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‘I can’t accept that feeling’: Relationships between interoceptive awareness, mindfulness and eating disorder symptoms in females with, and at-risk of an eating disorder

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Abstract

Mindfulness based therapies (MBTs) for eating disorders show potential benefit for outcomes yet evidence is scarce regarding the mechanisms by which they influence remission from symptoms. One way that mindfulness approaches create positive outcomes is through enhancement of emotion regulation skills. Maladaptive emotion regulation is a key psychological feature of all eating disorders. The aim of the current study was to identify facets of emotion regulation involved in the relationship between mindfulness and maladaptive eating behaviours. In three cross-sectional studies, clinical (n=39) and non-clinical (n=137 and 119) female participants completed: 1) the Eating Disorder Inventory (EDI) eating specific scales (drive-for-thinness and bulimia) and the EDI psychological symptom scales (emotion dysregulation and interoceptive deficits); and 2) mindfulness, impulsivity, and emotion regulation questionnaires. In all samples mindfulness was significantly and inversely associated with EDI eating and psychological symptom scales, and impulsivity. In non-clinical samples interoceptive deficits mediated the relationship between mindfulness and EDI eating specific scales. Non-acceptance of emotional experience, a facet of interoceptive awareness, mediated the relationship between mindfulness and eating specific EDI scores. Further investigations could verify relationships identified so that mindfulness based approaches can be optimised to enhance emotion regulation skills in sufferers, and those at-risk, of eating disorders.

Introduction

Emotion dysregulation is considered a key psychological characteristic of many psychiatric disorders whereby difficulties experiencing and differentiating emotions, and modulating or attenuating their intensity, underpins psychopathology (Sheppes et al., 2015). Indeed, the emotion dysregulation concept has received increasing support as a 'transdiagnostic' indicator of mental ill-health (Aldao et al., 2010, Kring and Sloan, 2010). Emotion regulation as a multidimensional construct is characterized by flexible modulation strategies, behavioural control, emotional awareness and distress tolerance (Gratz and Roemer, 2004). Similar conceptualisations highlight awareness, goals and strategies as features of adaptive emotion regulation (Gross and Jazaieri, 2014). Maladaptive emotion regulation, widely referred to as *emotion dysregulation*, is a key psychological characteristic of all eating disorders and is increasingly viewed as a transdiagnostic risk and/or maintenance factor rather than being disorder specific (Brockmeyer et al., 2014, Lavender et al., 2014, Merwin, 2011, Merwin et al., 2011, Svaldi et al., 2012).

Considerable attention has been directed towards emotion regulation as a mediator of the putative benefits of mindfulness based therapies (MBTs) (Chambers et al., 2009, Chiesa et al., 2014, Chiesa et al., 2013) whereby MBTs may affect symptom outcome by promoting more effective emotion regulation and greater flexibility responding to mental and external events (Brown et al., 2007, Moore and Malinowski, 2009, Roemer et al., 2015). Evidence is accumulating regarding the specific nature of emotion regulation difficulties in eating disorders (Brockmeyer et al., 2014, Butryn et al., 2013, Garner, 2004, Haynos and Fruzzetti, 2011, Lavender et al., 2014, Merwin, 2011, Racine and Wildes, 2013) and the potential therapeutic benefits of MBTs for eating related disorders has received increased empirical support (DeSole, 2013, Godsey, 2013, Katterman et al., 2014, Kristeller and Epel, 2014, O'Reilly et al., 2014, Wanden-Berghe et al., 2011). The nature of MBT is grounded in the development and wider application of Mindfulness Based Stress Reduction programmes (Kabat-Zinn, 2003), for example, its incorporation into Acceptance and Commitment Therapy (Hayes, 2011). In this context, mindfulness is frequently 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" (Kabat-Zinn, 2003, p. 145). Although the emerging use of MBTs shows promise in terms of improving eating disorder outcomes, evidence is scarce regarding the mechanisms by which MBTs may influence improvement in eating disorder symptoms such as drive-for-thinness and bulimic cognitions and behaviours. The present study addresses this gap in understanding by examining facets of emotion regulation through which dispositional mindfulness may operate to influence symptoms in those with an eating disorder and in university students who a are recognised to be a population at greater risk of developing eating disorders than the general population (Berg et al., 2009, Eisenberg et al., 2011, Sepulveda et al., 2008, Wilfley et al., 2013).

