

Title: Mindfulness, self-compassion, and mindful eating in relation to fat and sugar consumption: An exploratory investigation.

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Abstract:

While much research has focused on overeating when exploring constructs of mindfulness, mindful eating and self-compassion; there is limited research on the specific relationship of these constructs with consumption of energy-dense foods that have a large impact on weight regulation. In a cross-sectional study, university students (n=546) were recruited to explore the relationship between mindfulness, mindful eating, self-compassion, and fat and/or sugar consumption. Results indicated that all constructs were negatively related to fat and sugar consumption, but self-compassion did not do so in a univariate fashion. When investigating subscales, negative aspects such as isolation and over-identification show a significant positive relationship to fat and sugar consumption. Possible explanations and future directions are discussed further with an emphasis on the need for more empirical work.

Level V: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

Keywords: mindfulness; mindful eating; self-compassion; obesity; fat consumption; sugar consumption

Introduction

The typical diet in Western countries is characterised by energy-dense food, high in saturated fat and/or sugars [1], [2], [3], [4]. This diet plays a major role in the obesity epidemic and has an etiology of associations with a range of chronic diseases including heart diseases and diabetes [5]. A report by the World Health Organization [6] recommended reducing the consumption of energy-dense foods as a primary goal for the prevention of diet-related chronic diseases. While constructs such as mindfulness, mindful eating and self-compassion have been explored in association with eating behaviours, eating disorders and obesity; the direct association between these constructs and fat and sugar consumption has not been explored.

Dietary guidelines recommend that people limit consumption of energy-dense, nutrient-poor foods such as those high in added sugars [7], with a suggested limit of between 5-15% per daily intake (2010 American Dietary Guidelines). Most people do not meet these dietary recommendations [8] and children and adolescents consume more calories from added sugars than adults [9] with many of these coming from sugar-sweetened beverages (SSB) especially among adolescents [7], [10]. A recent meta-analysis and systematic review that examined results from sixty randomized controlled trials and prospective cohort studies concluded that increased dietary sugar intake was associated with increased body weight, while reduced dietary sugar intake was associated with decreased body weight [11]. With the ready availability of calorie-dense and high sugar foods, an understanding of patterns of consumption and overconsumption is increasingly important in order to support and enable weight regulation. One method of assisting weight regulation which has been proposed and explored in recent years, is the utilization of mindfulness, self-compassion and mindful eating.

A widely accepted definition of the practice of mindfulness is that it is an awareness that emerges through purposefully paying attention in the present moment, non-judgmentally [12]. The practice usually entails mindfulness meditation, which involves actively observing the present moment by attending to the breath, moment-to-moment, and accepting all experiences (such as feelings and thoughts) without adding any meaning to them. This helps people who observe the constant flow of information to systematically develop acceptance (instead of judgment), which may lead to further benefits such as compassion, equanimity, and other parts of mindfulness practice [13], [14], [15]. Recent psychological interventions have identified that self-compassion may be the most relevant construct within mindfulness in terms of assisting weight regulation and weight loss.

Self-compassion is a kinder approach toward oneself during personally challenging times, with a mindful awareness and understanding that one's experiences are part of what all people go through (see Neff, [16], [17] for review). Self-compassion consists of three main elements: self-kindness, common humanity, and mindfulness, combined, these elements create the construct of self-compassion (see Neff, [17], [18]). Self-compassion is underexplored in the context of eating patterns and fat and sugar consumption. People who break their diet usually increase their subsequent food intake (see Herman & Mack, [19]) and Adams and Leary [20] investigated this tendency in relation to self-compassion. In their research, this was not true for an experimental group that received a short self-compassionate induction to cope after the experience of breaking the diet. Following this work, further research has shown that self-compassion plays a significant role in maintaining weight (see Mantzios, Wilson, Linnell, & Morris, [21]), in weight loss [22], [23], and with different practices (i.e., mindful diaries instead of meditation – see Mantzios & Wilson, [24] and Hussein, Egan, & Mantzios, [25]). Participants benefited from self-compassion by breaking the negative cycle of shame, body image dissatisfaction and the drive for thinness when investigating women with and without eating disorders [26]. These detrimental elements are also evident in dieting and overweight populations (e.g., [27], [28], [29]).

