



## Research report

The effects of three mindfulness skills on chocolate cravings<sup>☆</sup>Julien Lacaille<sup>\*</sup>, Jinshia Ly, Natalie Zacchia, Sophia Bourkas, Emma Glaser, Bärbel Knäuper

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## ABSTRACT

There is accumulating evidence that mindfulness-based interventions are useful in reducing food cravings. However, existing studies have applied many mindfulness skills together, rendering it unclear which skills are essential and which are unnecessary. Based on recent investigations into the efficacy of individual mindfulness skills at managing cravings, the goal of the present study was to compare the efficacy of two-week mindfulness-based interventions, targeting different combinations of specific mindfulness skills (awareness, acceptance, disidentification), at reducing trait and state chocolate cravings. We compared the efficacy of the mindfulness interventions to an active control intervention (distraction). Overall, disidentification emerged as the most efficacious mindfulness skill. After two weeks of practice, those trained in disidentification reported less intense state cravings after a craving induction task compared with those trained in distraction. Mediation analyses revealed that this effect was mediated first by a greater increase in the disidentification skill, and subsequently by a greater decrease in trait chocolate cravings. Manipulation checks revealed that training the disidentification skill was more successful than training the other skills. Disidentification is shown to be a crucial mindfulness skill that can be taught to help better cope with food cravings.

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## Introduction

Food cravings are intense desires to consume specific foods and are a common phenomenon, as anywhere between 40% and 97% of people report experiencing them (Gendall, Joyce, & Sullivan, 1997; Weingarten & Elston, 1990). Although not necessarily problematic, food cravings are associated with maladaptive consequences. They can lead to unhealthy weight gain via snacking and binge eating (Basdevant, Craplet, & Guy-Grand, 1993; Drenowski, 1991; Gendall, Joyce, Sullivan, & Bulik, 1998), are associated with bulimia (Mitchell, Hatsukami, Eckert, & Pyle, 1985), guilt (Hetherington & Macdiarmid, 1995), depression (Gendall et al., 1998), decreased quality of life (Gendall et al., 1997), and have been shown to impair cognitive performance (Kemps, Tiggemann, & Grigg, 2008; Tiggemann, Kemp, & Parnell, 2010). Therefore, finding effective ways through which people can manage food cravings is of importance.

Mindfulness has been proposed as a relevant therapeutic intervention to assist in the management of cravings based on its theo-

retical connection to Buddhism (Marlatt, 2003). From a Buddhist perspective, cravings are a phenomenon of interest because they are thought to be in part responsible for human suffering (Ñanamoli & Bodhi, 1995). Cravings are described as attempts to prolong pleasant experiences and avoid unpleasant experiences. Both attempts can result in an increase in craving-related cognitions, which keeps one captured in a state of suffering (Grabovac, Lau, & Willett, 2011). This process of cognitive proliferation is consistent with a prominent cognitive theory of cravings, the Elaborated Intrusion (EI) theory of desire (Kavanagh, Andrade, & May, 2005; May, Andrade, Kavanagh, & Hetherington, 2012). According to the EI theory, cravings are thought to develop as rewarding spontaneous mental events, elicited by craving-related cues, which are then elaborated on in working memory and develop into full-blown craving episodes. For example, in an attempt to prolong the pleasant experience of the thought of a chocolate cake, triggered by the smell of chocolate, one might elaborate on the initial thought by imagining eating the cake and creating vivid imagery of the taste and texture in the mouth. All this exacerbates the craving state. Buddhist teachings claim that we can reduce our suffering by freeing ourselves from the command of our cravings and from the ensuing generation of mental events. The Buddha proposed mindfulness practice as a method to free ourselves from our cravings (Ñanamoli & Bodhi, 1995).

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While mindfulness practice involves developing various skills, it remains unclear which specific skills are involved. Most conceptualizations of mindfulness practice include three basic skills (e.g., Baer, 2003; Bishop, Lau, Shapiro, & Carlson, 2004; Brown, Ryan, & Creswell, 2007; Coffey, Hartman, & Fredrickson, 2010; Shapiro, Carlson, Astin, & Freedman, 2006; Teasdale, 1999; Tran, Glück, & Nader, 2013). Practicing mindfulness involves (1) continuously monitoring one's momentary experiences. Importantly, this monitoring is done in an impartial way such that one is refraining from pursuing pleasant experiences or from avoiding unpleasant experiences. This detachment from one's desire to pursue or avoid experiences can be achieved (2) by letting these experiences come and go on their own without judging them, and (3) by distinguishing oneself as separate from these experiences. Although these abilities are assigned various labels in the mindfulness literature depending on the context, in this study, which occurs in a craving context, we refer to (1) the ability to monitor one's cravings as a skill labeled "awareness", (2) the ability to refrain from controlling and judging craving experiences as a skill labeled "acceptance", and (3) the ability to separate oneself from thoughts about cravings as a skill labeled "disidentification". Because cravings are thought to arise as one pursues or avoids certain experiences, resulting in a process of cognitive elaboration (Grabovac et al., 2011), skills that discourage this process, namely acceptance and disidentification, are likely effective skills in the management of cravings. While being aware of one's experience is a pre-requisite for accepting it or disidentifying from it, awareness on its own should theoretically be insufficient to effectively manage cravings. The reason is that awareness alone does not specify *how* to "detach" oneself from the command of cravings.

