



The Importance of Body Acceptance in Exploring the Relationships of Mindfulness-Based Constructs to Eating Behaviours among Gay and Bisexual Men

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Abstract

Introduction Mindfulness and mindfulness-based constructs (e.g. self-compassion and mindful eating) have been negatively associated with problematic eating and body-related issues in general and other specific populations. Exploration of mindfulness-based concepts in relation to problematic eating would provide novel insight into the relationships of these elements among gay and bisexual men. The present research aimed to identify the role of body acceptance in exploring previous relationships between mindfulness-based constructs and eating behaviours.

Methods Participants completed an online questionnaire, comprising measures assessing mindfulness, self-compassion, mindful eating, body acceptance, grazing, emotional eating, restrained eating and external eating (data collection occurred in 2022). Correlation and further mediation analysis was employed to assess the relationships of these constructs within the present sample ($n = 164$).

Results Positive associations between body acceptance and mindfulness-based concepts and negative associations to problematic eating (grazing; emotional, restrained, and external eating) were found within a sample of self-identified gay and bisexual men. Mediation analysis showed the importance of body acceptance in exploring relationships between mindfulness, self-compassion, and mindful eating to grazing, emotional, restrained and external eating.

Conclusions Findings highlight the importance of body acceptance when considering the development of mindfulness- and/or compassion-based interventions to attenuate problematic eating among gay and bisexual men.

Policy Implications This research consolidates the importance of mindfulness and related constructs when considering problematic eating, which should be reflected in policy aiming to attenuate unhealthy eating in specific populations.

Keywords Self-compassion · Body-acceptance · Gay men · Mindfulness · Emotional eating · Restrained eating · Grazing

Introduction

Gay and bisexual men have been found to experience eating- and body-related issues disproportionately compared to heterosexual men (Williamson, 1999). A growing body of literature denotes several attributing factors relating to the increased eating- and body-related issues including social influences (Blashill, 2010) and homonegativity (Badenes-Ribera et al., 2018). Research within this community is

predominantly focused on clinical disordered eating and eating disorder prevalence (Parker & Harriger, 2020), with a lack of exploration of other problematic eating behaviours which could also be prevalent. Mindfulness and related concepts (i.e. self-compassion and mindful eating) have been shown to be negatively associated with unhealthy eating behaviours (Egan & Mantzios, 2018; Mantzios & Egan, 2017; Mantzios et al., 2018a, b). Mindfulness and compassion-based interventions have shown to reduce problematic eating within the general population and more specific population groups with specialised needs (Atkinson & Wade, 2016; Egan et al., 2021; Mantzios & Wilson, 2015; Marchiori & Papiés, 2014; Smith et al., 2006), but again, similar examinations are scarce for gay and bisexual men. Explorations of the relationships of mindfulness and related concepts to problematic eating behaviours in gay and bisexual men may

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provide novel insight and suggestions for future interventions to attenuate eating and body-related disturbances.

Eating and Body-Related Issues among Gay and Bisexual Men

Recent research has shown the disproportionately adverse eating- and body-related issues experienced by gay men when compared with straight men (Joy & Numer, 2018). Gay and bisexual men experience higher prevalence of eating disorders and disordered eating, compared to straight men (Naamani, 2018; Siconolfi et al., 2009; Williamson & Hartley, 1998). Research attributes homonegativity and body dissatisfaction to predicting eating disturbances within this population (Smith et al., 2011). Williamson and Spence (2001) investigated maladaptive eating in a sample of 202 gay men aged 14–72, where the importance of slimness and attractiveness was reported as the most influential predictor of problematic eating-related attitudes presenting a basis when considering problematic eating in gay men.

Further explorations of eating and body concerns highlight how gay men are subject to social pressures presented by the community to conform to weight and body ideals (Joy & Numer, 2018; Regan et al., 2021). The strong focus on social capital gained from attracting potential romantic partners leads to self-objectification (Martins et al., 2007) and further fosters a critical aspect of the community, which focuses on body shape (Peplau et al., 2009; Regan et al., 2021). Foster-Gimbel and Engeln (2016) reported that gay men experienced romantic rejection due to the anti-fat bias in more instances than straight men. This negative projection of critical perspectives around body image has produced a community which idolises a ‘slim’ or ‘muscular’ body shape, with those who do not attain or maintain these attributions potentially experiencing low self-esteem (Yelland & Tiggemann, 2003). Overall, the non-acceptance of the community and the potential implications of self-non-acceptance of one’s body support the utility and effectiveness of mindfulness-based interventions and previous relationships observed in gay and bisexual populations.