Mindfulness and self-compassion appear to complement each other in ways that translate into better outcomes for both mental and physiological health. Recent research conducted by Palmeira, Pinto-Gouveia and Cunha [30] assessed the efficacy of a group intervention that incorporated mindfulness, compassion, and acceptance and commitment therapy approaches. Significant increases in health related quality of life, reductions in unhealthy eating behaviours, and reductions in BMI in overweight and obese women were found. Research evidence also suggests that self-compassion explains the effectiveness of mindfulness practices. For example, people who scored higher in self-compassion experienced more benefits from training in mindfulness [31]. While well-being and stress are key determinants in eating behaviours and obesity [32], [33], research shows that self-compassion partially mediated the association between mindfulness and well-being [34], as well as mindfulness practice and stress [35]. Finally, when self-compassion was compared to mindfulness, research demonstrated that self-compassion was a more significant predictor of symptom severity in anxiety and depression [36], and further research has shown a clear association of anxiety and depression to obesity [37].

The psychological and physiological benefits from being more self-compassionate are evident and may be partially explained by the association between mindfulness and self-compassion and

increased resiliency and tolerance to psychological distress. The experience of stress, anxiety and depression are known to increase feelings of hunger and a preference for high fat and sugary foods [38]. A recent meta-analysis showed a positive link between self-compassion and healthy eating habits, as well as other non-food related associations to healthier lifestyles [39]. Therefore, the indirect benefits of both mindfulness and self-compassion may be factors that can enable and enhance weight regulation (see Mantzios & Wilson, [40]), and may well be predictive of fat and sugar consumption. The combination of mindfulness and eating has created a new imperative for researchers who are specifically interested in investigating eating and how well it conforms to the principles of mindfulness: namely, mindful eating.

In a recent review, Mantzios and Wilson [40] suggested that the investigations and interventions need to be more explicit and specific to eating. Mindful eating is the application of mindfulness fundamentals to food-related experiences; that is, purposeful attention to the present moment with a non-judgment or accepting attitude. Mindful eating has been related to healthier eating [41], and has been suggested to drop fasting glucose levels, reduce the consumption of sweets [42] and assist weight loss through mindfulness-based interventions [43]; however, mindful eating relates to less fat and sugar consumption has not been explored. Overall, research suggests that mindfulness, self-compassion and mindful eating leads to healthier decision making in health contexts (see e.g., Black, Sussman, Johnson, & Milam, [44], Jordan et al., [41]), which may well translate to less fat and sugar consumption. Therefore, the aim of the present study was to investigate the relationship between mindfulness, mindful eating, self-compassion, and fat and sugar consumption.

Methods

Participants

634 students were recruited through an online invitation to take part in a study investigating eating behaviours. 88 participants were excluded from the sample as they did not meet the set body mass index (i.e. BMI <18), which may have indicated the existence of an eating disorder; leaving a final sample of 546 undergraduate students. The sample ($M_{age} = 21.2, SD = 5.6; M_{BMI} = 24.7, SD = 5.5; 263$ females)

consisted of: White European (n=362), South Asian (n=12), Black (n=38), Chinese (n=37), and mixed ethnicity (n=25), with (n=67) not disclosed. Participants were recruited on a voluntary basis, and did not receive any course credits or financial rewards.

Materials

Participant information sheet. Participants were asked to report their age, gender, height, weight, ethnicity, smoking and exercising habits.

Self-compassion scale (SCS; [16]). The SCS scale is a 26 item self-report measure. Responses range from 1 (*almost never*) to 5 (*almost always*), with overall scores ranging from 26 to 130. Sample items include '*I try to be loving towards myself when I'm feeling emotional pain*' (i.e. self-kindness) and '*When I'm down and out, I remind myself that there are lots of other people in the world feeling like I am*' (i.e. common humanity). The scale is composed of six subscales, with alphas of: self-kindness ($\alpha=.88$), self-judgment ($\alpha=.87$), common humanity ($\alpha=.85$), isolation ($\alpha=.83$), mindfulness ($\alpha=.82$) and over-identification ($\alpha=.82$). The present study produced an overall Cronbach's alpha of .95 for the total score.

