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The Association of Trait Mindfulness and Self-compassion with Obsessive-Compulsive Disorder Symptoms: Results from a Large Survey with Treatment-Seeking Adults

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Abstract

Little is known about the role of mindfulness and self-compassion in obsessive-compulsive disorder. This cross-sectional study examined associations of mindfulness and self-compassion with obsessive-compulsive disorder symptoms and with the obsessive beliefs and low distress tolerance thought to maintain them. Samples of treatment-seeking adults ($N = 1871$) and non-treatment-seeking adults ($N = 540$) completed mindfulness, self-compassion, obsessive-compulsive disorder, anxiety, depression, obsessive beliefs and distress tolerance questionnaires. Participants with clinically significant obsessive-compulsive disorder symptoms reported lower trait mindfulness and self-compassion compared to participants with clinically significant anxiety/depression and to non-clinical controls. Among the clinical sample, there were medium-large associations between mindfulness and self-compassion and obsessive-compulsive disorder symptoms, obsessive beliefs and distress tolerance. Mindfulness and self-compassion were unique predictors of obsessive-compulsive disorder symptoms, controlling for depression severity. Once effects of obsessive beliefs and distress tolerance were controlled, a small effect remained for mindfulness (facets) on obsessing symptoms and for self-compassion on washing and checking symptoms. Directions for future research and clinical implications are considered in conclusion.

Keywords Obsessive-compulsive disorder · Mindfulness · Self-compassion · Obsessive beliefs · Distress tolerance

Obsessive-compulsive disorder (OCD) is a debilitating mental health condition characterised by obsessions, i.e. persistent unwanted intrusive thoughts, images or urges that can cause significant distress, and compulsions, i.e. repetitive, ritualistic behaviours aimed at alleviating distress and/or preventing negative outcomes (APA 2013). Obsessive-compulsive disorder is a heterogeneous disorder as obsessions can centre on contamination, harm, symmetry or taboo thoughts and compulsions include physical behaviours like washing, checking, ordering, counting and mental acts (e.g. mantras) (Wheaton et al. 2010). Hypervigilant attention, avoidance of obsessional triggers, thought suppression and reassurance seeking also characterise OCD (Salkovskis 1999). While obsessive-compulsive symptoms lie on a continuum (Abramowitz et al. 2014), OCD affects 2–3% of the population (e.g. Ruscio et al. 2010) and has a high comorbidity with depression and anxiety disorders (Brakoulias et al. 2017; Macy et al. 2013; Ruscio et al. 2010).

Obsessional intrusions are indistinct in content from intrusions in the general population (e.g. Berry and Laskey 2012) but are more persistent and distressing in OCD (APA 2013). The cognitive model of OCD asserts this is because people with OCD appraise normal intrusions as personally significant or important, believing they influence real-life events and imply they are 'bad, mad or dangerous' (Shafran and Rachman 2004, p. 97). These misappraisals are informed by obsessive beliefs, including inflated personal responsibility, intolerance of uncertainty, perfectionism, overestimation of threat, the need to control thoughts and the over-importance of thoughts (OCGWG 1997). The latter meta-cognitive

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belief includes 'thought-action fusion', the belief that having a bad thought is morally equivalent to, or increases the likelihood of, acting on the thought (e.g. Rachman and Shafran 1999; Shafran and Rachman 2004). The cognitive model furthermore proposes that compulsions leave maladaptive appraisals of intrusive thoughts unchallenged.

Whilst obsessive beliefs play a central role in the cognitive model of OCD, they do not explain all the variance in OCD symptoms(s) (subtypes) in nonclinical and/or OCD samples (e.g. Abramowitz et al. 2009; Wheaton et al. 2010). Whilst adults with OCD endorse obsessive beliefs to a greater extent than healthy controls, evidence for the specificity of (all) obsessive beliefs to OCD (subtypes), compared to depression and anxiety disorders, is mixed (e.g. Belloch et al. 2010; Steketee et al. 1998; OCCWG 2005; Taylor et al. 2006; Tolin et al. 2006; Viar et al. 2011; Wu and Carter 2008). This reflects the heterogeneity of OCD but also suggests other theoretical constructs play a role in the maintenance of OCD symptoms.

Recently, the potential role of low distress tolerance, i.e. "the ability to experience and withstand negative psychological states" (Simons and Gaher 2005, p. 83) has been explored (e.g. Cougle et al. 2011). Low distress tolerance is proposed to compound the unpleasant feelings evoked by unwanted intrusions and contribute to the urge to engage in the maladaptive behaviours, specifically compulsions, avoidance, thought suppression and reassurance seeking, to eliminate distress (Robinson and Freeston 2014). Research evidence to date suggests low distress tolerance is associated with OCD symptoms, particularly obsessions, in both nonclinical (Cougle et al. 2011, 2012) and clinical samples (Laposa et al. 2015). However, evidence is mixed as to whether distress tolerance is a unique predictor of OCD symptoms once depression, anxiety and/or anxiety sensitivity are controlled for (Blakey et al. 2016; Cougle et al. 2011, 2012; Keough et al. 2010; Laposa et al. 2015; Macatee et al. 2013; Robinson and Freeston 2014).

Yet more recently, the theoretical constructs of mindfulness and self-compassion have also started to receive attention in relation to OCD, in light of the emerging interest in mindfulness-based interventions (MBIs) for OCD. Mindfulness is broadly defined as "the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment", with nonjudgment referring to a friendly, open and accepting stance (Kabat-Zinn 2003, p. 145). Mindfulness is commonly operationalised as a multifaceted construct consisting of: (i) observing, i.e. attending to internal (sensations) and external (e.g. sights) experiences; (ii) describing, i.e. giving words to internal experiences; (iii) acting with awareness, i.e. the ability to attend to activities in the present moment (the opposite of acting on automatic pilot); (iv) non-judging inner experience, i.e.

not judging thoughts and feelings as good or bad, and; (v) non-reactivity to inner experience, i.e. letting (unpleasant) thoughts and feelings pass without acting to get rid of them (Baer et al. 2006, 2008). Self-compassion is an associated construct, commonly defined as a non-evaluative positive attitude towards the self at times of difficulty that involves: (i) self-kindness (rather than being self-critical); (ii) common humanity (rather than seeing one's own suffering as an isolating experience), and; (iii) mindfulness, particularly equanimity towards unpleasant experiences (as opposed to identifying with them) (Neff 2003). Self-compassion is associated with, yet distinct from, self-esteem, self-criticism and self-pity (Barnard and Curry 2011). As these definitions show, mindfulness, self-compassion and distress tolerance are related, yet distinct constructs. Mindfulness involves non-judgmental awareness of present-moment experiences, whatever these may be, including pleasant, unpleasant and neutral experiences (Kabat-Zinn 2003). Self-compassion is argued to necessitate mindfulness but is a broader construct that includes an attitude of kindness towards the self and an appreciation of shared human experience (Neff 2003). Distress tolerance, on the other hand, specifically involves tolerance of unpleasant emotional or physical states when it is not possible to change these experiences (Leyro et al. 2016). Therefore, mindfulness and self-compassion are broader constructs that could have the potential to explain OCD symptoms over and above distress tolerance.

