, Orcutt, Bardeen, & Varkovitzky, 2011; Ruiz, 2010; Spinhoven, Drost, de Rooij, van Hemert, & Penninx, 2014) experiential avoidance did not uniquely contribute to the prediction of anxiety or depression in any of the models. Rather, in both the cross-sectional and longitudinal models, results suggested that cognitive fusion independently mediated the association between predictors and outcomes, as well as the experiential avoidance 🡪 cognitive fusion pathway, suggesting that experiential avoidance played a mediational role when it enhanced cognitive fusion. These findings suggest that the negative effects of worry, rumination and stressful life events on future anxiety and depression were attributable to enhanced fusion with difficult private experiences, whether that be as a direct effect of the predictor or through the intervening influence of experiential avoidance (i.e., experiential avoidance 🡪 cognitive fusion), with no significant direct effects emerging in the longitudinal data. A key difference between this study and those referenced above is that this study selected a measure of experiential avoidance that was designed to have minimal content overlap with distress. Although it is speculative, it is possible that previous research has inflated the perceived association between experiential avoidance and distress through confounding the measurement of these two constructs (see Wolgast, 2014).

The differences that have emerged across the two samples in this paper are difficult to interpret based on the current data. Samples were not matched for sociodemographic variables, which means that the differences could be attributable to differences in factors such as age (clinical group were significantly older), socioeconomic status (not measured) or educational attainment (greater educational attainment in the non-clinical group). Another possible interpretation is that the interplay between cognitive fusion and experiential avoidance, when predicting symptoms of anxiety and depression, differs as a function of level of distress (i.e., clinical versus non-clinical nature of the samples). For example, one possible interpretation is that cognitive fusion is more fundamental to variance in anxiety and depression towards the lower end of the mental health continuum. Here, cognitive fusion uniquely mediated the predictors to outcomes association, as well as in the pathway of experiential avoidance 🡪 cognitive fusion. However, it is possible that at higher ends of the mental health continuum, a bidirectional association becomes established whereby experiential avoidance and cognitive fusion begin to work in a reciprocally enhancing manner (akin to a vicious cycle), which in turn enhances symptoms of anxiety and depression. Thus, the bidirectional association between cognitive fusion and experiential avoidance may be especially toxic. This is consistent with the findings of Bardeen and Fergus (2016) who reported that the relationship between cognitive fusion, depression, anxiety, stress and PTSD symptomatology became significantly stronger as levels of experiential avoidance increased. However, these ideas are very speculative. Indeed, it is also possible that the different findings reflect an issue of poor replicability, signalling that the model did not generalise beyond this clinical sample. Future research examining the model, using matched samples from across the mental health continuum, would help to elucidate.

The findings should be considered in the light of some important limitations. Firstly, most of the data presented is cross-sectional, and the longitudinal data only used two time points which did not allow for thorough temporal modelling of proposed mediation effects. Given this, our studies provided a statistical test of a theoretical model rather than a truly empirical examination. Future work investigating these pathways using rigorous longitudinal design would greatly advance the literature. Secondly, samples were predominantly female, White-British individuals who self-selected to take part. As such, it cannot be assumed that the findings would extend to other samples and research using more diverse samples is needed. Thirdly, self-report questionnaires were used to measure dynamic psychological processes that are contextually influenced and difficult to capture using verbal processes. As such, they offer a convenient proxy for cognitive fusion and experiential avoidance. Future research using behavioural measures would greatly advance this literature. Fourthly, there is a lack of clarity and accessible methods for power calculations in serial multiple mediations where complex relationships exist and product terms are often small (Thoemmes, Muto, Tada, & Sugiyama, 2010). It is therefore possible that some analyses were non-significant due to being underpowered. Finally, this study focused on the open/closed process pair of the ACT model. Whilst this has been useful for honing in on the way an individual experiences and responds to private events, and how this is associated with anxiety and depression, the role of the remaining four processes were not considered. It would be interesting to expand this work, perhaps using structural equation modelling, to examine the interplay between all processes from within the ACT model and, crucially, how these affect overt behaviour. In this study, behaviours symptomatic of anxiety and depression were measured using the DASS, GAD-7, PHQ-9 (many of the items of which are focused on overt behavioural manifestations of anxiety and depression (e.g., poor appetite, difficulties sleeping, restlessness)), but mapping these processes onto broader behavioural repertoires, such as value-governed behaviours, and using overt behavioural measures, is an important area for future research.