Body Acceptance and Associations to Problematic Eating

Body acceptance has been described as the acknowledgement of aspects of the body and accepting them without judgement (Tylka & Wood-Barcalow, 2015). Perceived ‘body acceptance by others’ (Swami et al., 2020) relating to those who are close to the individual (family and

friends) has also been linked to body image and wellbeing outcomes (Layman et al., 2021). An exploration of how mindfulness, self-compassion and mindful eating relate to body image and body acceptance in gay and bisexual men was conducted by Regan et al. (2023) and found that body acceptance mediated the relationship between mindfulness, self-compassion and mindful eating to body image. This research presents the importance of body acceptance in explaining the relationship between mindfulness-based constructs and body image providing considerations of acceptance and mindfulness within future interventions to attenuate body concerns within gay and bisexual men. Considering the association between body concerns and problematic eating behaviours, the potential implications for eating behaviours through the association with body acceptance poses another interest in developing health amongst gay and bisexual men and has not been explored in previous literature.

The strong focus on slim and/or muscular body ideals within this community leads to a high prevalence of restrained eating (Conner et al., 2004). Restrained eating relates to the restricted consumption of foods to achieve weight loss or to prevent weight gain (Herman & Mack, 1975). Research has shown that this behaviour is counter-productive and may eventually be followed by weight gain (e.g., Lowe et al., 2013). External eating and grazing have both been presented as behaviours associated with weight outcomes in the general population and not extensively explored among gay and bisexual men (Carter & Jansen, 2012; Wardle, 2007). Grazing is defined as the uninhibited repetitive eating of small portions of food (Heriseanu et al., 2019); external eating relates to eating due to food-related stimuli, regardless of hunger or satiety (Schachter et al., 1968). Greater attention has been given to grazing as a problematic behaviour, due to its greater prevalence through the changing social parameters instigated by the pandemic and the greater amounts of time spent at home (Ramalho et al., 2022).

Further exploration of eating behaviours relating to adverse health outcomes revealed that emotional eating has been found to contribute to weight increase, higher BMI and obesity in the general population (Van Strien, 2018) but also in more specific populations with specialised needs in nutritional intake (Egan et al., 2021; Spinosa et al., 2019). Emotional eating refers to over-eating in response to experiencing negative emotions (Frayn & Knäuper, 2018). While literature focusing on relationships of problematic eating and body acceptance is limited, previous associations of body image to problematic eating propose a potential of associations to body acceptance (Brytek-Matera et al., 2021; Duarte & Pinto-Gouveia, 2015).

Mindfulness and Self-Compassion in Relation to Eating and the Body

Mindfulness has been described as paying attention to the present moment on purpose, non-judgementally (Kabat-Zinn, 2015). Trait mindfulness has been included in research that explores the prevalence of eating behaviours and body image (e.g. Mantzios & Wilson, 2015; Prowse et al., 2013). Self-compassion links closely with mindfulness, a construct described as the awareness of one's own suffering, with a desire to alleviate it, comprising of three elements, kindness, common humanity and mindfulness (Germer & Neff, 2013). Mindfulness and self-compassion generally relate positively to healthy eating and negatively to 'unhealthy' or problematic eating (Dutt et al., 2019; Hussein et al., 2017; Mantzios & Egan, 2017; Mantzios et al., 2018a; Rahimi-Ardabili et al., 2018). This finding has been reflected in research within the general population, but also in more specific populations (e.g. adolescent/student females; health care professionals; individuals with a diagnosis of cystic fibrosis) (Egan et al., 2021; Kausar et al., 2022).

Mindfulness and compassion-based interventions have been found as effective in attenuating body- and eating-related disturbances (Minot, 2016). Considering the critical nature of the gay community and the tendency to experience romantic rejection when not adhering to idolized body ideals, engagement with community norms could lead to lower self-esteem, self-criticism and potentially lower levels of self-compassion (Williamson & Spence, 2001). Mindfulness and self-compassion have been found to relate negatively to grazing, suggesting that greater levels of mindfulness and self-compassion may lead to fewer instances of engaging in grazing behaviours (Mantzios et al., 2018b). Mindful eating is related negatively to grazing, further highlighting the importance of mindfulness in relation to grazing (Mantzios et al., 2018a). Mindful eating behaviour is defined as an awareness of eating, moment by moment, non-judgmentally (Mantzios, 2021, 2023). These findings provide interesting insight into the potential efficacy of mindful- and/or compassion-based interventions at attenuating grazing behaviours. Exploration of grazing behaviours, mindfulness and self-compassion among gay and bisexual men has not been explored in past literature and would provide novel insight into potential problems and solutions for this population. Previous studies have reported that mindfulness (Verrier & Day, 2021) and self-compassion (Gouveia et al., 2019) negatively relate to emotional eating, suggesting that higher levels of trait mindfulness and self-compassion relate to lower scores of emotional eating. These findings are consistently presented within eating literature within general and more specific populations (e.g. adolescent females, individuals with a diagnosis of cystic fibrosis) (see Egan et al., 2021; Hsu & Forestell, 2021).