Mindfulness and self-compassion are understood as universal human dispositions or skills that individuals possess to varying degrees (Brown and Ryan 2003; Sauer et al. 2013). This is borne out in research showing that dispositional mindfulness and self-compassion have a positive association with wellbeing and a negative association with negative affect (e.g. shame, guilt and anxiety), mental health difficulties (e.g. depression) and maladaptive cognitive processes such as rumination, worry and thought suppression (Barnard and Curry 2011; Keng et al. 2011; MacBeth and Gumley 2012; Tomlinson et al. 2018; Zessin et al. 2015). Mindfulness and self-compassion are central to MBIs, which improve mindfulness and self-compassion skills (Gu et al. 2015) through mindfulness meditation practices and teacher-led inquiry (e.g. Segal et al. 2013). Research shows that MBIs benefit (recurrent) depression and, to a lesser extent, anxiety symptoms (e.g. Goldberg et al. 2018; Khoury et al. 2013; Kuyken et al. 2016; Strauss et al. 2014).

The growing interest in MBIs (adapted) for OCD (e.g. Key et al. 2017; Külz et al. 2019; Selchen et al. 2018; Strauss et al. 2018) is informed by the fact approximately 50% of patients do not experience OCD symptom remission following cognitive behavioural therapy for OCD (Öst et al. 2015). The rationale for MBIs for OCD is predicated on the assumption that poor mindfulness and self-compassion skills contribute to OCD symptoms (e.g. Didonna 2009; Külz et al.

2014). Conceivably, OCD can be considered 'antithetical' to mindfulness (Didonna 2009) as poor mindfulness skills are reflected in the over-importance given to obsessional intrusions and heightened reactivity to (triggers of) such thoughts through avoidance, compulsions and reassurance seeking, hypervigilant attention to triggers of obsessions, thought suppression and control. Poor self-compassion skills are implicated in feelings of guilt and shame and obsessive beliefs such as inflated personal responsibility, perfectionism, the belief that one should be able to exercise control over thoughts and moral thought-action fusion (e.g. Bream et al. 2017; Shapiro and Stewart 2011; Weingarden and Renshaw 2015; Wetterneck et al. 2013). Crowe and McKay (2016) argue that adults with OCD may have poor mindfulness and self-compassion skills even when compared to adults with other common mental health problems such as depression and anxiety because of their unique tendency to appraise common and harmless intrusions as important and personally significant, informed by inflated personal responsibility and thought-action-fusion beliefs, and the extent to which they react to such thoughts with ritualistic, repetitive, time-consuming and often apparently senseless compulsions.

Few studies have examined the unique relationship of mindfulness or self-compassion with OCD symptoms to inform the proposed potential benefit of MBIs for OCD. A single study examined self-compassion in 111 adults with OCD and found a medium negative association ($r = -.30$, $p < .01$) with OCD symptom severity (Wetterneck et al. 2013). Whilst this suggests that lower self-compassion is associated with increased OCD symptom severity, the specificity of the association of self-compassion with OCD was not examined. Also, the study did not explore whether this association varied according to OCD symptom subtype, e.g. symptoms that centre on perfectionism (e.g. ordering compulsions) or unacceptable thoughts (e.g. Külz et al. 2014), and whether self-compassion explains OCD symptoms once more established constructs, e.g. obsessive beliefs, are accounted for. Five further studies with clinical (Didonna et al. 2018; Hawley et al. 2017) and nonclinical samples (Crowe and McKay 2016; Emerson et al. 2017; Solem et al. 2015) found that OCD symptoms were negatively associated with (facets of) mindfulness and that adults with clinically significant OCD symptoms demonstrated lower trait mindfulness (facets) relative to healthy controls.

Research examining the unique association of self-compassion with OCD is absent while evidence is equivocal about the unique association of mindfulness with OCD relative to other common mental health difficulties, particularly depression and anxiety disorders (Crowe and McKay 2016; Didonna et al. 2018; Hawley et al. 2017). The latter studies were conducted with relatively small samples of participants with a diagnosis, or clinically significant symptoms

of, OCD (ranging from 42 in Crowe and McKay to 144 in Hawley et al.), depression (from 17 in Crowe and McKay to 50 in Didonna et al.) and/or anxiety (from 19 in Crowe and McKay to 162–344 in Hawley et al.). Therefore, analyses may have been under-powered to detect potentially small differences in mindfulness (facets) between OCD and depression and/or anxiety disorders, as the latter disorders are also associated with low mindfulness and self-compassion relative to healthy controls (e.g. Arch et al. 2018; Didonna et al. 2018; Nejati et al. 2012; Roemer et al. 2009). The correlational analyses did not control for depression severity (apart from Solem et al. 2015) to establish the unique association of mindfulness and self-compassion with OCD. This is an important omission as OCD has a high degree of comorbidity with depression, and self-compassion and mindfulness have known associations with depression (see above). Research to date also does not elucidate the (relative importance of the) relationship of mindfulness and self-compassion with different OCD symptom subtypes. Finally, it is unclear if, and how strongly, trait mindfulness and self-compassion are related to obsessive beliefs and whether mindfulness and self-compassion significantly contribute to our understanding of OCD symptoms over and above obsessive beliefs, a construct central to the cognitive model of OCD, and distress tolerance, examined more recently as an aspect of emotion regulation difficulties associated with OCD (Robinson and Freeston 2014).

The current study aimed to address these evidence gaps to gain a better understanding of whether mindfulness and self-compassion skills are unique predictors of OCD symptoms. This would provide preliminary evidence towards the assumption, inherent in the recent interest in MBIs for OCD, that OCD is associated with deficient mindfulness and self-compassion skills that can be targeted to benefit OCD symptom reduction; the absence of a unique association of mindfulness and self-compassion with OCD would question the potential causal importance of these skills in OCD and suggest that targeting these skills, i.e. through offering MBIs for OCD, would be of little therapeutic benefit to OCD symptoms.

This study aimed to gain a better understanding of the unique relationship of mindfulness and self-compassion with obsessive-compulsive symptoms and the obsessive beliefs and distress intolerance thought to maintain them. These relationships were examined using both a disorder (hypothesis 1) and continuum model (hypotheses 2–4) of OCD. Specifically, informed by the research and theoretical literature described above, this study tested the following hypotheses: (1) Treatment-seeking adults with clinically significant OCD symptoms would report lower trait mindfulness and self-compassion compared to treatment-seeking adults with clinically significant depression/anxiety symptoms and non-treatment-seeking adults (student sample)

without clinically significant symptoms of OCD, depression or anxiety; (2) In treatment-seeking adults, mindfulness (facets) and self-compassion would be negatively associated with OCD symptom severity, obsessive beliefs and distress tolerance; (3) In treatment-seeking adults, mindfulness and self-compassion would predict OCD symptom severity, controlling for depression severity, and; (4) In treatment-seeking adults, mindfulness and self-compassion would continue to independently predict OCD symptom severity once the effects of depression severity, obsessive beliefs and distress tolerance were accounted for.