Five Facet Mindfulness Questionnaire - Short Form (FFMQ-SF; [45]). The FFMQ-SF is a 24-item questionnaire measuring five main characteristics of mindfulness, and is based on the original 39-item version (FFMQ; [46]). Responses range from 1 (*never or rarely true*) to 5 (*very often or always true*), with total scores varying from 24 to 120. Sample items are '*I find it difficult to stay focused on what's happening in the present moment*' (i.e. acting with awareness) and '*usually when I have distressing thoughts or images I can just notice them without reacting*' (i.e. non-reactive), and higher scores indicate higher levels of mindfulness. The five measured facets produced an alpha: observing ($\alpha=.77$), describing

($\alpha=.87$), acting with awareness ($\alpha=.83$), non-judging ($\alpha=.78$) and non-reactivity ($\alpha=.77$). The present study produced an overall Cronbach's alpha of .86 for the overall score.

Mindfulness Eating Scale (MES; [47]). The MES is a 28 item scale, and is combined with five subscales, with responses ranging from 1 (*Never*) to 4 (*Usually*), and overall scores varying from 28 to 112. Sample items include '*I wish I could control my eating more easily*' (i.e. acceptance) and '*I notice flavours and textures when I'm eating my food*' (i.e. awareness). Higher scores indicate higher levels of mindful eating. The five subscales produced an alpha of: acceptance ($\alpha=.91$), awareness ($\alpha=.85$), non-reactivity ($\alpha=.77$), routine (.81), distractibility ($\alpha=.90$) and unstructured (.73). The present study produced an overall Cronbach's alpha of .90 for the total score.

Three factor eating questionnaire – Short form (TFEQ-R18; [48]). The TFEQ-R18 is an 18 item questionnaire and measures the concepts of restrained eating, emotional eating and uncontrolled eating, and is based on the original 51 item-version (TFEQ; [49]). It includes items such as '*When I smell a delicious food, I find it very difficult to keep from eating, even if I have just finished a meal.*' (i.e., restrained eating) and '*When I feel lonely, I console myself by eating*' (i.e. emotional eating). Responses range from 1 (*definitely false*) to 4 (*definitely true*), with overall scores ranging from 18 to 76. The three subscales produced an alpha of: restrained eating ($\alpha=.77$), emotional eating ($\alpha=.40$) and uncontrolled eating ($\alpha=.85$). The present study produced an overall Cronbach's alpha of .83 for the overall score.

Dietary fat and free sugar – short questionnaire (DFS; [50]). The DFS is a 26 item questionnaire that measures dietary saturated fat and free sugar intake over the past 12 months. Response options range between '*1 per month or less*' to '*5+ per week*', and sample items include '*Fried chicken or chicken burgers*' and '*Doughnuts, pastries, croissants*', and overall scores range from 26 to 130. Higher scores indicating higher energy, fat and sugar intake. The present study produced a Cronbach's alpha of .83.

Procedure and Design

Convenience sampling was used to approach students attending a university in the West Midlands region of the United Kingdom to take part in the present study. Potential participants responded to an advertisement from various online invitations, and a link was provided for participants to click on, which directed them to a participant information form, consent form, and it was then followed by the demographic information page and the questionnaires. Once participants completed the study, they were directed to a debriefing form, which provided them with further information about the aim and purpose of the current study. Participants were also given the opportunity to record an arbitrary number, which would allow them to withdraw their data at a later stage and retain the anonymity of participation. Ethical approval was granted by the Ethical Committee based within the University.

Results

Inter-correlations between BMI, total fat and sugar consumption, self-compassion, mindfulness, and mindful eating are presented in Table 1. Findings suggest that there is a small significantly negative relationship between BMI and mindful eating [$r=-.25$, $n=546$, $p<.001$]. In addition, small significant negative relationships are observed between total fat and sugar consumption, mindfulness [$r=-.13$, $n=489$, $p<.001$], and mindful eating [$r=-.12$, $n=537$, $p<.001$]. There are also large significant positive relationships between self-compassion, mindfulness [$r=.65$, $n=498$, $p<.001$], and a moderate relationship with mindful eating [$r=.38$, $n=546$, $p<.001$].

Insert Table 1 here

Inter-correlations between BMI, total fat and sugar consumption, mindfulness and mindful eating subscales are presented in Table 2. BMI displayed a small significant positive relationship with the observe subscale [$r=.10$, $n=540$, $p<.05$] and a small significant negative relationship with the act with awareness subscale [$r=-.12$, $n=545$, $p<.001$], both of which are subscales of the mindfulness scale. BMI also displayed

a small significant negative relationship with acceptance [$r=-.26$, $n=545$, $p<.001$], distractibility [$r=-.23$, $n=546$, $p<.001$] and unstructured eating [$r=-.13$, $n=546$, $p<.001$] subscales. Furthermore, there was a small significant negative relationship between total fat and sugar consumption and non-reactivity [$r=-.20$, $n=536$, $p<.001$], distractibility [$r=-.17$, $n=537$, $p<.001$], and unstructured eating [$r=-.25$, $n=537$, $p<.001$] subscales.