Furthermore, Alberts et al. (2012) investigated the efficacy of a mindfulness-based intervention programme for eating aimed at reducing emotional, external and restrained eating and body image concerns. Participants scored significantly lower on all measures of eating and body image concern in the mindfulness condition when compared with the control group. Previous experimental research has indicated how mindfulness-based interventions are responsible for changes in body and eating measurements, while the interrelation between mindfulness-based constructs, body image and eating behaviours has been a common theme of understanding the utility and rationale behind mindfulness-based constructs (Breines et al., 2014; Kelly & Stephen, 2016; Mantzios et al., 2020a, b; Prowse et al., 2013; Webb et al., 2018).

Collectively, these findings present interesting insights when considering the role of mindfulness-based constructs in problematic eating and outline the potential effectiveness of reducing body image issues and problematic eating behaviours within more general populations; however, similar research focusing on gay and bisexual men is scarce. There is a clear justification for exploring eating-related behaviours, body image and mindfulness-based concepts among gay and bisexual men. The disproportionate prevalence of eating and body disturbances in this population when compared with straight men highlights the need to explore problematic eating within this community. Exploring the potential of body acceptance in explaining relationships of mindfulness-based constructs to problematic eating would provide a basis for investigating the efficacy of a body acceptance, mindful and/or compassion-based intervention to attenuate eating-related issues among gay and bisexual men.

The Present Study

The association of mindfulness, self-compassion and mindful eating to eating behaviours and the potential importance of body acceptance within the general and more specific population present insight into how these mechanisms may relate to health outcomes. Significantly, the consideration of mindfulness-based constructs predicting body-acceptance is of particular interest, given that people who are more accepting would show signs of more acceptance of their bodies. The present research aimed to identify a mechanism or motivation of change, explaining the utility of body-acceptance as a mediator. The significance of recognizing the role of body acceptance becomes evident when explaining how mindfulness-based concepts relate to body image among gay and bisexual men, as investigated by Regan et al. (2023). Therefore, the current study builds upon this foundation,

seeking to explore potential advantages for eating behaviours through four hypotheses:

1. Body acceptance will negatively relate to grazing, emotional eating, external eating and restrictive eating.
2. Body acceptance will positively relate to mindfulness, self-compassion and mindful eating.
3. Mindfulness, self-compassion and mindful eating will relate negatively to grazing, emotional eating, external eating and restrictive eating.
4. Body acceptance can exhibit a sequential mediating effect between mindfulness, self-compassion and mindful eating to grazing, emotional eating, external eating and restrictive eating.

Method

Participants

All participants ($n = 164$, $M_{age} = 34.5$, $SD = 10.4$; $M_{BMI} = 26.23$, $SD = 4.6$) were English-speaking, from the UK and self-identified as gay, bisexual or heteroflexible men (see Table 1 for participant demographic information). Participants were recruited through the research program ‘Prolific’; a short advertisement denoting the aims, nature of the study and eligibility criteria was published on the site. Only participants with no diagnosis of an eating disorder within the past 2 years and were over the age of 18 were eligible to take part. Participants who met these criteria and who were interested could follow the link to the online questionnaire. According to Fritz and MacKinnon (2007), a sample size of 164 would allow observations of an indirect effect of a medium-sized alpha pathway coefficient (i.e. predictor to mediator) and a medium-sized beta pathway coefficient (i.e. mediator to criterion) at 80% power using bias-corrected bootstrapping estimating procedures.

Table 1 Participant demographic information

Variable	Participants ($n = 164$)
Sexuality	
Gay	102
Bisexual	55
Heteroflexible	5
Non-disclosure	2
Gender	
Trans-male	9
Cis male	136
Gender fluid	2
Gender non-conforming	3
Non-disclosure	14

Table 1 (continued)

Variable	Participants ($n = 164$)
Ethnicity	
White British	134
White Irish	3
Pakistani	2
Chinese	2
African	3
Caribbean	1
Non-disclosure	19

Materials

Participant Information Sheet

Participants were asked to report their age, gender, height, weight, ethnicity, smoking and exercise engagement.

The Self-compassion Scale (SCS; Neff, 2003) is a 26-item scale containing 6 sub-scales (self-kindness, self-judgment items, common humanity, isolation, mindfulness, over-identified). Responses are recorded on a 5-point Likert scale (1 = Almost Never and 5 = Almost Always) whereby higher scores relate to higher levels of self-compassion. Sample items include: ‘When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people’ and ‘I try to be loving towards myself when I’m feeling emotional pain’. Cronbach’s alpha for the SCS in the present research is 0.94.