To achieve the study aims, an anonymous survey was conducted with adults awaiting treatment in National Health Service (NHS) Improving Access to Psychological Therapies (IAPT) services, which deliver evidence-based psychological therapies for common mental health problems across England, in accordance with National Institute for Health and Care Excellence (NICE) guidelines (NICE 2005). The survey was also conducted with a student sample from a university in the South of England to obtain a healthy control group (hypothesis 1).

Methods

Participants

A treatment-seeking clinical sample of participants was recruited through 28 IAPT services across England. Inclusion criteria were: (i) adults aged 18+; (ii) assessed and offered treatment in IAPT; (iii) able to read and communicate in English (assumed by their participation). Exclusion criteria were: (i) patients who had declined, started or completed treatment when services sent out the study invitations. As IAPT services are open to adults of all ages, an upper age limit was not applied to ensure the sample was representative of routine IAPT treatment seeking adults. The total clinical sample consisted of 1871 participants who were mostly White (93%), female (71%), (self-)employed (56%) with at least secondary education (96%, 41% with a university qualification). A small proportion of participants had mindfulness experience (18%) and/or had started an intervention at the time of survey completion (19%) (guided self-help typically starts shortly after assessment).

A student sample was recruited to represent non-treatment seeking adults, from among whom a sub-sample of healthy controls were selected to test the first hypothesis (see further details below). Inclusion criteria for the student sample were: (i) adults 18+; (ii) able to read and communicate in English. Students awaiting or receiving treatment in an NHS mental health or NHS psychological therapies service were excluded. The total student sample consisted of 540 participants, who were predominantly White (84%)

and female (82%) without mindfulness experience (87%), had achieved at least secondary education (99%, 25% with a university qualification) and self-identified as students (93%). See Table A1, Online Appendix A for further details about the samples.

To test the first hypothesis, a subset of clinical sample participants who scored above the clinical cut-off on the Obsessive-Compulsive Inventory-Revised (OCI-R) (Foa et al. 1998) formed the obsessive-compulsive (OC) group ($n = 833$) while a subset of clinical sample participants who scored below the clinical cut-off on the OCI-R but above the clinical cut-off for the Generalized Anxiety Disorder-7 (GAD-7) (Spitzer et al. 2006) questionnaire and/or the Patient Health Questionnaire-9 (PHQ-9) (Kroenke et al. 2001) formed the anxious depressed (AD) group ($n = 738$). A subset of student sample participants scoring below the clinical cut-off on the OCI-R, PHQ-9 and GAD-7 formed the healthy controls (HC) group ($n = 231$). Only those participants making up the OC, AD and HC groups were included in the statistical analysis testing hypothesis 1. See Table A2, Online Appendix A for further group details. Selecting healthy controls from a student rather than a community sample was informed by pragmatic considerations, given that the size of the sample would require considerable financial resources to remunerate community sample participants for taking part in the study.

Procedure

IAPT services posted or handed out a letter of invitation to eligible patients, containing a link to the online information sheet and survey. Participants were also given the option to request a paper copy to complete the survey offline. To recruit the student sample, the study was advertised at university using posters and flyers, an online research participant system, student forums and emails sent by academic staff on the researchers' behalf.

The clinical sample completed the survey on the Bristol Online Survey platform (BOS, Bristol, UK). Qualtrics (Qualtrics, Provo, UT) was used with the student sample to ensure compatibility with university IT systems. Survey completion took approximately 20–30 min. As the survey was anonymous, participants were informed in the participant information sheet that consent was assumed by their submission of the online or paper survey. Ethical approval for the study was granted by an NHS research ethics committee.

Measures

The Five-facet mindfulness questionnaire-Short Form (FFMQ-SF) (Bohlmeijer et al. 2011) is a 24-item measure of trait mindfulness, also described as mindfulness skills, that

is highly correlated ($r = .89$) with the FFMQ-39 (Baer et al. 2006) that it derived from. Items are rated on a five-point Likert scale [1 (never or very rarely true) to 5 (very often or always true)]. The FFMQ-SF has five subscales: observing (for experienced meditator samples), describing, acting with awareness, nonjudging and non-reacting. Bohlmeijer et al. (2011) reported adequate to excellent internal consistency (ranging from $\alpha = .73$ to .91) across the five subscales.

Since the development of the FFMQ, multiple studies have called the construct validity of the observe facet into question (also see Rudkin et al. 2018) as it was unexpectedly positively associated with markers of poor mental health in nonmeditating (e.g. Baer et al. 2006, 2008), heterogeneous clinical (Curtiss and Klemanski 2014) and/or OCD (Emerson et al. 2017) samples. The authors of the studies concluded that in these samples, the observe facet might measure maladaptive, self-focused attention rather than the intended mindful observation of present-moment experiences with equanimity. Therefore, as research has shown better evidence for a four- than a five-factor hierarchical structure of the FFMQ-39 and/or FFMQ-15 among novice meditators and patients with heterogeneous mental health problems (e.g. Baer et al. 2008; Curtiss and Klemanski 2014; Gu et al. 2016), the current study excluded the observe facet from the FFMQ-SF. The FFMQ-SF full scale minus the observe facet will be referred to as the FFMQ-SF-O. For this study, the internal consistency of the FFMQ-SF-O was $\alpha = .83$ in the clinical sample and $\alpha = .84$ in the student sample.

The Self-compassion scale-Short Form (SCS-SF) (Raes et al. 2011) is a 12-item measure of self-compassion rated on a five-point Likert scale [1 (almost never) to 5 (almost always)]. It has good internal consistency ($\alpha \geq .86$) and test–retest reliability (intra-class correlation coefficient (ICC) = 0.89 (95% CI [0.87-0.93]) and a near perfect correlation ($r = 0.97$) with the original 26-item SCS (Neff 2003) (Garcia-Campayo et al. 2014; Raes et al. 2011). It has good construct validity evidenced through expected negative medium to large correlations with, a.o., measures of depression and anxiety (Hayes et al. 2016). Confirmatory factor analysis showed a good fit for the same six-factor hierarchical structure (subscales are: self-kindness, self-judgement, common humanity, isolation, mindfulness and over-identification) as the original SCS. However, as internal consistency for (some of) the subscales was relatively low (ranging from .54 to .81), Raes et al. (2011) recommend limiting the use of the SCS-SF to the full-scale score. Internal consistency: clinical sample $\alpha = .84$, student sample: $\alpha = .86$.