Notwithstanding these limitations, the current findings have some tentative implications. The clinical data suggests that interventions focused on reducing both cognitive fusion and experiential avoidance would be helpful for individuals presenting with clinical levels of anxiety and depression. This complements intervention research, which has started to show that reductions in experiential avoidance and increases in acceptance mediate the effects of ACT for anxiety and depression (e.g., Forman, Herbert, Moitra, Yeomans & Geller, 2007). The current work complements this by demonstrating associations between experiential avoidance, cognitive fusion, anxiety and depression in a clinical sample who have not been socialised to the ACT model. The serial association between cognitive fusion and experiential avoidance in the clinical sample has the potential to further inform clinical practice. For example, fostering environments that undermine cognitive fusion may reduce the development of experiential avoidance and the potential for heightened levels of anxiety and depression. Likewise, increasing acceptance skills in those prone to cognitive fusion may reduce the potential for cognitive fusion to lead to mental health difficulties. It is also possible that those who present with particularly high levels of experiential avoidance may benefit from initial work that focuses on defusing from difficult thoughts, as an inroad for reducing experiential avoidance, anxiety and depression.

Our data also have tentative implications for nonclinical anxiety and depression. Although in need of replication, our data tentatively suggest that cognitive fusion is more relevant to understanding non-clinical anxiety and depression. This suggests that interventions designed to reduce over reliance on cognition to regulate behaviour, such as through cognitive defusion techniques (i.e., skills in defusing from difficult cognitions and enhancing the ability to hold private events in awareness, with openness and acceptance, and then allowing them to pass without reacting to them), may be a useful early intervention to enhance psychological wellbeing in student and sub-clinical populations. Our data also tentatively suggest that individuals who experience stressful life events and/or who are prone to repetitive negative thinking may benefit from using acceptance, defusion, and mindfulness techniques to reduce their risk of developing anxiety and depression.

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**Document figures and tables**

**Predictors:**

Worry/

Rumination/

Stressful life-events

**DV**

Anxiety/

Depression

**M1**

Cognitive Fusion

**M2**

Experiential Avoidance

a1

b1

a3

a2

b2

c'