The Dutch Eating Behaviour Questionnaire (DEBQ; Van Strien et al., 1986) is a 33-item scale containing 3 sub-scales (external eating, restrained eating and emotional eating). Responses are recorded on a 5-point Likert scale (1 = Never and 5 = Very Often) whereby higher scores relate to higher rates of external restrained and emotional eating. Sub-scales were used within the analysis; the restrained eating subscale contains 10 items, for example: ‘Do you watch exactly what you eat?’ and ‘Do you deliberately eat foods that are slimming?’. Cronbach’s alpha for the restrained eating subscale in the present research is 0.87. The emotional eating subscale contains 12 items, for example: ‘Do you have a desire to eat when you are depressed or discouraged?’ and ‘Do you have a desire to eat when you are feeling lonely?’ Cronbach’s alpha for the emotional eating subscale in the present research is 0.81. The external eating subscale contains nine items, for example: ‘If you walk past the baker do you have the desire to buy something delicious?’ and ‘If you walk past a snackbar or a cafe, do you have the desire to buy something delicious?’. Cronbach’s alpha for the external eating subscale in the present research is 0.85.

The Grazing Questionnaire (GQ; Lane & Szabo, 2013) is an 8-item scale aiming to assess grazing behaviours. Responses are recorded on a 5-point Likert scale (0 = Never and 4 = All of the time) whereby higher scores relate to higher rates of grazing eating behaviour. Sample items include ‘Do you find yourself taking extra helpings or picking at extra food once you’ve finished your main meal?’ and ‘Do you find yourself picking at or nibbling food continuously?’. Cronbach’s alpha for the GQ in the present research is 0.90.

The Body Image Acceptance and Action Questionnaire-5 (BI-AAQ-5; Basarkod et al., 2018) is a short form of the Body Image — Acceptance and Action Questionnaire (BI-AAQ-5) which aims to assess body image acceptance. The BI-AAQ-5 is a 5-item scale where responses are recorded using a 7-point Likert scale (1 = Always true and 7 = Never true) whereby higher scores relate to higher rates of body non-acceptance; scores were reverse-scored within the analysis to represent that higher scores relate to higher rates of body acceptance. Sample items include ‘Worrying about my weight makes it difficult for me to live a life that I value’ and ‘I shut down when I feel bad about my body shape or weight’. Cronbach’s alpha for the BI-AAQ-5 in the present research is 0.94.

The Mindful Behaviour Eating Scale (MEBS; Winkens et al., 2018) is a 20-item scale and has five subscales (focused eating, eating with awareness, eating without distraction, hunger and satiety cues). Responses were recorded using a four-point Likert scale (1 = Never to 4 = Usually) whereby higher scores relate to higher rates of mindful eating. Sample items include: ‘It is easy for me to concentrate on what I eat’, ‘I notice flavours and textures when I’m eating my food’ and ‘I trust my body to tell me when to eat’. Cronbach’s alpha for the MES in the present research is 0.84.

The Five Facet Mindfulness Questionnaire (FFMQ; Gu et al., 2016) is a 15-item scale, and comprises five subscales (observing items, describe items, acting with awareness items, non-judging items, non-reactivity items) whereby higher scores relate to higher levels of trait mindfulness. Responses were recorded using a 5-point Likert scale (1 = Never or very rarely true to 5 = Very often or always true), and sample items include ‘I’m good at finding words to describe my feelings’, ‘I notice how foods and drinks affect my thoughts, bodily sensations, and emotions’ and ‘I find myself doing things without paying attention’. Cronbach’s alpha for the FFMQ in the present research is 0.76.

Procedure

Participants were recruited via the online research platform ‘Prolific’ and were paid for their time in line with the national minimum wage, as outlined within the referenced ethics application. Upon following the link to the questionnaire, participants were presented with an online version of the Information Sheet and Consent form which had to be viewed and responded to before the questionnaire could be accessed. Upon the questionnaire’s completion, participants were presented with the online Debrief form. This included information regarding the contact details of the researcher, further support and details of their right to withdraw their data from the study should they wish to do so at a later date. Data was collected in March 2022. Ethical approval was received from The Business Law and Social Sciences Ethics Committee at a West Midlands University in the United Kingdom (Regan/#10,149/sub2/R(B)/2022/Feb/BLSSFAEC).

Analyses

All statistical analyses were conducted using IBM SPSS 25. Bivariate correlation analysis (Pearson’s) was used to assess the relationship between measures explored within the questionnaire. Mediation analyses were conducted using Hayes’s (2017) PROCESS (Model 4) with a bootstrap sample of 5000. Confidence intervals (CI) do not cross zero and are considered significant when upper and lower boundaries are corrected to 95%. Body acceptance was used as a mediator to explore the effect on the relationship between mindfulness, self-compassion and mindful eating on grazing, external, restrained and emotional eating. A correction for multiple comparisons using the false-discovery-rate (FDR) method (Benjamini & Hochberg, 1995; Benjamini & Yekutieli, 2001), with a threshold of 0.20, was utilised with the intention to achieve a 20% probability of being a false discovery (reported as p_{Δ} in Table 3, indicating a change to non-significance from the significance observed in the uncorrected analyses).