The Obsessive-Compulsive Inventory-Revised (OCI-R) is an 18-item measure of OCD symptoms adapted from the long-form OCI (Foa et al. 1998), with good reliability and validity indices and a clinical cut-off score of 21 (Foa et al. 2002; Huppert et al. 2007). Items are rated on a five-point rating scale [0 (not a lot) to 4 (extremely)]. Six sub-scales relate to OCD symptom subtypes: washing, checking, ordering, obsessing, neutralising and hoarding. Since its inception, hoarding symptoms have been re-classified as a separate hoarding disorder (APA 2013). As only one study has re-examined the specificity and sensitivity of the OCI-R without hoarding items (Wootton et al. 2015), this study preserved the 18-item OCI-R full scale (and associated cut-off score). Internal consistency of the OCI-R was excellent: clinical sample ($\alpha = .90$; student sample $\alpha = .92$).

The Obsessive Beliefs Questionnaire (OBQ-20) is a 20-item version of the original OBQ-87 (OCCWG 2005). Four subscales measure overestimation of threat, inflated responsibility, over-importance of (need to control) thoughts and perfectionism/intolerance of uncertainty. Items are rated on a 7-point Likert scale [1 (disagree very much) to 7 (agree very much)]. The OBQ-20 has adequate to good internal consistency (ranging from .78 to .83 across three community or student samples) (Moulding et al. 2011) and correlates highly ($r = .93–.99$) with the 38-item OBQ-TRIP from which it was derived (Fergus & Carmin, 2014). Subscales showed a moderate to strong correlation with OCD symptoms ($r = .48–.74$) in a clinical sample (Fergus and Carmin 2014), suggesting good convergent validity. Internal consistency was excellent in the current study (clinical sample: $\alpha = .94$; student sample $\alpha = .94$).

The Distress Tolerance Scale (DTS) is a 15-item measure of distress tolerance that is most commonly used to study distress tolerance in OCD (Robinson and Freeston 2014). Items are rated on a 5-point scale [1 (strongly agree) to 5 (strongly disagree)]. The four subscales are: (i) tolerance (of emotional distress); (ii) absorption (of attention by negative emotions); (iii) appraisal (of (one's responses to) emotional distress); and (iv) regulation (efforts to get rid of or avoid distress). The DTS has good discriminant validity, internal consistency ($\alpha = .83–.85$) and test–retest reliability over 6 months ($ICC = .61$) (Simons and Gaher 2005). In the current study, internal consistency was excellent (clinical sample $\alpha = .93$, student sample $\alpha = .92$).

The Patient Health Questionnaire-9 (PHQ-9) is a widely used 9-item questionnaire of depression severity rated on a four-point scale [0 (not at all) to 3 (nearly every day)] (Kroenke et al. 2001). It has good construct validity (evident in strong positive correlations with functional impairment, disability days, and symptom-related difficulty) and excellent internal consistency ($\alpha = .86–.89$) and test–retest reliability ($r = .84$) (Kroenke et al. 2001). The recommended clinical cut-off score of ≥ 10 had good sensitivity (88%) and specificity (88%) against a mood disorder diagnosis criterion (Kroenke et al. 2001). The choice to use the PHQ-9 was informed by its excellent psychometric properties and the fact that it is routinely used in IAPT to screen for depression

symptoms (Hay, 2011). Furthermore, its brevity helped to minimise the burden on participants. Internal consistency was good (clinical sample: α = .87, student sample: α = .85).

The Generalized Anxiety Disorder-7 (GAD-7) is a widely used 7-item questionnaire rated on a four-point scale [0 (not at all) to 3(nearly every day)] (Spitzer et al., 2006). The GAD-7 has excellent internal consistency (α = .92) and good test–retest reliability (ICC = 0.83), factorial, procedural and construct validity (showing expected correlations with general health and depression questionnaires) (Spitzer et al. 2006). Designed as a screening measure for generalised anxiety disorder, the GAD-7 also detects panic disorder, social phobia and PTSD and is now recommended as a broad-spectrum screening tool for anxiety symptoms (Beard and Bjorgvinsson 2014). The GAD-7 is a primary screening and outcome measures in IAPT services (Hay 2011). IAPT services apply a cut-off score of 8, following the recommendation by Kroenke et al. (2007) that it is a reasonable cut-off score for the identification of possible cases of anxiety disorders. Therefore, the current study applied this cut-off score to identify adults with clinically significant anxiety symptoms. Internal consistency was excellent (clinical sample α = .89, student sample α = .90).

Participants were asked seven multiple-choice sociodemographic questions about their age group, gender, ethnicity, highest education qualification, current employment status, and prior mindfulness experience (MBI completion or regular mindfulness practice). Clinical sample participants were asked to indicate their IAPT treatment status.

Sample Size and Power Calculations

Power calculations for the first hypothesis (using the statistical programme G*Power, power set to .90, d = .2, two-tailed, p < .05) showed at least 527 participants per group were needed to detect potentially only small differences in mindfulness and self-compassion between the OC and AD groups (see participant and statistical analysis (hypothesis 1) sections), resulting in a recruitment target of at least 1581 participants across the two samples (clinical: 1054, student: 527). Recruitment continued for a year, until each group's target was reached. This sample size was also ample to detect even small effects in correlational, hierarchical regression analyses conducted to test the second and third hypotheses (e.g. Fritz and MacKinnon 2007).

Missing Data

Following ethical guidelines and consultation with members of a lived experience advisory panel, participants could complete the study without being forced to answer all questions. Just 1.4% of (sub)scale data was missing, across 17% of cases and all variables. Data was missing completely at

random (Little's MCAR test: χ^2 (2661) = 2773.53, p = .063). There was relatively more missing data for the clinical sample (1.8% of the total clinical sample versus .1% of total student sample). This may be because the survey platform for the clinical sample did not prompt participants who missed a question. Also, approximately 15% of the clinical sample completed the survey offline (i.e. on paper) (through active patient requests and research site recruitment strategies) whereas student sample participants exclusively accessed the survey online. List- or pair-wise deletion methods are increasingly considered outdated in dealing with missing data (Enders, 2010). However, in case of a very low percentage of missing data, particularly if missing completely at random, the specific method chosen to address missing data is unlikely to significantly affect results (e.g. Dong and Peng 2013; Enders 2010). Therefore, default (IBM SPSS version 25) pair- or list-wise deletion methods were used.