**Figure 1:** Model Paths Tested in the Serial Multiple Mediation Models.

**Table 1**: Means, SDs, SEs of Mean and Correlations

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | Correlations |  |  |
| *Study 1 (Clinical)* | Mean  | SD | SE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1. PSWQ | 61.70 | 10.20 | 1.35 | - | - | - | - | - | - | - |  |
| 2. RRS | 24.82 | 5.06 | 0.68 | .23 | - | - | - | - | - | - |  |
| 3. SRRS  | 173.09 | 98.44 | 13.03 | .20 | .14 | - | - | - | - | - |  |
| 4. BEAQ | 56.78 | 9.44 | 1.25 | .11 | .47\*\*\* | .23 | - | - | - | - |  |
| 5. CFQ | 35.25 | 7.08 | 0.94 | .31\* | .62\*\*\* | .36\*\* | .58\*\*\* | - | - | - |  |
| 6. PHQ-9  | 14.09 | 5.95 | 0.79 | .07 | .52\*\*\* | .43\*\*\* | .58\*\*\* | .44\*\*\* | - | - |  |
| 7. GAD-7 | 12.47 | 5.17 | 0.69 | .36\*\* | .37\*\* | .45\*\*\* | .49\*\*\* | .51\*\*\* | .65\*\*\* | - |  |
| *Study 2 (Non-Clinical)* |  |  |  |  |  |  |  |  |  |  |  |
| 1. PSWQ | 55.03 | 13.96 | 1.36 | - | - | - | - | - | - | - | - |
| 2. RRS | 21.15 | 6.07 | 0.59 | .44\*\*\* | - | - | - | - | - | - | - |
| 3. LESS  | 291.81 | 179.94 | 17.48 | .07 | .31\*\* | - | - | - | - | - | - |
| 4. BEAQ | 50.48 | 11.24 | 1.09 | .25\* | .41\*\*\* | .17 | - | - | - | - | - |
| 5. CFQ | 28.03 | 9.25 | 0.90 | .58\*\*\* | .71\*\*\* | .28\*\* | .52\*\*\* | - | - | - | - |
| 6. DASS T1 Dep  | 9.82 | 10.36 | 1.01 | .28\*\* | .59\*\*\* | .41\*\*\* | .48\*\*\* | .64\*\*\* | - | - | - |
| 7. DASS T1 Anx  | 8.46 | 7.15 | 0.69 | .40\*\*\* | .45\*\*\* | .27\*\* | .44\*\*\* | .58\*\*\* | .59\*\*\* | - | - |
| 8. DASS T2 Dep  | 11.21 | 11.44 | 1.16 | .29\*\* | .60\*\*\* | .27\*\* | .32\*\*\* | .54\*\*\* | .67\*\*\* | .46\*\*\* | - |
| 9. DASS T2 Anx  | 8.30 | 7.37 | 0.75 | .33\*\*\* | .48\*\*\* | .25\* | .27\*\* | .45\*\*\* | .44\*\*\* | .62\*\*\* | .68\*\*\* |