Results

Correlation Analyses

Pearson’s bivariate correlation coefficient was employed using significant values between variables (body acceptance, mindfulness, self-compassion and mindful eating, grazing, external, emotional and restrained eating), including means and standard deviations as shown in Table 2.

Table 2 Means and standard deviations of variables and bivariate correlations between body acceptance, mindfulness, self-compassion, mindful eating, grazing, restrained, external and emotional eating with all associated

Scales	1	2	3	4	5	6	7	8	<i>M</i>	<i>SD</i>
(1) BIAAQ									21.51	8.41
(2) FFMQ	.452**								45.78	7.44
(3) SCS	.536**	.616**							72.72	16.97
(4) MEBS	.528**	.488**	.420**						66.29	10.88
(5) GQ	-.551**	-.260**	-.300**	-.575**					21.81	6.74
(6) DEBQ-RE	-.569**	-.164*	-.376**	-.376**	.590**				31.57	7.34
(7) DEBQ-EX	-.558**	-.133	-.317**	-.329**	.569**	.787**			27.23	7.76
(8) DEBQ-EM	-.567**	-.122	-.237**	-.342**	.561**	.758**	.862**		35.57	8.21

Body acceptance — BIAAQ (Body image Acceptance and Action scale); Mindfulness — FFMQ (Five Facet Mindfulness Questionnaire); Self-compassion — SCS (The Self-compassion scale); Mindful eating — MEBS (Mindful Eating Behaviour Questionnaire); Grazing — GQ (The Grazing Questionnaire); Restrained eating — DEBQ-RE (Dresden Eating Behaviour Questionnaire, Restrained eating sub-scale); Emotional eating — DEBQ-EM (Emotional eating sub-scale); External eating — DEBQ-EX (External eating sub-scale) — Total scores

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

Significant negative associations were observed between body acceptance to grazing ($r = -0.551$, $p < 0.001$), external ($r = -0.558$, $p < 0.001$), emotional ($r = -0.567$, $p < 0.001$) and restrained eating ($r = -0.569$, $p < 0.001$), suggesting that with higher body acceptance, there is a decrease of problematic eating (grazing, external, emotional and restrained eating). Significant positive associations were observed between body acceptance, mindfulness ($r = 0.452$, $p < 0.001$), self-compassion ($r = 0.536$, $p < 0.001$) and mindful eating ($r = 0.526$, $p < 0.001$). The higher the body acceptance, the higher the scores in mindfulness, self-compassion and mindful eating are. Significant negative associations were observed between mindfulness to grazing ($r = -0.260$, $p < 0.001$) and restrained eating ($r = -0.164$, $p < 0.05$), suggesting that higher scores on measures assessing mindfulness relate to a decrease in grazing and restrained eating. Significant negative associations were observed between self-compassion to grazing ($r = -0.300$, $p < 0.001$), restrained eating ($r = -0.376$, $p < 0.001$), emotional eating ($r = -0.237$, $p < 0.05$) and external eating ($r = -0.317$, $p < 0.001$). The higher the scores of self-compassion, the lower the scores in grazing, restrained, emotional and external eating are. Significant negative associations were observed between mindful eating to grazing ($r = -0.575$, $p < 0.001$), restrained eating ($r = -0.376$, $p < 0.001$), emotional eating ($r = -0.342$, $p < 0.001$) and external eating ($r = -0.329$, $p < 0.001$). The

higher the scores in mindful eating, the lower the scores in grazing, restrained, emotional and external eating.

Mediation Analyses

Twelve mediation analyses are reported and presented in Table 3. These comprised assessing the direct and indirect relationships of mindfulness-based constructs (mindfulness; self-compassion; mindful eating) to problematic eating behaviours (restrained eating; emotional eating; external eating; grazing) through their relationships to body acceptance.

Model 1

Model 1 comprised assessing the direct and indirect relationships of mindfulness-based constructs (mindfulness; self-compassion; mindful eating) to restrained eating through their relationships to body acceptance. Body acceptance was entered as the mediator, mindfulness-based constructs as the predictor variables and restrained eating as the outcome variable. All mediations were significant whereby a 95% bias-corrected confidence interval based on 5000 bootstrap samples indicated that there was an indirect effect which was above zero. An example figure is presented, reflecting the direction of the mediating relationships highlighted within Model 1 (Fig. 1).