Statistical Analyses

Descriptive statistics included mean scores and standard deviations for questionnaire data and frequencies and percentages for categorical sociodemographic questions. Visual inspection of histograms, quantile–quantile (QQ) plots and probability–probability (PP) plots was used to assess normality of scaled variables. To test the first hypothesis, Chi square tests were first conducted to test (OC, AD, HC) group differences on sociodemographic variables. Cramer's V tests examined the strength of the association. One-way between-group Analysis of Variance (ANOVA) tested the group effect on mean FFMQ-SF-O and SCS-SF full-scale scores. Contrast t tests used bootstrap p values and were converted into Cohen's d, using the pooled SD (Field 2013). Cohen's (1992) guidelines were used to interpret effect sizes: .20 = small .50 = medium .80 = large. To test the second hypothesis, robust Pearson's zero-order correlations of the questionnaire data were calculated for the total clinical sample. Correlations were inspected for multi-collinearity and interpreted as follows: .10 = small, .30 = medium, .50 = large (Field 2013). Robust hierarchical regression analyses tested FFMQ-SF-O and SCS-SF (sub-) scales (step 2) as independent predictors of OCI-R (sub) scale scores, controlling for depression severity (PHQ-9) (step 1) (hypothesis 3). Analyses were repeated with FFMQ-SF and SCS-SF (sub-)scales entered in step 3, controlling for obsessive beliefs and distress tolerance (step 2) and depression severity (step 1) (hypothesis 4). An effect was statistically significant if the BCa 95% CI did not contain 0. Effect sizes for R^2, ΔR^2 and sr^2 were calculated using Cohen's f^2 (0.02 = small, 0.15 = medium, 0.35 = large) (Cohen 1988; Selya et al. 2012). All analyses were conducted using IBM SPSS (version 25). All analyses were repeated without participants who had mindfulness experience and/or started

IAPT treatment (see participants section) to check the significance and size of effects remained unchanged. Bonferroni corrections (p criterion $= .05/k$) were applied to calculate the familywise error rate (Field, 2013).

Results

Hypothesis 1

To examine the first hypothesis, one-way ANOVA was conducted to test the group effect (OC, AD, HC) on mindfulness (FFMQ-SF-O) and self-compassion (SCS-SF). Prior to this, group effects on sociodemographic variables were tested, using Chi square. The obsessive-compulsive (OC) ($n = 833$), anxious-depressed (AD) ($n = 738$) and healthy controls (HC) ($n = 231$) groups differed significantly on the distribution of employment (χ^2 (12) = 1021.48, $p < .001$, Cramer's $V = .53$, p < .001), age groups (χ^2 (12) = 618.1, p < .001, Cramer's V: .42, $p < .001$), education (χ^2 (4) = 58.30, $p < .001$, Cramer's $V = .13$, $p < .001$), and mindfulness experience [$\chi^2 = 18.88$, $p = .001$, Cramer's $V = .07$, $p < .001$, small effect: HC vs. (OC & AD)]. See Table A2 in Online Appendix A for further details on group effects on sociodemographic variables. As all but the last variables were intrinsic to the student sample and/or not independent of the group effect (Field, 2013; Miller and Chapman 2001), they were not controlled for when testing the group effect on mindfulness and self-compassion. As mindfulness experience enhances mindfulness skills (e.g. Baer et al. 2008), all analyses were repeated without participants with mindfulness experience as a sensitivity analysis to establish whether statistical significance and size of effects remained unchanged.

One-way ANOVA showed a significant group effect on FFMQ-SF-O and SCS-SF (see Table 1). Nonorthogonal contrast tests (contrast 1: OC vs. HC, contrast 2: OC vs. AD) showed all effects were in the expected direction; the OC group scored significantly lower on mindfulness and

Table 2 Contrast tests for FFMS-SF-O and SCS-SF. Contrast 1 = OC versus HC, contrast 2 = OC versus AD

Scale	Contrast	t	Hedges' g [95% CI]	Conclusion[a]
FFMQ-SF-O	1	−28.62*	−1.99 [−2.16, −1.82]	OC < HC
	2	−11.60*	−0.60 [−0.71, −0.50]	OC < AD
SCS-SF	1	−25.43*	−2.02 [−2.19, −1.85]	OC < HC
	2	−9.33*	−0.48 [−0.58, −0.38]	OC < AD

HC healthy controls, *AD* anxious/depressed group, *OC* obsessive-compulsive group, *FFMQ-SF-O* five-facet mindfulness questionnaire-short form full scale minus observe subscale, *SCS-SF* self-compassion scale -short form, *g* Hedges' *g*

*$p < .001$

[a]Indicates which of the two groups had the significantly lower mean score for the scale

self-compassion than the HC (large effect) and AD groups (medium effect) (see Table 2). Excluding OC, AD or HC participants who had mindfulness experience and/or had started IAPT treatment did not alter the significance or size of effects. See Tables B1 and B2, Online Appendix B for group effects on OBQ-20 and DTS.

Hypothesis 2

To test the hypothesis that mindfulness (facets) and self-compassion would be negatively associated with OCD symptom severity, obsessive beliefs and distress tolerance in the clinical sample, robust Pearson zero-order correlations between all measures were calculated for the total clinical sample (see Table 3). There were medium to large negative correlations of the FFMQ-SF-O and SCS-SF with the OCI-R. The BCa 95% CI of these correlations did not overlap; the association of mindfulness with OCD symptoms was significantly larger than for self-compassion. See Table C1, Online Appendix C for zero-order correlations between OCI-R subscales, FFMQ-SF-O subscales and SCS-SF.

There were large, negative zero-order correlations of mindfulness and self-compassion with obsessive beliefs

Table 1 One-way ANOVA testing group (OC, AD, HC) effect on FFMQ-SF and SCS-SF

Scale	Group	n	M	SD	df	*Welch's F*
FFMQ-SF-O	OCD	785	48.70	8.80	683.27	410.43*
	AD	691	54.15	9.20		
	HC	231	65.70	7.66		
SCS-SF	OCD	813	24.10	6.56	626.51	326.10*
	AD	716	27.44	7.42		
	HC	230	37.75	7.37		

OC obsessive-compulsive group, *AD* anxious/depressed group, *HC* healthy controls, *FFMQ-SF-O* five-facet mindfulness questionnaire-short form full scale minus observe subscale, *SCS-SF* self-compassion scale-short form

*$p < .001$

Table 3 Clinical sample descriptive statistics and robust Pearson zero-order correlations [BCa 95% CI 1000 samples] for all measures

Measure	*M*	*SD*	FFMQ-SF-O	SCS-SF	OCI-R	OBQ-20	DTS	PHQ-9
FFMQ-SF-O	52.49	10.00						
SCS-SF	26.56	7.82	.62* [.59,.65]					
OCI-R	21.6	13.2	− .44* [− .47,− .40]	− .35* [− .39,− .31]				
OBQ-20	86.46	25.97	− .57* [− .60− .54]	− .58* [− .61,− .54]	.57* [.54,.60]			
DTS	2.32	.88	.43* [.38,.47]	.46* [..42,.50]	− .36* [− .40,− .32]	− .51* [− .55,− .47]		
PHQ-9	14.72	6.36	− .49* [− .53,− .45]	− .43* [− .47,− .39]	.42* [.38,.46]	.44* [.40,.48]	− .33* [− .38,− .28]	
GAD-7	13.16	5.54	− .49* [− .53,− .45]	− .44* [− .48,− .40]	.48* [.45,.52]	.51* [.48,.54]	− .41* [− .46,− .37]	.68* [.65,.71]

FFMQ-SF-O five-facet mindfulness questionnaire-short form full scale minus observe subscale, *SCS-SF* self-compassion scale-short form, *OCI-R* obsessive compulsive inventory-revised, *OBQ-20* obsessive beliefs questionnaire-20, *DTS* distress tolerance scale, *PHQ-9* patient health questionnaire-9, *GAD-7* generalised anxiety disorder-7

*$p < .001$

and distress tolerance. Partial correlations with obsessive beliefs were similar for mindfulness (*pr* (controlling for self-compassion) = − .33, BCa 95% CI [− .37, − .29]) and self-compassion (*pr* (controlling for mindfulness) = − .35, BCa 95% CI [− .39, − .31]). The partial correlation between mindfulness and distress tolerance (*pr* = .21, BCa 95% CI [.15, .27]) was weaker than for self-compassion (*pr* = .31, BCa 95% CI [.26,.35]), as the BCa 95% CI of these partial correlations did not overlap. See Table C2 in Online Appendix C for zero-order correlations between FFMQ-SF-O subscales, SCS-SF and OBQ-20 subscales.