Emerging empirical evidence suggests that mindfulness strategies are effective at managing cravings. For instance, interventions using mindfulness exercises have been shown to be effective at reducing food cravings (Alberts, Mulken, Smeets, & Thewissen, 2010; Alberts, Thewissen, & Raes, 2012; Forman et al., 2007) as well as substance-use cravings (Bowen et al., 2009; Witkiewitz, Bowen, Douglas, & Hsu, 2012). Alberts et al. (2012) found that compared with a wait-list control group, women with disordered eating behaviours who participated in an eight-week mindfulness-based intervention reported a significant reduction in food cravings after the intervention.

While these studies provide support for the utility of mindfulness at managing cravings, they do not elucidate the mechanisms by which food cravings can be reduced. Because these interventions typically contain exercises that combine different mindfulness skills, it is unclear which aspects of mindfulness are most helpful and which may be unnecessary to train. Investigating the efficacy of exercises targeting different combinations of mindfulness skills would inform theories about how mindfulness leads to changes in cravings as well as facilitate the development of more effective and efficient methods to manage cravings by isolating "active" skills currently used in multi-component interventions.

There are emerging findings on the efficacy of exercises using different combinations of mindfulness skills. These findings are largely based on food craving (Alberts, Thewissen, & Middelweerd, 2013; Litvin, Kovacs, Hayes, & Brandon, 2012; May, Andrade, Batey, Berry, & Kavanagh, 2010; Moffitt, Brinkworth, Noakes, & Mohr, 2012; Papiés, Barsalou, & Custers, 2012) and substance-use studies (Szasz, Szentagotai, & Hofmann, 2012; Westbrook et al., 2011). In the following section, we review studies, in which the efficacy of the awareness, acceptance, and disidentification skills at managing cravings was examined.

May et al. (2010) examined the efficacy of exercises targeting the awareness skill at managing cravings. Specifically, the researchers tested the extent to which being aware of one's somatic sensations reduced the intensity of cravings and craving-related thoughts in

participants who experienced frequent food cravings. They found that when comparing the cravings of hungry participants before and after applying these awareness-enhancing strategies, there was no change in their state craving intensity, nor when compared with a control group in which participants were not given a specific strategy to apply. While this finding would be consistent with the theory-based prediction that awareness without further instruction is insufficient, this lack of change in craving intensity may alternatively have been due to the paradigm used, as cravings were not experimentally induced in this study, perhaps resulting in a floor effect. It is unclear if developing awareness without additional instruction is an effective skill at managing cravings.

The effects of acceptance-based strategies on cravings have been tested in a few studies, with contradictory findings. Westbrook et al. (2011) tested the efficacy of an acceptance manipulation at reducing cigarette cravings. Smokers who had abstained from smoking for 12 h were presented with smoking-related pictures during fMRI. Participants were trained to both (1) simply look at the pictures with no further instruction and (2) to remain aware of the reactions to the pictures without judging them (i.e., acceptance). They were then cued to either apply the "look as they normally would" instructions or the "look in a non-judgmental manner" instructions while being presented the craving-inducing pictures. When they applied the "look non-judgmentally" instructions, they reported less intense cravings and demonstrated diminished neural activity in a craving-related brain region, compared to when they applied the "look normally" instructions.

Although Westbrook et al. (2011) provided empirical support for the efficacy of an acceptance-based strategy at reducing cravings, two subsequent studies revealed contradicting evidence. Szasz et al. (2012) briefly trained smokers to remain aware of and tolerate their cigarette cravings while being exposed to smoking-related cues in the laboratory. The researchers found that, contrary to their expectations, participants accepting their cravings experienced an increase in craving intensity, which was not the case for participants in another experimental condition, who were instructed to reappraise the consequences of smoking as negative. More recently, Alberts et al. (2013) tested the short-term effect of a commonly used acceptance-based exercise to manage food cravings. Hungry participants were instructed to become aware of their cravings and refrain from avoiding or controlling them by tolerating them while being exposed to desirable foods. Contrary to expectations, accepting cravings resulted in an increase in craving intensity, which was not the case for participants in another experimental condition, who were instructed to suppress their cravings. The authors speculated that while acceptance strategies may be effective at reducing cravings in the long term, as suggested by previous findings from interventions including such exercises (Alberts et al., 2010, 2012), they may be counterproductive in the short-term. They reasoned that this is perhaps due to insufficient exposure to craved cues without reacting to them, which would be necessary for the extinction of cravings to occur. As such, it remains unclear whether training people to accept their cravings is useful or counterproductive in the management of cravings, and if it is useful, what the minimum dose of training is.

Contrary to investigations of acceptance-based interventions, studies investigating the effects of disidentification on cravings consistently support its efficacy at managing cravings. Papiés et al. (2012) found that participants who disidentified from their thoughts resulted in changes in their preferential reactions to attractive food. More specifically, they recorded participants' implicit approach or avoidance reactions to attractive and neutral food images. Further instructions to see their thoughts about the images as transient states of mind, separate from themselves, eliminated spontaneous approach reactions to attractive food images. Similarly, while testing the efficacy of cognitive strategies intended

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