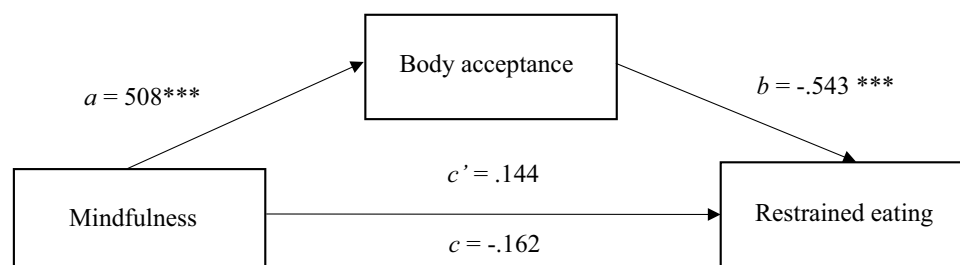


Fig. 1 The mediating effect of body acceptance in the relationship between mindfulness and restrained eating. All presented effects are unstandardised; a is the effect of mindfulness on body acceptance; b

is the effect of body acceptance on restrained eating; c' is the direct effect of mindfulness on restrained eating; c is the total effect of mindfulness on restrained eating. * $p < .05$; ** $p < .01$; *** $p < .001$

Model 2

Model 2 comprised assessing the direct and indirect relationships of mindfulness-based constructs (mindfulness; self-compassion; mindful eating) to emotional eating through their relationships to body acceptance. Body acceptance was entered as the mediator, mindfulness-based constructs as

the predictor variables and emotional eating as the outcome variable. All mediations were significant whereby a 95% bias-corrected confidence interval based on 5000 bootstrap samples indicated that there was an indirect effect which was above zero. An example figure is presented, reflecting the direction of the mediating relationships highlighted within Model 2 (Fig. 2).

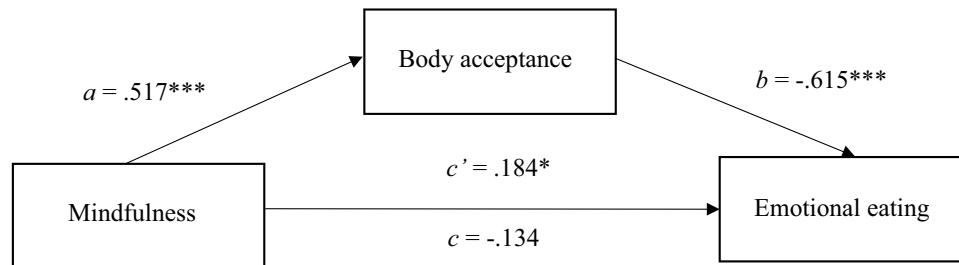


Fig. 2 The mediating effect of body acceptance in the relationship between mindfulness and emotional eating. All presented effects are unstandardised; a is the effect of mindfulness on body acceptance; b

is the effect of body acceptance on emotional eating; c' is the direct effect of mindfulness on emotional eating; c is the total effect of mindfulness on emotional eating. $*p < .05$; $**p < .01$; $***p < .001$

Model 3

Model 3 comprised assessing the direct and indirect relationships of mindfulness-based constructs (mindfulness; self-compassion; mindful eating) to external eating through their relationships to body acceptance. Body acceptance was entered as the mediator, mindfulness-based

constructs as the predictor variables and external eating as the outcome variable. All mediations were significant whereby a 95% bias-corrected confidence interval based on 5000 bootstrap samples indicated that there was an indirect effect which was above zero. An example figure is presented, reflecting the direction of the mediating relationships highlighted within Model 3 (Fig. 3).

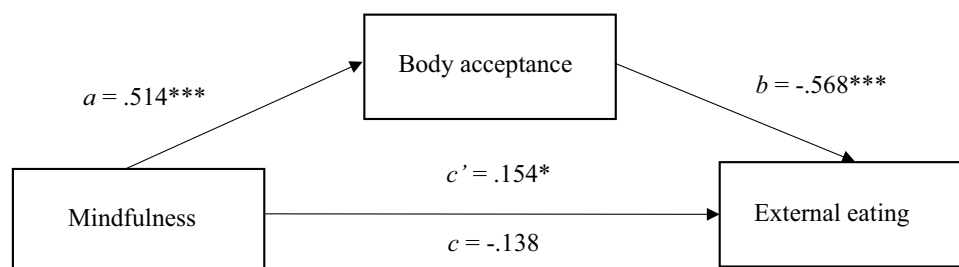


Fig. 3 The mediating effect of body acceptance in the relationship between mindfulness and external eating. All presented effects are unstandardised; a is the effect of mindfulness on body acceptance; b

is the effect of body acceptance on external eating; c' is the direct effect of mindfulness on external eating; c is the total effect of mindfulness on external eating. $*p < .05$; $**p < .01$; $***p < .001$

Model 4

Model 4 comprised assessing the direct and indirect relationships of mindfulness-based constructs (mindfulness; self-compassion; mindful eating) to grazing through their relationships to body acceptance. Body acceptance was entered as the mediator, mindfulness-based constructs as

the predictor variables and grazing as the outcome variable. All mediations were significant whereby a 95% bias-corrected confidence interval based on 5000 bootstrap samples indicated that there was an indirect effect which was above zero. An example figure is presented, reflecting the direction of the mediating relationships highlighted within Model 4 (Fig. 4).