The known association of mindfulness, self-compassion and OCD with depression was borne out in the current study as Table 3 shows significant medium to large correlations of the FFMQ-SF-O, SCS-SF and OCI-R with the PHQ-9. The fact that anxiety is often a key feature of OCD was reflected in a large positive correlation between the GAD-7 and the OCI-R. Sensitivity analyses excluding clinical sample participants with mindfulness experience and/or who had started IAPT treatment, left the significance and size of effects unchanged. See Online Appendix C for clinical sample inter-correlations between FFMQ-SF-O (Table C3), OCI-R (C4), OBQ-20 (C5) and DTS (C6) subscales.

Table 4 Hierarchical regression of PHQ-9, FFMQ-SF-O total and subscales and SCS-SF on OCI-R total scale

Outcome	Model	Predictor	*B*	Lower	Upper	*SE*	*β*	*p*	ΔR^{2a}	*pr*	sr^2
OCI-R total *N* = 1606	1	PHQ-9	0.92	0.81	1.01	0.05	.44	.001	.19		
	2	PHQ-9	0.58	0.48	0.69	0.05	.28	.001	.07	.27	.057
		FFMQ-SF-O	− 0.32	− 0.24	− 0.38	0.04	− .24	.001		− .20	.032
		SCS-SF	− 0.17	− 0.07	− 0.26	0.05	− .10	.001		− .09	.006
	2	PHQ	0.61	0.49	0.72	0.06	.30	.001	.07	.28	.060
		Describe	− 0.32	− 0.47	− 0.17	0.08	− .10	.001		− .11	.009
		Act aware	− 0.16	− 0.34	0.03	0.11	− .05	.110		− .04	.001
		Nonjudge	− 0.43	− 0.60	− 0.27	0.09	− .12	.001		− .13	.013
		Nonreact	− 0.42	− 0.63	− 0.20	0.11	− .11	.001		− .10	.008
		SCS-SF	− 0.14	− 0.25	− 0.04	0.05	− .08	.004		− .07	.004

BCa 95% CI, *SE* and *p*-values based on 1000 bootstrap samples

OCI-R obsessive compulsive inventory-revised, *PHQ-9* patient health questionnaire-9, *FFMQ-SF-O* five-facet mindfulness questionnaire-short form full scale minus observe subscale, *SCS-SF* self-compassion scale-short form, ΔR^2 (change) explained variance, *pr* partial correlation, sr^2 semi-partial correlation squared

[a]*F*-change statistic significant at $p < .001$

Hypothesis 3

Robust hierarchical regression analyses tested mindfulness facets and self-compassion as independent predictors of OCD symptoms (step 2), controlling for depression severity (step 1). Results show that at the full-scale level, the PHQ-9 predicted 19% of the variance in the OCI-R, while FFMQ-SF-O (facets) and SCS-S explained a further 7% (small to medium effect) (see Table 4). Mindfulness was the more substantive predictor of OCD symptoms (small to medium effect) than self-compassion (small effect). At the mindfulness facet level, all facets apart from 'acting with awareness' independently predicted OCD symptom severity, after controlling for depression severity ($\Delta R^2 = .07$) (small effects). At the OCD symptom subtype level (controlling for depression severity) there was a medium effect of the four mindfulness facets and self-compassion on obsessing symptoms ($\Delta R^2 = .16$) and a small effect on neutralising and physical compulsions (ordering: $\Delta R^2 = .03$; checking: $\Delta R^2 = .03$, washing: $\Delta R^2 = .02$; neutralising: $\Delta R^2 = .02$) (all F-change statistics significant at $p < .001$) (see Table D1, Online Appendix D for further details). The 'non-reactivity' and 'nonjudging' facets were independent negative predictors of obsessing symptoms (non-reactivity: $pr = -.29$, $sr^2 = .055$, $p = .001$); nonjudging: $pr = -.25$, $sr^2 = .039$, $p = .001$) (at Bonferroni-corrected p value .008). The 'describe' facet

independently predicted washing ($pr = -.10$, $sr^2 = .009$, $p = .001$), checking ($pr = -.07$, $sr^2 = .005$, $p = .002$) and neutralising symptoms ($pr = -.07$, $sr^2 = .004$, $p = .006$), but effects were small. The 'nonjudging' facet also significantly but marginally predicted checking symptoms ($pr = -.07$, $sr^2 = .005$, $p = .002$). Self-compassion was an independent negative predictor of ordering symptoms ($pr = -.08$, $sr^2 = .006$, $p = .003$) (small effect). All analyses were repeated with mindfulness experience (Y/N) and treatment status (not received vs. (partly) received) entered in step 1, followed by PHQ-9 (step 2) and FFMQ-SF and SCS-SF (step 3). Results showed these variables did not significantly independently predict OCI-R total or subscale scores (all F-change statistics non-significant (at $p < .05$).

Hypothesis 4

To examine whether trait mindfulness and self-compassion predicted OCD symptoms over and above obsessive beliefs and distress tolerance, robust hierarchical regression of mindfulness and self-compassion (step 3) on OCD symptoms was repeated with obsessive beliefs and distress tolerance entered in step 2, after controlling for depression severity (step 1). Table 5 shows that after depression severity ($R^2 = .19$) (step 1), obsessive beliefs and distress tolerance ($\Delta R^2 = .19$) (step 2), mindfulness (facets) and

Table 5 Hierarchical regression of PHQ-9, OBQ-20, DTS, FFMQ-SF-O total and subscales and SCS-SF on OCI-R total scale

