



Dispositional mindfulness and reward motivated eating: The role of emotion regulation and mental habit



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ABSTRACT

Evidence regarding the effectiveness of mindfulness based interventions (MBIs) for eating disorders, weight management and food craving is emerging and further studies are required to understand the underlying mechanisms of MBIs in these domains. The current study was designed to establish the role of specific mechanisms underlying the putative relationship between mindfulness and reward motivated eating. We predicted that mindfulness would be negatively related to features of reward motivated eating and that this association would be mediated by emotion regulation and habitual negative self-thinking. A cross-sectional survey measuring uncontrolled and emotional eating, mindfulness, emotion regulation and habitual negative self-thinking was completed by female and male meditators and non-meditators (N = 632). Lower levels of dispositional mindfulness were associated with difficulties in emotion regulation, habitual negative self-thinking and both emotional and uncontrolled eating. Difficulties in emotion regulation significantly mediated the mindfulness-uncontrolled eating relationship. Habitual negative self-thinking significantly mediated the mindfulness-emotional eating relationship. Participants with meditation experience reported greater levels of dispositional mindfulness, fewer difficulties with emotion regulation and habitual negative self-thinking and reduced uncontrolled eating tendencies, compared to non-meditators. The findings suggest that MBIs designed to change reward motivated eating and weight control should focus on emotion regulation and mental habits as underlying mechanisms.

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1. Introduction

Mindfulness has attracted considerable popular interest (Jha, 2013) and scientific investigation (Chiesa & Serretti, 2010; Davis & Hayes, 2011; Malinowski, 2013) in the past two decades. Although various definitions of mindfulness have been proposed and no clear consensus has been reached (Chiesa, 2012; Shonin, Van Gordon, & Griffiths, 2014) a broad definition often referred to by researchers (Chiesa & Malinowski, 2011; Malinowski, 2008; Zgierska et al., 2009) describes mindfulness as ‘paying attention in a particular way, on purpose, in the present moment, and non-judgementally’ (p.4; Kabat-Zinn, 1994). One reason for the popularity of this definition presumably is that a large proportion of research is concerned with mindfulness-based interventions such

as mindfulness-based stress reduction (MBSR) or mindfulness-based cognitive therapy (MBCT), both of which are built around the approach to mindfulness introduced by Kabat-Zinn. A recent meta-analytic review of the mechanisms of mindfulness-based interventions has identified strong and consistent evidence for the role of emotional and cognitive reactivity (Gu, Strauss, Bond, & Cavanagh, 2015). Substantial evidence exists to demonstrate that mindfulness training produces beneficial outcomes by promoting effective emotion regulation (Chambers, Gullone, & Allen, 2009; Chiesa, Serretti, & Jakobsen, 2013). The case for developing mindfulness skills to manage unhealthy habitual behaviour rests on the proposition that cultivating mindful awareness of internal experiences (e.g., emotions and physical sensations) facilitates self-acceptance, cognitive flexibility and generally improves the ability to respond adaptively to disturbing emotions (Katterman, Kleinman, Hood, Nackers, & Corsica, 2014). In this respect mindfulness has the potential to moderate the influence of automatic approach-avoidance tendencies evident in maladaptive reward

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motivated behaviour (Ostafin, Bauer, & Myxter, 2012). Maladaptive eating behaviour provides a potent vehicle to identify mechanisms of reward motivated behaviour governed by automatic processes (Lowe, Van Steenburgh, Ochner, & Coletta, 2009). For example, laboratory based evidence indicates that brief mindfulness meditation experience attenuates appetitive reaction to rewarding food cues (Fisher, Lattimore, & Malinowski, 2016; Lacaille et al., 2014; Papies, Barsalou, & Custers, 2012).

The current study was designed to identify the role of emotion regulation and mental habit in the putative relationship between mindfulness and reward driven eating behaviour. The construct of 'mental habit' describes *how* we think (the process) rather than *what* we think (the content) that is characterised by automaticity, lack of awareness, mental efficiency, lack of control and lack of conscious intent (Verplanken, Friborg, Wang, Trafimow, & Woolf, 2007). The focus on *how* phenomena are experienced rather than changing the *content* of these experiences per se is consistent with how positive outcomes of mindfulness practices can be understood (Bishop et al., 2004; Chiesa & Malinowski, 2011; Shapiro, Carlson, Astin, & Freedman, 2006).

Emotion regulation is a multidimensional construct characterised by flexible modulation strategies, behavioural control, emotional awareness and distress tolerance (Gratz & Roemer, 2004). Difficulties in emotion regulation are evident in disorders where automatic habitual reactivity to reward characterises unhealthy behavioural outcomes, for example binge eating or bulimia type disorders (Svaldi, Tuschen-Caffier, Lackner, Zimmermann, & Naumann, 2012), and addiction (Witkiewitz, Lustyk, & Bowen, 2012). Enhancement of emotion regulation skills can be fostered by cultivating attention to habitual modes of reacting, most notably by use of mindful attention training or meditation (Brown, Ryan, & Cresswell, 2007).