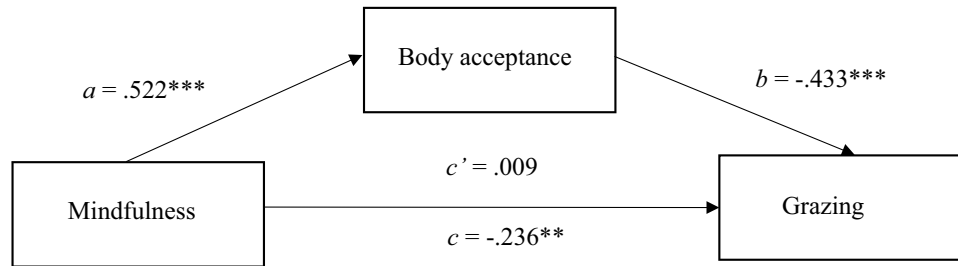


Fig. 4 The mediating effect of body acceptance in the relationship between mindfulness and grazing. All presented effects are unstandardised; a is the effect of mindfulness on body acceptance; b is the

effect of body acceptance on grazing; c' is the direct effect of mindfulness on grazing; c is the total effect of mindfulness on grazing. * $p < .05$; ** $p < .01$; *** $p < .001$

Detailed results of each mediation for models 1, 2, 3 and 4 concerning each dependent variable showing the indirect effects are summarized in Table 3.

Discussion

The aim of this research was to explore the relationship between body acceptance, mindfulness, self-compassion,

Table 3 Total, direct, and indirect effects of mindfulness, self-compassion and mindful eating on grazing, restrained eating, emotional eating and external eating using body acceptance as mediators

								Indirect	effect
y	x	m	a path coefficient	b path coefficient	Total effect	Direct effect	Effect (SE)	LCI	UCI
Model 1									
RE	MI	BA	.508**	-.543**	-.162	.114	-.275	-.3838	-.1781
RE	SC	BA	.263**	-.455**	-.151**	-.031	-.120	-.1746	-.0745
RE	ME	BA	.404**	-.447**	-.256**	-.075	-.181	-.2516	-.1171
Model 2									
EME	MI	BA	.517**	-.615**	-.134	.184 ^{pΔ}	-.318	-.4366	-.2123
EME	SC	BA	.266**	-.574**	-.113*	.039	-.153	-.2132	-.1004
EME	ME	BA	.408**	-.517**	-.256**	-.045	-.211	-.2991	-.1353
Model 3									
EXE	MI	BA	.514**	-.568**	-.138	.154 ^{pΔ}	-.292	-.4088	-.1886
EXE	SC	BA	.268**	-.463**	-.141**	.017	-.124	-.1786	-.0776
EXE	ME	BA	.407**	-.488**	-.233**	-.034	-.198	-.2781	-.1223
Model 4									
GR	MI	BA	.522**	-.433**	-.236**	-.009	-.226	-.3286	-.1374
GR	SC	BA	.268**	-.417**	-.118**	-.006	-.112	-.1660	-.0686
GR	ME	BA	.411**	-.273**	-.355**	-.243**	-.112	-.1743	-.0558

'RE' represents restrained eating (DEBQ, restrained eating sub-scale); 'EME' represents emotional eating (DEBQ, emotional eating sub-scale); 'EXE' represents external eating (DEBQ, external eating sub-scale); 'MI' represents mindfulness (FFMQ); 'GR' represents grazing (GQ) 'SC' represents self-compassion (SCS); 'ME' represents mindful eating (MEBQ); 'BA' represents body acceptance (BIAAQ-5) — total scores. p_{Δ} FDR, change to non-significance from the significance observed in the uncorrected analyses