The rationale for cultivating mindfulness skills as a component of therapy for eating disorders rests on the proposition that by cultivating mindful awareness of internal experiences (e.g, emotions, physical sensations) this facilitates self-acceptance, cognitive flexibility, compassion for self and others, and generally improves ability to respond adaptively to disturbing emotions (Katterman et al., 2014). Preliminary evidence regarding the benefits of MBTs for eating disorders illustrates that in addition to positive outcomes for eating specific symptoms (e.g., binge eating), key psychological characteristics are also amenable to change in clinical cases (Merwin et al., 2011), namely, '*interoceptive awareness*' and '*emotion regulation difficulties*' (Clausen et al., 2011, Gustafsson et al., 2010, Nevonen et al., 2006). Early in the conceptualisation of eating disorders it was proposed that 'deficits' in interoceptive awareness were central to understanding the aetiology and maintenance of symptoms (Bruch, 1962, Skarderud, 2009).

The putative deficit in interoceptive awareness relates to on-going confusion and difficulty recognising, being aware of, and accepting internal bodily signals, especially hunger, often confusing such signals with emotions (Cameron, 2001). Interoceptive awareness abilities appear to be essential prerequisites for adaptive emotion regulation (Fustos et al., 2013). Deficits in interoceptive awareness, for example being unable to distinguish hunger from anxiety, stand out as a common feature across anorexia and bulimia nervosa (Lavender et al., 2015, Lavender et al., 2014, Merwin, 2011, Merwin et al., 2013, Merwin et al., 2011, Merwin et al., 2010, Milos et al., 2004). By contrast, the diagnostic conceptualisation of '*emotion regulation difficulties*' as a key psychological problem in eating disorders relates to a tendency toward mood instability, impulsivity, recklessness, anger and self-destructiveness (Garner, 2004).

Both interoceptive awareness and emotion regulation difficulties have consistently been assessed in outcome studies using specific subscales of the Eating Disorders Inventory (EDI) (Garner, 2004). The EDI refers directly to 'deficits' whereby the interoceptive deficits scale reliably predicts symptoms across all eating disorder types compared to healthy controls (Clausen et al., 2011), and discriminates between eating disorder patients and controls (Nevonen et al., 2006). Risk of developing eating disorders is jointly predicted by the interoceptive deficits and emotion dysregulation scales (Gustafsson et al., 2010). A limitation of the assessment of interoceptive deficits using the EDI has been highlighted (Merwin et al., 2010) such that the EDI scale does not clearly differentiate between the two dimensions of the putative interoceptive deficit, namely, *lack of clarity* and *non-acceptance* of affective arousal. Each dimension may implicate separate mechanisms underlying symptom appearance and by consequence target of intervention. For example, non-acceptance of affective arousal may lead to avoidance-based coping associated with dietary restriction and binge-purge behaviour (Merwin et al., 2010).

Merwin et al. (2010) suggest that the non-acceptance component of the interoceptive deficit is more important than the lack of clarity component, and present evidence to support that distinction in predicting eating disorder symptoms. By consequence they propose that mindfulness and acceptance based interventions "are well suited to address this core ED symptom [non-acceptance of affective arousal]" (p. 899) (Merwin et al., 2010). However it may be premature to conclude that lack of clarity of affective arousal is not so important in eating disorders. In a non-clinical study that used the heartbeat detection method of assessing interoceptive awareness EEG analysis shows that adaptive emotion regulation depends upon how clearly one is aware of interoceptive bodily signals (Fustos et al., 2013). Mindfulness meditation promotes adaptive emotion regulation by enhancing awareness of internal states (Menezes et al., 2012) but also by enabling non-judgemental acceptance of internal states as passing phenomena. Therefore, it is not yet certain whether one or both aspects of interoceptive awareness examined by Merwin et al. (2010) should be considered as "targets" of MBTs. Despite the claims that MBTs can improve outcomes for eating disorder sufferers, perhaps by addressing key psychological characteristics such as interceptive awareness deficits, empirical evidence to support relationships between mindfulness, interoceptive awareness and eating disorder symptoms is needed to support on-going therapy development.