The term dispositional mindfulness describes an inherent human capacity that is experienced to lesser or greater extent by all humans and is not culturally bound (e.g. Bergomi, Tschacher, & Kupper, 2012; Brown & Ryan, 2004; Kabat-Zinn, 2003). Practiced regularly over longer time spans of months and years, the state of mindfulness cultivated in mindfulness meditation is proposed to become a stable, dispositional tendency to be mindful across situations in daily life (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Brown et al., 2007). As dispositional mindfulness describes both an inherent capacity and the outcome of cultivation through meditation practice, the current study includes analysis that compares those with and without meditation experience, and self-reported mindfulness.

Several psychological processes have been proposed to underpin the positive associations between mindfulness practice and adaptive emotion regulation. Firstly, increasing non-judgemental awareness facilitates healthy engagement with thoughts and emotions (Hayes & Feldman, 2004). Secondly, mindfulness training of attention may result in an improved capacity to disengage from aversive emotional stimuli, thereby enabling greater emotional flexibility (Lutz, Slagter, Dunne, & Davidson, 2008). Finally, mindfulness practice promotes meta-cognitive awareness (Malinowski, 2013), an ability to decentre from thoughts and emotions and re-perceive them as transient rather than taking them as reality. Decentring in this way allows disengagement from overt and covert habitual reactions (Shapiro et al., 2006; Williams, 2008).

The ability fostered by mindfulness practice to disengage from habitual reactions has consequences for behaviour and cognition. For example, Lacaille et al. (2014) showed disengaging from one's thoughts about food effectively reduces food cravings. On a behavioural level habit can be defined as 'a recurrent, often unconscious pattern of behaviour that is acquired through frequent repetition' (Pinker et al., 2013). On a cognitive level the mental

habit concept extends beyond overt behaviour to covert mental events or 'mental habits' such as habitual negative self-thinking (Verplanken, 2010). This construct is distinct from other forms of repetitive thought such as rumination, as it relates to the habitual nature of the process rather than the content of cognition (Verplanken, 2010). Verplanken and Tangelder (2011) have proposed that mindfulness mitigates dysfunctional effects of habitual negative thinking through two key processes. Firstly, present-moment awareness may interrupt the automatic quality of the mental habit. Secondly, non-judgmental acceptance may reduce the risks of dysfunctional consequences by diminishing the weight that negative thoughts are given. By consequence they suggest that emotional distress associated with experiencing habitual negative self-thinking is reduced (Verplanken & Tangelder, 2011). This implies that the modulation of mental habit by mindfulness should in turn reduce engagement in emotional eating behaviours that arguably arise from attempts to alleviate aversive internal states (Heatheron & Baumeister, 1991). Prior research indicates that difficulties in emotion regulation and habitual negative self-thinking are associated with an increased vulnerability to experience problematic eating behaviours (Lavender et al., 2015, 2014; Sim & Zeman, 2004; Verplanken & Tangelder, 2011; Verplanken & Velsvik, 2008; Whiteside et al., 2007).

It is clear from everyday observation that many individuals have difficulty controlling what and how much they eat. This phenomenon is increasingly evident when individuals are motivated to eat when not physically hungry, and is referred to as hedonic hunger or reward motivated eating (Lowe & Butryn, 2007). Although intentional (controlled) processes, for example, dietary restraint (Coelho, Polivy, Herman, & Pliner, 2008), can change overt eating behaviour by inhibiting automatic appetitive reactions to food cues, under specific conditions the ability to engage controlled processes is weakened. This is evident when individuals experience demanding cognitive load (Lattimore & Maxwell, 2004), stress (Wallis & Hetherington, 2009), and aversive negative affect (Heatheron & Baumeister, 1991; Heatheron, Polivy, Herman, & Baumeister, 1993), all of which undermine controlled behaviour such as dietary restraint. Furthermore, individual differences in sensitivity to reward further weaken intentional effort to control thoughts and emotions associated with reward motivated eating (Tetley, Brunstrom, & Griffiths, 2010). Relying solely on controlled processes to regulate automatically reward motivated hedonic eating is not sufficient because self-control resource capacity is variable and limited (Tice & Bratslavsky, 2000). Recent evidence indicates that mindfulness based techniques moderate the effect of automatic processes on overt behaviour, e.g., craving for food and addictive substances (Alberts, Mulken, Smeets, & Thewissen, 2010; Alberts, Thewissen, & Raes, 2012; Ostafin et al., 2012; Witkiewitz & Bowen, 2010; Witkiewitz, Bowen, Douglas, & Hsu, 2013). Furthermore, dispositional mindfulness is negatively associated with self-reported emotional eating and reward motivated eating (Lattimore, Fisher, & Malinowski, 2011).

In sum, the recent findings reviewed above highlight emerging support for the beneficial role of mindfulness in improving maladaptive, reward motivated behaviours which are characterised by automatic reactivity. Emotion regulation and mental habit have been identified as two potential mechanisms that may explain how mindfulness is related to reward motivated eating behaviour. Reward motivated eating behaviour can be measured using the emotional and uncontrolled eating subscales of the Three Factor Eating Questionnaire (Cappelleri, Bushmakin, Gerber, Leidy, Sexton, Lowe, et al., 2009) which has proven associations with dispositional mindfulness and captures tendencies to automatically react to hedonic food cues (Barkeling, King, Naslund, & Blundell, 2006). We expected that dispositional mindfulness would be associated with

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