LCI lower confidence interval, UCI upper confidence interval

* $p < .05$; ** $p < .001$

mindful eating and their relationship to grazing, restrained, external and emotional eating among gay and bisexual men. The potential mediating relationship of body acceptance on the relationship between mindfulness-based constructs to eating behaviours was also explored. Findings supported hypothesis (4), showing that body acceptance mediated the relationship between mindfulness to both grazing and restrained eating; self-compassion to grazing, restrained, emotional and external eating; mindful eating to grazing, restrained emotional and external eating. This relates to previous research that has highlighted the link between mindfulness (Egan et al., 2018; Mantzios & Egan, 2017), self-compassion (Rahimi-Ardabili et al., 2018) and mindful eating (Mantzios et al., 2018a, b) to problematic eating. These findings also align with previous research highlighting the importance of considering body acceptance when exploring body-related issues and mindfulness-based concepts among gay and bisexual men (Regan et al., 2023). This research shows the importance of body acceptance and the prominence of this construct when considering problematic eating among gay and bisexual men. A higher acceptance of one's body, including aspects one views to be 'unsatisfactory', relates to lower levels of problematic eating. Body acceptance also related positively to mindfulness-based constructs, which additionally relate to lower levels of problematic eating, reflecting the linearity of relationships within gay and bisexual men, when compared with more traditional literature exploring general and other specific populations (Dutt et al., 2019; Egan & Mantzios, 2018; Hussein et al., 2017; Mantzios & Egan, 2017; Mantzios & Wilson, 2015; Rahimi-Ardabili et al., 2018). It is important to note that following correction for multiple comparisons, two direct effect pathways were deemed non-significant (mindfulness to emotional eating and mindfulness to external eating). Future research should focus on exploring the potential relationship of mindfulness to emotional and external eating specifically to replicate the findings.

Correlation analysis showed that body acceptance related negatively to grazing, external, emotional and restrained eating and positively to mindfulness, self-compassion and mindful eating. These findings support hypothesis (1), further aligning with previous research exploring relationships between body acceptance and mindfulness-based constructs (Regan et al., 2023). Findings also showed significant positive associations of body acceptance to mindfulness, self-compassion and mindful eating, supporting hypothesis (2). Significant negative associations were observed between mindfulness to grazing and restrictive eating; further negative associations were observed between self-compassion and mindful eating to grazing, emotional, external and restrained eating, supporting hypothesis (3). Generally, these findings correspond with previous literature suggesting the negative association between mindfulness-based

constructs and problematic eating within general and more specific samples who have been found to experience problematic eating (adolescent females; health care professionals; individuals with a diagnosis of cystic fibrosis) (Egan et al., 2021; Hsu & Forestell, 2021; Spinosa et al., 2019). These findings, therefore, confirm the mirrored relationships of mindfulness-based constructs to problematic eating in gay and bisexual men, as highlighted in other populations. Future research should consider the relationship between mindfulness to emotional and external eating among gay and bisexual men as non-significant associations were observed.

The authors acknowledge the following limitations of this research. The cross-sectional nature of this study does provide some insight, although the greater depth of qualitative data should be explored to gain further insight into these constructs within gay and bisexual men. The representativeness of the sample should also be considered; the proportion of participants who took part who identified as 'White British' shows a significant lack of representation of minority ethnicities within this sample when compared with the UK population. Future research should endeavour to include greater representation of minority ethnic backgrounds within their samples to provide a more inclusive overview of insight into the eating of gay and bisexual men. The authors also consider the complexity of defining 'gay men' or 'bisexual men'. Non-binary, non-conforming and gender fluid individuals were included within this sample; the authors fully acknowledge these individuals may or may not be comfortable with the 'label', 'men'. The inclusion of gender minorities within this sample was to endeavour to provide a greater inclusion of queer experiences within psychological research and not to label or make assumptions about participants' gender. The authors also consider that gay and bisexual men are two identities inclusive of sexual minority men, although future research should consider exploration of eating behaviours and mindfulness-based constructs among other sexual minority men (e.g. pansexual, asexual).

Further research is needed to explore the nuanced role of body acceptance in explaining the relationship between mindfulness-based constructs and problematic eating among gay and bisexual men. Mindful and compassion-based interventions have been shown to be effective at reducing eating and body-related issues in the general and more specific populations. This research consolidates the importance of mindfulness and related constructs when considering problematic eating, which should be reflected in policy aiming to attenuate unhealthy eating in specific populations. Future policymakers should consider these findings when developing clinical practice guidelines or recommendations, indicating the potential usefulness of mindfulness and self-compassion-based interventions and/or incorporation of body acceptance (e.g. mindfulness-based cognitive therapy,

compassion focused therapy and acceptance and commitment therapy) in attenuating problematic eating among gay and bisexual men.

Author Contribution All authors contributed equally to the initial conceptualization of the study. The manuscript was written by HR and reviewed by all members. All authors read and approved the final manuscript.

Data Availability The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics Approval The study was approved by The Business Law and Social Sciences Ethics Committee at Birmingham City University (Regan/#10149/sub2/R(B)/2022/Feb/BLSSFAEC) and was in accordance with the ethical standards of the institutional and/or national research committee, and with the 1964 Helsinki Declaration and its later amendments. This article does not contain any studies with animals.

Consent to Participate Informed consent was obtained from all individual participants included in the study.

Consent for Publication Participants signed informed consent regarding publishing their data. No identifying information is included in this article.

Competing Interest The authors declare no competing interests.

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