Outcome	Model	Predictor	B	Lower	Upper	SE	β	p	ΔR^{2a}	pr	sr^2
OCI-R total $N = 1497$	1	PHQ-9	0.91	0.81	1.01	0.05	.44	.001	.19		
	2	PHQ-9	0.44	0.35	0.53	0.05	.20	.001	.19	.23	.040
		OBQ-20	0.23	0.20	0.26	0.01	.45	.001		.41	.125
		DTS	−0.95	−1.71	−0.19	0.39	−.06	.016		−.07	.003
	3	PHQ-9	0.41	0.31	0.5	0.05	.20	.001	.01	.21	.027
		OBQ-20	0.22	0.19	0.25	0.02	.44	.001		.37	.097
		DTS	−0.95	−1.71	−0.19	0.39	−.06	.020		−.07	.003
		FFMQ-SF-O	−0.14	−0.21	−0.07	0.04	−.11	.001		−.10	.006
		SCS-SF	0.12	0.02	0.21	0.05	.07	.018		.07	.003
	3	PHQ	0.41	0.31	0.51	0.05	.20	.001	.01	.21	.026
		OBQ-20	0.23	0.19	0.26	0.02	.44	.001		.37	.097
		DTS	−0.93	−1.71	−0.11	0.39	−.06	.021		−.07	.003
		Describe	−0.15	−0.29	−0.01	0.07	−.05	.033		−.06	.002
		Act aware	−0.12	−0.32	0.06	0.09	−.04	.173		−.04	.001
		Nonjudge	−0.07	−0.23	0.09	0.09	−.02	.437		−.02	.000
		Nonreact	−0.26	−0.45	−0.54	0.10	−.07	.009		−.07	.003
		SCS-SF	0.14	0.03	0.24	0.05	.08	.009		.07	.003

BCa 95% CI, SE and p-values based on 1000 bootstrap samples

OCI-R obsessive compulsive inventory-revised, *PHQ-9* patient health questionnaire-9, *OBQ-20* obsessive beliefs questionnaire-20, *DTS* distress tolerance scale, *FFMQ-SF-O* five-facet mindfulness questionnaire-short form full scale minus observe subscale, *SCS-SF* self-compassion scale-short form, ΔR^2 (change) explained variance, *pr* partial correlation, sr^2 semi-partial correlation squared

[a]F-change statistic significant at $p < .001$

self-compassion significantly but marginally predicted OCD symptoms ($\Delta R^2 = .01$). Mindfulness ($pr = -.10$, $sr^2 = .006$) and not self-compassion, was a statistically significant but small independent negative predictor of OCD symptoms. At the mindfulness facet level, none of the mindfulness facets independently predicted total OCD symptoms. However, at the OCD symptom subtype level (see Table D2, Online Appendix D for further details), there was a small effect of mindfulness and self-compassion on the obsessing symptom dimension ($\Delta R^2 = .05$), specifically a small to medium effect for 'nonreactivity' ($pr = -.27$, $sr^2 = .04$, $p < .001$), followed by 'nonjudging' ($pr = -.15$, $sr^2 = .01$, $p = .001$). Self-compassion also significantly independently predicted checking ($pr = -.09$, $sr^2 = .008$, $p = .002$) and washing symptoms ($pr = -.07$, $sr^2 = .004$, $p = .005$) but effects were small. None of the four mindfulness facets or self-compassion significantly independently predicted ordering or neutralising symptoms.

Discussion

Summary of Results

This study aimed to test if people with clinically significant OCD symptoms showed disproportionately poor mindfulness and self-compassion skills when compared to non-OCD clinical controls and to healthy controls, to explore the relationship between mindfulness and self-compassion with OCD symptom severity and to examine whether these constructs helped to explain OCD symptoms over and above depression, obsessive beliefs and intolerance of distress. The rationale for the study was to seek initial evidence for whether and how interventions that enhance mindfulness and self-compassion skills may benefit OCD symptom reduction.

The first hypothesis was supported as treatment-seeking adults with clinically significant OCD symptoms reported significantly lower trait mindfulness and self-compassion than healthy controls (in line with findings from Crowe and McKay (2016), Didonna et al. (2018) and Emerson et al. (2017)) and treatment-seeking adults with clinically significant depression and/or anxiety symptoms. This provides initial support for the notion that adults with OCD may experience particular challenges with being mindful and self-compassionate, even relative to people with other common mental health problems.

In support of the second hypothesis, there were significant medium to large negative associations of mindfulness and self-compassion with OCD symptoms among treatment-seeking adults, mirroring results from previous studies (Solem et al. 2015; Wetterneck et al. 2013). Results furthermore showed that mindfulness and self-compassion were

predictors of OCD symptoms (small effect), independent of depression severity (hypothesis 3).

Mindfulness was a stronger independent predictor of overall OCD symptoms (small effect) than self-compassion, which suggests that mindfulness skills may be more pertinent to OCD symptom reduction than self-compassion. At the mindfulness facet level, there was a small to medium effect of 'nonreactivity' and 'nonjudging' facets on obsessions. The describe facet was a predictor of washing, checking and neutralising symptoms and self-compassion was a predictor of ordering symptoms but effects were small. The acting with awareness facet was not independently associated with any OCD symptoms. This is perhaps surprising given the theorised central importance of acting with awareness to interrupting unhelpful repetitive thinking processes, such as rumination and worry (supported by the fact that Emerson et al. (2017) found a small effect for acting with awareness on the frequency and distress associated with obsessive intrusions) and habitual behavioural responses (e.g. Segal et al. 2013). The lack of association possibly reflects that compulsions in OCD are perhaps not best understood as automatic, habitual behaviours carried out with little awareness, but rather as functional behaviours aimed at reducing anxiety (Abramowitz and Jacoby 2015).

As predicted, mindfulness and self-compassion had a (comparable) negative association with obsessive beliefs (large effect) and a positive association with distress tolerance (medium to large effect), which was stronger for self-compassion than mindfulness. The latter is unsurprising as self-compassion and distress tolerance are both measured in relation to times of difficulty whereas the mindfulness measure also captured everyday life. Also, the distress tolerance measure incorporates appraisal of one's ability to tolerate distress, which reflects self-criticism (e.g. 'I am ashamed of myself when I feel distressed or upset').

While mindfulness and self-compassion independently contributed to the prediction of OCD symptoms beyond depression severity, these associations were attenuated once the role of obsessive beliefs and distress tolerance with OCD symptoms was accounted for; mindfulness but not self-compassion continued to be an independent, if marginal, predictor of OCD symptoms (hypothesis 4). Interestingly, distress tolerance was not an independent predictor of OCD symptom subtypes other than of obsessing symptoms (small effect), which is in line with results from a study on the associated construct of experiential avoidance (Abramowitz et al. 2009). None of the mindfulness facets were independent predictors of (total) OCD symptoms. At the OCD symptom subtype level, however, the ability to bring a nonreactive stance to inner experiences, i.e. to let unpleasant thoughts and feelings pass without acting to get rid of them, was a relatively

substantial predictor of obsessing symptoms (small to medium effect), followed by the ability to take a non-evaluative stance towards distressing thoughts and images (nonjudging). Self-compassion was an independent predictor of washing and checking symptoms but effects were very small.

Strengths and Limitations

The current study was conducted with a large clinical sample of treatment-seeking adults from a wide, varied geographical area. A priori power calculations ensured the study was sufficiently powered to test group differences in mindfulness and self-compassion. The study accounted for the known association of depression with mindfulness, self-compassion and OCD, and tested the unique association of mindfulness and self-compassion with OCD symptoms, over and above (more) established constructs that contribute to explaining OCD symptoms, i.e. obsessive beliefs and distress tolerance.