Insert Table 2 here

Inter-correlations between BMI, total fat and sugar consumption and self-compassion subscales are presented in Table 3. There is a small significant negative relationship between BMI and isolation [$r=-.09$, $n=535$, $p<.05$]. In addition, total fat and sugar consumption appears to have a small significant negative relationship to negative aspects of self-compassion (i.e., isolation and over-identification) [$r=-.10$, $n=526$, $p<.05$] [$r=-.10$, $n=529$, $p<.05$].

Insert Table 3 here

Discussion

To our knowledge, this is the first study that explores cross-sectional constructs such as mindfulness, mindful eating and self-compassion in relation to fat and sugar consumption. As suggested in previous research, eating related constructs that are aligned with a mindful attitude (such as mindful eating) relate stronger to lower BMI than generic measures of mindfulness (e.g., Mantzios & Wilson, [23]), as well as to decreased fat and sugar consumption. While mindfulness and self-compassion did not relate to higher levels of BMI, mindfulness appeared to be a slightly stronger correlate of lower fat and sugar consumption, whilst self-compassion showed no relationship at all. While literature is mixed in regards to the relationship of mindfulness and self-compassion to BMI, the data suggests that

mindfulness as a construct is more consistent with constructs that describe healthier eating. The non-significant relationship of self-compassion may be attributable to elements discussed by Mantzios and Egan [51], whereby the self-compassion scale is not specific to health behaviours or eating. They further suggested that being kind to yourself does not guarantee both psychological and physiological health, and self-kindness may be expressed by eating or drinking unhealthy foods.

When findings were explored further, self-compassion subscales that related to fat and sugar consumption, as well as BMI were *isolation* and *over-identification* (i.e., the exact opposite of common humanity and mindfulness). In regards to mindfulness, *observing* and *acting with awareness* subscales, which are comparable to the mindful eating *distractibility* and *unstructured* eating subscales significantly related to BMI. The strongest correlation to BMI, however, was with the mindful eating *acceptance* subscale. In regards to fat and sugar consumption, the mindful eating *distractibility* and *unstructured* eating subscales, as well as the non-reactivity subscale significantly related to fat and/or sugar consumption.

Limitations

We identified three limitations to the present study. First, only university students were used in the present study; previous research has demonstrated that university students tend to not meet dietary guidelines, and exceed their daily fat and sugar intake [52], [53], [54]. Hence, caution should be taken when generalizing the findings towards other populations. Second, the average BMI was within the normal range, and findings could be significantly different amongst disordered eaters, dieters and obese participants. Obese participants were a minority within our sample, which made it difficult to develop further analyses and draw more conclusions. Closely aligned to this limitation is the weight and height which were self-reported and may have been misattributed. Third, the study presents cross-sectional data, which makes further interpretations less robust. Future research should look into

experimental and longitudinal studies, as well as clinical and community populations to explore the variation of fat and sugar consumption within mindfulness-based interventions, and allow causal and directional interpretations.

In addition, future research may also seek to explore the potential of intuitive eating and the association with fat and sugar consumption. Intuitive eating is distinct from mindful eating, however, there is a theoretical overlap between both constructs. Intuitive eating is often described as a 'non-dieting approach' similar to mindful eating, and emphasizes focus on internal hunger and fullness cues in addition to internal awareness and acceptance related facets [55]. Differing from mindful practice, intuitive eating promotes altering cognitive distortions, emotional eating and increasing shape acceptance [56]. Preliminary research has found that increased intuitive eating was related to improvements in emotional and physical health, and weight loss in obese women [57]. Other research has highlighted that intuitive eating was associated with lower BMI and decreased disordered eating patterns [58].

Conclusion

This data usefully adds to our knowledge base, however it requires multiple follow-up studies to investigate the quantity and the nature of third-wave constructs and interventions with fat and sugar consumption. The data also raises questions around the effectiveness of self-compassion when it comes to weight regulation. Despite the positive results that have been observed in other research [23],[40], it may be that self-compassion is better understood in the context of dieting, or, in relation to specific eating types (e.g., emotional or restrictive eating, see Adams & Leary, [20]).