Despite accumulating evidence regarding emotion regulation and interoceptive awareness difficulties as transdiagnostic factors in eating disorder aetiology, a subcomponent of the emotion regulation construct, namely impulse control, may prove useful in differentiating eating disorder subtypes. Gratz and Roemer (2004) aligned their view of emotion regulation with theoretical positions (Linehan, 1993, Thompson, 1994) that postulate adaptive emotion regulation to be "the ability to inhibit inappropriate or impulsive behaviours, and behave in accordance with desired goals when experiencing negative emotions" (p. 42, Gratz and Roemer,

2004). Impulse control falls under the broader multidimensional construct of impulsivity, that also encompasses urgency, response inhibition and delayed gratification (Bari and Robbins, 2013). Impulsivity differentiates between individuals with eating disorders and controls and is implicated as a either a causal or moderating factor in eating disorder symptom expression (Waxman, 2009). Recent reviews and empirical studies highlight how impulsivity, especially impulse control, as defined in the multidimensional emotion regulation model (Gratz and Roemer, 2004) is expressed differentially in clinical samples across eating disorders (Brockmeyer et al., 2014, Lavender et al., 2015). Additionally in non-clinical individuals lower dispositional mindfulness is related to greater emotional eating associated with eating disorders yet this relationship is mediated by impulsivity (Lattimore et al., 2011), and is strongly related to different facets of impulsivity after controlling for negative affect and psychological distress (Peters et al., 2011).

Beyond the behavioural manifestation of disordered eating (e.g., purging, bingeing, restriction), key psychological problems including difficulties in emotion regulation, interoceptive awareness and impulse control often persist in clinical cases beyond remission from behavioural symptoms (Holland et al., 2013, Slane et al., 2013, Wagner et al., 2006) and thus therapies should be focussing on these key psychological problems implied in the etiology and maintenance of eating disorders to prevent reoccurrence of eating specific symptoms. MBTs show promise for effectively treating eating disorders (Godsey, 2013, Katterman et al., 2014, Wanden-Berghe et al., 2011) possibly by fostering increased emotion acceptance and decreased emotion avoidance which may break connections between eating disorder symptoms and maladaptive emotion regulation (Wildes et al., 2010). Given the available evidence a plausible assumption is that MBTs improve awareness and acceptance of on-going emotion (Butryn et al., 2013, Chapman et al., 2006, Juarascio et al., 2013), thereby limiting impulsive tendencies, and by consequence create more effective and adaptable behavioural options for dealing with negative or challenging emotional reactions. Although recent findings indicate that mindfulness moderates the relationship between eating disorder cognitions and eating specific symptoms in non-clinical university students (Masuda et al., 2011, Masuda et al., 2012) there is a lack of knowledge regarding the impact mindfulness may have on the relationship between key psychological problems and eating specific symptoms such as excessive calorie restriction and binge eating. However, in a recent study of eating disorder patients at admission to treatment, facets of mindfulness similar to those measured by the Five Facet Mindfulness Questionnaire (Baer et al., 2006), namely present moment awareness and non-judgmental acceptance, were negatively correlated with the EDI eating specific scales of drive-for-thinness and bulimia (Butryn et al., 2013). Furthermore, improvements in awareness and non-judgmental acceptance were associated with improvement in eating specific symptoms post-treatment (Butryn et al., 2013). Although Butryn et al. (2013) identified a relationship between two core features of dispositional mindfulness that reflect the widely used definition (Kabat-Zinn, 2003) and the EDI eating specific symptoms, their study did not address a path through which mindfulness is related to potential improvement in eating disorder symptoms.