Limitations of the study included that respondents, who were predominantly White females, may not adequately represent all adults who experience OCD symptoms. To minimise the study's demands on participants and IAPT services, it was not possible to establish a formal diagnosis for study participants through a structured diagnostic interview, or to administer the Y-BOCS, which is the gold standard for assessing OCD symptom severity (e.g. Moritz et al. 2002). Instead, groupings were guided by clinical cut-off scores on well-established measures of OCD, depression and/or anxiety. Due to the significant overlap of depression and anxiety symptoms and in the absence of a formal diagnosis, it was not possible to make separate group comparisons of OCD with anxiety and with depression disorders, respectively. No upper age limit was applied to the clinical sample to ensure it was representative of routine IAPT treatment-seeking adults. Whilst aging processes could conceivably affect the variables of interest, supplementary analyses showed that excluding adults aged 65 + did not substantively alter the size or significance of effects for any of the analyses. The healthy control group was drawn from a student sample with resultant significant differences in age, education and employment between the clinical groups (OC and AD) and healthy controls. It would have been preferable to recruit a community sample as it would have been more likely to match the clinical sample on sociodemographic variables, but it was not feasible to resource for the recruitment of a large community sample. A large proportion of students presented with clinically significant symptoms of depression, anxiety and/or OCD, mirroring other studies of student mental health (e.g. Hunt and Eisenberg 2010). As a result, it was not possible to achieve a larger healthy controls sample, which contributed to unequal sample sizes. Significant, large effects were nonetheless found for all OC versus HC group comparisons, showing the study was sufficiently powered.

The study results cast doubt on the specificity of the recommended cut-off score for the OCI-R (e.g. Foa et al. 2002) as a very large proportion of treatment-seeking adults scored within the clinical range of OCD symptoms. Nonetheless, the OCI, from which the OCI-R is derived, is the primary outcome measure of OCD symptom severity within IAPT (Hay 2011). Also, the fact that the OC group endorsed obsessive beliefs and distress tolerance to a significantly greater degree than the AD group (Tables B1 and B2 in Online Appendix B) is in line with the cognitive model of OCD. Supplementary analyses showed that dividing the sub-groups based on an OCI-R cut-off score of 34, derived from the mean + 1 SD (total sample), did not have any notable impact on the size and significance of between-group effects.

While results were largely in line with predictions, it is evidently not possible to assume that mindfulness and self-compassion are causally related to OCD symptoms and by extension to conclude that enhancing mindfulness and self-compassion skills will reduce OCD symptoms. Instead, it is possible that OCD symptom reduction leads to improvements in mindfulness and self-compassion skills. Furthermore, the cross-sectional nature of the study precludes any firm conclusions about the nature of the relationship between mindfulness, self-compassion and obsessive beliefs. For example, there may be an indirect effect of mindfulness and self-compassion on OCD symptoms through obsessive beliefs. Also, the relationship of mindfulness and self-compassion with obsessive beliefs may reflect their shared association with constructs such as decentering (Bernstein et al. 2015) or meta-cognitive awareness (Teasdale et al. 2002) and further research is needed to ascertain their shared and unique conceptual elements.

Research and Clinical Implications

Future studies should attempt to replicate results with adults with a confirmed diagnosis of OCD and draw comparisons with matched adults with a diagnosis of depression and anxiety disorders (without OCD) to further examine the unique associations of mindfulness and self-compassion with OCD. As results from recent factor analytic studies of the SCS-SF are mixed (e.g. Garcia-Campayo et al. 2014; Gu et al. 2017; Hayes et al. 2016; Strauss et al. 2016), future studies should test the association of self-compassion with OCD using new measures of self-compassion once available. The nature of the relationship of mindfulness and self-compassion with

obsessive beliefs also needs to be explored further; the conceptual overlap of nonjudging and nonreactivity facets and obsessive beliefs with decentering or meta-cognitive awareness should also be examined further in the context of OCD (Bernstein et al. 2015; Segal et al. 2013). Also, it is conceivable that the small effect of mindfulness and self-compassion on OCD symptoms is mediated through obsessive beliefs. Studies that use experimental designs and include mediation analyses based on longitudinal data involving repeated measurement will be particularly helpful in confirming whether mindfulness and self-compassion skills have a direct effect on OCD symptoms or primarily impact OCD symptoms through their effect on obsessive beliefs (Kazdin 2007). Given the mixed evidence for (all) obsessive beliefs as a significant unique predictor of (dimensions of) OCD symptoms (e.g. Belloch et al. 2010; Steketee et al. 1998; OCCWG 2005; Taylor et al. 2006; Tolin et al. 2006; Viar et al. 2011; Wu and Carter 2008), it is also worth exploring how mindfulness and self-compassion relate to other psychological processes implicated in the maintenance of OCD symptoms (e.g. see Treanor 2011). The recent re-categorisation of OCD as a neuropsychiatric disorder (APA 2013), albeit controversial (Abramowitz and Jacoby 2015), also invites further research into the relationship of mindfulness and self-compassion with excessive habit formation, goal-directed behaviour deficits and the brain circuitry implicated in OCD.

Overall, results suggest that teaching mindfulness and self-compassion skills is likely to have only a small overall effect on OCD symptoms, with possibly a small-to-medium effect on the dimension of obsessing symptoms. This notion is supported by recent RCTs of Mindfulness-Based Cognitive Therapy (MBCT) adapted to OCD, either as a first-line (Selchen et al. 2018) or augmentation therapy for CBT for OCD (Key et al. 2017; Külz et al. 2018, Selchen et al. 2018), which overall show modest effects. The findings furthermore suggest that training mindfulness skills, particularly nonjudging and nonreacting skills, may be more pertinent to OCD symptom reduction than training self-compassion skills, although the latter may have a small benefit for physical compulsions. Targeting obsessive beliefs is likely to be more beneficial to OCD symptom reduction than training mindfulness and self-compassion skills per se, although training mindfulness skills may have a small additional benefit for obsessing symptoms, e.g. unwanted sexual or aggressive thoughts. It is possible that teaching mindfulness skills that are directly targeted at OCD symptoms may be more potent than the current study of the association between the general tendency to be mindful in daily life and OCD symptoms suggests. Also, MBIs for OCD may still effectively target obsessive beliefs (e.g. Key et al. 2017; Külz et al. 2018; Selchen et al. 2018). Whilst reductions in obsessive beliefs following MBIs would not necessarily

demonstrate that enhanced self-compassion and mindfulness skills accounted for the change, Key et al. (2017) found that an increase in mindfulness skills was significantly correlated with a reduction in obsessive beliefs ($r = -.63$). Mediation analyses would need to explore the causality of this relationship. In conclusion, this study showed that mindfulness and self-compassion contribute to explaining OCD symptoms. The nature of their relationship with other constructs used to explain OCD, specifically obsessive beliefs, needs to be explored further, in order to more clearly assert that teaching mindfulness and self-compassion skills may bring added benefits to adults with OCD above and beyond CBT.

Compliance with Ethical Standards

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