Although much research has focused on overeating, it is apparent that eating the wrong types of food has a similar detrimental effect on weight regulation. While this research serves as a platform to conduct further investigations, the necessity of exploring fat and sugar consumption in relation to the

proposed constructs and aligned interventions is clear. Interventions for weight loss which rely on restriction may prove as effective, at least in the short term, but are often not aligned with healthy eating and may foster feelings and behaviours, which are not aligned to mindful and compassionate being and living.

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Table 1

Means, Standard Deviations, and Bivariate Correlations between BMI, fat and sugar consumption, mindfulness, mindful eating, and self-compassion.

	1	2	3	4	<i>M</i>	<i>SD</i>
(1) BMI					24.71	5.51
(2) FS	-.077				57.29	11.71
(3) SCS	-.044	-.062			69.79	19.98
(4) FFMQ	.007	-.126**	.649**		72.28	12.63
(5) MES	-.252**	-.118**	.378**	.422**	75.75	12.68

Note: BMI= Body Mass Index, FS= Total Fat and Sugar Consumption, SCS= Self-Compassion Scale, FFMQ= Five-Facet Mindfulness Questionnaire, MES = Mindful Eating Scale.

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Table 2

Means, Standard Deviations and Bivariate Correlations between BMI, total fat and sugar consumption, mindfulness, and mindful eating subscales.

	1	2	3	4	5	6	7	8	9	10	11	12	M	SD
1) BMI													24.70	5.51
2) FS	-.077												57.29	11.71
3) OB	.102*	-.058											13.61	3.75
4) AA	-.115**	-.076	.003										15.34	4.30
5) NJ	-.059	-.083	-.127**	.373**									13.47	4.04
6) NR	.024	-.036	.111*	.250**	.250**								13.88	3.95
7) DS	.053	-.084	.112*	.337**	.269**	.298**							15.96	4.80
8) ACC	-.253**	.079	-.062	.365	.296**	.234**	.146**						13.26	5.36
9) AW	-.064	-.070	.261**	.226**	.064	.079	.169**	.086*					16.20	3.16
10) ME-NR	-.067	-.199**	.041	.218**	.149**	.127**	.138**	.274**	.014				13.49	3.38
11) ROU	-.076	.083	-.014	.075	.084	.042	.076	.096*	-.054	.212**			12.59	2.83
12) DIST	-.226**	-.172**	.019	.422**	.207**	.156**	.201**	.446**	.338**	.391**	.107*		12.30	3.40
13) UNS	-.134**	-.247**	-.003	.259**	.150**	.067	.070	.293**	.058	.310**	-.090*	.503**	8.01	2.70

Note: BMI= Body Mass Index, FS= Total Fat and Sugar Consumption, OB= Observe, AA= Act Awareness Subscale, NJ= Non-Judgement Subscale, NR= Non-React Subscale, DS= Describe Subscale, ACC= Acceptance Subscale, AW=Awareness Subscale, ME-NR= Non-Reactivity Subscale, ROU= Routine Subscale, DIST= Distractibility Subscale, UNS= Unstructured Subscale.

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Table 3

Means, Standard Deviations and Bivariate Correlations between BMI, total fat and sugar consumption and self-compassion subscales.

	1	2	3	4	5	6	7	<i>M</i>	<i>SD</i>
1) BMI								24.70	5.51
2) FS	-.077							57.30	11.71
3) SK	-.019	-.010						13.52	4.62
4) SJ	-.073	-.012	.689**					12.54	4.75
5) CH	-.008	-.020	.659**	.431**				11.91	3.87
6) ISO	-.093*	-.103*	.559**	.745**	.458**			10.29	3.87
7) MIN	.011	-.075	.701**	.486**	.689**	.509**		11.94	3.60
8) OI	-.028	-.096*	.567**	.767**	.478**	.753**	.568**	9.77	3.79

Note: BMI= Body Mass Index, FS= Total Fat and Sugar Consumption, SK= Self-Kindness Subscale, SJ= Self-Judgement Subscale, CH= Common Humanity Subscale, ISO= Isolation Subscale, MIN= Mindfulness Subscale, OI= Over-identification Subscale.

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).