To develop understanding of potential causal pathways there is a need to identify whether mindfulness alters key psychological problems (emotion dysregulation, interoceptive deficits, and impulse control) to affect outcomes (e.g., reduction in drive-for-thinness and bulimic behaviours). Such relationships can be modelled statistically using cross-sectional methodology. This approach was adopted in the current study to examine how dispositional mindfulness is associated with eating disorder symptoms through a potential influence on emotion dysregulation, interoceptive awareness deficits and impulse control. Three studies were conducted, one in a sample of outpatients from an eating disorder service, and the other two in university student samples where the risk of developing eating disorders is greater than in the general population (Berg et al.,

2009, Eisenberg et al., 2011, Wilfley et al., 2013). Prospective evidence from a non-clinical population indicates that emotion regulation problems amplify the influence maladaptive beliefs and cognitions have on the risk for developing eating disorders (Stice et al., 2011). Considering these links between emotion regulation and eating disorder development, and the prevalence of eating disorder symptoms in community samples, the inclusion of non-clinical samples in the current study afforded an opportunity to determine whether the suggested associations between mindfulness, key psychological problems and eating specific symptoms exist outside of clinical settings.

In view of the widespread use of the EDI in outcome studies we utilised this measure in all three studies. In our first study we predicted that lower dispositional mindfulness would be associated with higher scores on the EDI-3 scales of drive-for-thinness, bulimia, emotion dysregulation and interoceptive deficits, and with higher scores on an impulsivity measure. According to our propositions outlined above we expected that the relationship between mindfulness and eating specific symptoms would be mediated jointly or independently by emotion dysregulation, interoceptive deficits and impulsivity. We tested these propositions again in study two to determine whether similar associations and mediation effects would be present in university students who are at greater risk of developing eating disorder than the general populationan. In view of the evidence regarding the nature of interoceptive deficits in eating disorder patients (Merwin et al., 2010) our final study tested the predictions Merwin et al. (2010) they made regarding the relation between eating disorder symptoms and both dimensions of the putative interoceptive deficit, namely that symptoms of bulimia and anorexia nervosa would be associated with non-acceptance of affective arousal rather than lack of clarity of arousal. The novel aspect of our replication of Merwin's work (Merwin et al., 2010) is an additional prediction regarding the role of dispositional mindfulness. We predicted that non-acceptance of affective arousal would mediate the relation between dispositional mindfulness and eating disorder symptoms of anorexia and bulimia nervosa.

Section snippets

Participants

Thirty-nine Caucasian female participants from an outpatient eating disorder service self-selected to take part in the study (age M=29yr; range 18–50yr, SEM=1.5). The primary diagnostic characteristics (DSM-IV) obtained from medical records were: Anorexia Nervosa (n=7), Binge Eating Disorder (n=4), Bulimia Nervosa (n =16), Eating Disorder Not Otherwise Specified (n=12). Participants attended assessments at a National Health Service Eating Disorder Therapy Service (UK, North West). Ethical…

Comparative scores on EDI-3 across all samples

Information regarding scores on the anorexia and bulimia scales of EDI-3 (drive-for-thinness and bulimia) are presented in Table 1 for comparative purposes across all three samples. In addition to mean (SD) raw scores, information is provided regarding percentage of participants scoring in clinical ranges according to published normative data (Garner, 2004). Comparison of averages indicates that the clinical sample scores substantially higher than those in study 2 and study 3, especially when…

Discussion

The purpose of the studies presented was to examine the relationship between mindfulness and eating disorder symptoms as measured by the EDI-3 and how interoceptive awareness deficits, impulsivity and emotion dysregulation may play a part in this relationship. The reason for examining these relationships was to identify possible targets that mindfulness-based therapies may focus on to improve outcomes. By examining these issues in a clinical sample and in samples at-risk of developing eating…

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> *Citation Excerpt :*
>
> …Low levels of dispositional mindfulness are related to ACEs and specific types of childhood adversity (Daigneault et al., 2016; Whitaker et al., 2014). Dispositional mindfulness negatively correlates with various psychopathological symptoms, including depressive, anxiety, PTSD, and disordered eating symptoms (e.g., Daigneault et al., 2016; Desrosiers et al., 2013; Lattimore et al., 2017; Tomlinson et al., 2018). Further, dispositional mindfulness is inversely associated with mechanisms through which childhood adversity leads to adult psychopathological symptoms.…

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>
> …This left 100 research articles for consideration. Two articles presented two studies relevant to the association between disordered eating and interoception (Maïano et al., 2016; Young et al., 2017) and one article presented three relevant studies (Lattimore et al., 2017). Therefore, the final number of studies included was 104.…

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