\*p<.05, \*\*p<.01, \*\*\*p<.001

**Table 2:** Bootstrapping Output for Serial Mediational Models (PROCESS Model 6)

|  |  |  |
| --- | --- | --- |
|  Clinical Sample | Non-Clinical Sample, Cross-sectional | Non-Clinical Sample, Longitudinal |
|  | **B** | **SE** | **95% CI** | **sig**  | **B** | **SE** | **95% CI** | **sig** | **B** | **SE** | **95% CI** | **sig** |
|  **Worry 🡪 CF 🡪 EA 🡪 Anxiety** |  |  |  |  |  |
| a1b1 (CF mediation) | .038 | .028 | -.002 to .115 | N | .133 | .035 | .075 to .215 | Y | .111 | .039 | .046 to.203 | Y |
| a2b2 (EA mediation) | -.013 | .018 | -.059 to .017 | N | -.005 | .008 | -.031 to .005 | N | .001 | .009 | -.016 to .024 | N |
| a1a3b2 (CF🡪EA mediation) | .031 | .022 | .005 to .100 | Y | .020 | .017 | -.008 to .061 | N | -.002 | .021 | -.042 to .041 | N |
| **Worry 🡪 EA 🡪 CF 🡪 Anxiety** |  |  |  |  |  |  |  |  |
| a1b1 (CF mediation) | .031 | .023 | -.000 to .094 | N | .110 | .031 | .058 to .183 | Y | .092 | .034 | .030 to .162 | Y |
| a2b2 (EA mediation) | .018 | .024 | -.014 to .084 | N | .015 | .015 | -.004 to .061 | N | -.002 | .015 | -.038 to .026 | N |
| a1a3b2 (EA🡪CF mediation) | .001 | .011 | -.005 to .043 | N | .023 | .011 | .007 to .053 | Y | .016 | .010 | .003 to .045 | Y |
| **Rumination 🡪 CF 🡪 EA 🡪 Depression** |  |  |
| a1b1 (CF mediation) | -.023 | .118 | -.288 to .190 | N | .397 | .133 | .151 to .671 | Y | .497 | .173 | .193 to .895 | Y |
| a2b2 (EA mediation) | .090 | .075 | -.016 to .276 | N | .026 | .043 | -.028 to .158 | N | -.016 | .035 | -.108 to .038 | N |
| a1a3b2 (CF🡪EA mediation) | .117 | .069 | .028 to .320 | Y | .084 | .064 | -.014 to .238 | N | -.010 | .022 | -.064 to .028 | N |
| **Rumination 🡪 EA 🡪 CF 🡪 Depression** |  |  |  |  |  |  |  |  |
| a1b1 (CF mediation) | -.020 | .089 | -.199 to .161 | N | .339 | .122 | .123 to .164 | Y | .421 | .150 | .160 to .758 | Y |
| a2b2 (EA mediation) | .184 | .011 | -.032 to .432 | N | .104 | .081 | -.024 to .282 | N | .000 | .094 | -.169 to .207 | N |
| a1a3b2 (EA🡪 CF mediation) | .207 | .088 | .067 to .419 | Y | .064 | .028 | .024 to .145 | Y | .076 | .037 | .026 to .187 | Y |
| **Stressful life events 🡪 CF 🡪 EA 🡪 Anxiety** |  |  |  |  |  |  |  |  |
| a1b1 (CF mediation) | .004 | .003 | -.001 to .013 | N | .005 | .002 | .003 to .010 | Y | .006 | .002 | .002 to .012 | Y |
| a2b2 (EA mediation) | .001 | .002 | -.003 to .005 | N | .002 | .001 | -.001 to .002 | N | -.000 | .001 | -.002 to .001 | N |
| a1a3b2 (CF🡪EA mediation) | .003 | .002 | .001 to .009 | Y | .001 | .001 | -.001 to .003 | N | -.000 | .001 | -.003 to .002 | N |
| **Stressful life events 🡪 EA 🡪 CF 🡪 Anxiety** |  |  |  |  |  |  |  |
| a1b1 (CF mediation) | .001 | .002 | -.000 to .010 | N | .004 | .002 | .001 to .008 | Y | .008 | .004 | .003 to .018 | Y |
| a2b2 (EA mediation) | .003 | .002 | -.000 to .010 | N | .001 | .001 | -.000 to .003 | N | .000 | .002 | -.004 to .005 | N |
| a1a3b2 (EA 🡪CF mediation) | .001 | .001 | .000 to .006 | Y | .002 | .001 | .000 to .004 | Y | .004 | .002 | .001 to .010 | Y |
| **Stressful life events 🡪 CF 🡪 EA 🡪 Depression** |  |  |  |  |  |
| a1b1 (CF mediation) | .001 | .003 | -.004 to .010 | N | .008 | .003 | .003 to .015 | Y | .012 | .005 | .006 to .023 | Y |
| a2b2 (EA mediation) | .001 | .003 | -.005 to .008 | N | .001 | .001 | -.001 to .003 | N | .000 | .001 | -.002 to .003 | N |
| a1a3b2 (CF🡪EA mediation) | .006 | .003 | .002 to .013 | Y | .001 | .001 | -.001 to .005 | N | .000 | .002 | -.003 to .004 | N |
| **Stressful life events 🡪 EA 🡪 CF 🡪 Depression** |  |  |  |  |  |
| a1b1 (CF mediation) | .001 | .003 | -.003 to .007 | N | .005 | .002 | .002 to .012 | Y | .004 | .002 | .001 to .009 | Y |
| a2b2 (EA mediation) | .007 | .005 | -.001 to .017 | N | .002 | .002 | -.000 to .006 | N | -.005 | .001 | -.003 to .002 | N |
| a1a3b2 (EA 🡪CF mediation) | .000 | .001 | .001 to .004 | Y | .002 | .001 | .001 to .006 | Y | .002 | .001 | .001 to .005 | Y |