Appetite 164 (2021) 105257

Contents lists available at ScienceDirect

Appetite

journal homepage: www.elsevier.com/locate/appet

Examining the relationship between weight controllability beliefs and eating behaviors: The role of internalized weight stigma and BMI

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ARTICLE INFO

Keywords:
Attributions
Personal responsibility
Weight stigma
Eating
BMI

ABSTRACT

Body weight is often viewed as personally controllable. This belief, however, ignores the complex etiology of body weight. While such attributions of personal willpower may help some individuals regulate their eating patterns, they have also been associated with increased internalized weight stigma which, itself, is associated with more disinhibited eating. The current investigation aimed to examine how internalized weight stigma, along with BMI, may explain the effect of weight controllability beliefs on disparate dietary behaviors. A community sample of 2702 U.S. adults completed an online survey about their weight controllability beliefs, eating behaviors, and internalized weight stigma, as well as demographic items and self-reported BMI. Results showed that greater weight controllability beliefs were positively related to both more restricted eating, $\beta = 0.135$, $p < .001$, and more disinhibited eating, $\beta = 0.123$, $p < .001$. This ironic effect was partially explained by increased internalized weight stigma. Moreover, BMI moderated the relationship, such that individuals with lower weights demonstrated stronger effects for two of the three eating outcomes than those with higher weights. These findings advance our understanding of the relationship between attributions of personal control for body weight and subsequent health behaviors, and further underscore the need to target internalized weight stigma in dietary interventions.

Body weight is often viewed as a culpable condition (Wang & Coups, 2010): under a person's personal control if only they try hard enough. This notion is reinforced through diet culture (Blaine et al., 2002) and popular media (Ata & Thompson, 2010; Yoo, 2013) in their promotions of personal discipline and perseverance in order to lose and control weight. Indeed, many people support these notions when reflecting on their own behavior, attributing weight re-/gain to personal regulatory challenges (Sainsbury et al., 2019). Evidence suggests this mindset may be effective for some individuals. For example, people with greater weight controllability beliefs—the belief that one's personal behaviors such as diet and exercise influence one's weight status–tend to feel more efficacious in their ability to eat healthy food (Knerr et al., 2016; cf.; Pearl & Lebowitz, 2014), and dietary self-efficacy is negatively related to the prevalence of severe binge eating (Clark et al., 2000; Goodrick et al., 1999; Linardon, 2018). Moreover, dietary adherence is positively related to weight loss maintenance over time (Del Corral et al., 2011).

However, this notion of personal control and willpower oversimplifies the nature of body weight regulation and weight control. In reality, substantial science shows that body weight is determined by a complex interaction of genetic, biological, and environmental factors, many of which lie outside of personal control (e.g. Bray et al., 2017; Dubois et al., 2012). Additionally, most people who intentionally lose weight face challenges in maintaining substantial weight loss long-term (Greaves et al., 2017), and the majority re-gain the weight they lost—or more—with time (e.g. Weiss et al., 2007). While individuals who believe in the personal controllability of weight may have more faith in the efficacy of their weight-control attempts (Pearl & Lebowitz, 2014), they also tend to blame previous unsuccessful weight loss attempts on their own actions (Hospers et al., 1990).

In all, beliefs about personal controllability of weight can culminate in feelings of internalized weight stigma (Pearl & Lebowitz, 2014). That is, individuals who believe that their weight is due to personal dietary behavior or willpower may be more likely to internalize negative weight-based stereotypes and beliefs, such as the belief that one's

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https://doi.org/10.1016/j.appet.2021.105257
Received 16 November 2020; Received in revised form 18 February 2021; Accepted 6 April 2021
Available online 14 April 2021

self-worth is tied to their weight. Internalized weight stigma is also a key predictor of weight-related health behavior outcomes such as poorer weight loss maintenance (Lillis et al., 2020; Puhl et al., 2017), lower exercise (Mensinger & Meadows, 2017; Vartanian & Novak, 2011), and difficulty dieting (Raves et al., 2016), including lower motivation to diet (Vartanian et al., 2018). More than affecting intentional caloric restriction, internalized weight stigma also contributes to maladaptive eating behaviors such as emotional or uncontrolled eating (Carels et al., 2019; O'Brien et al., 2016), as well as binge eating (Lawson et al., 2020; Mehak et al., 2018; Schvey & White, 2015; for a review, see; Pearl & Puhl, 2018). Across these domains, internalized weight stigma appears to hinder weight-related health behaviors (for reviews, see Nolan & Eshleman, 2016; Pearl & Puhl, 2018).

Eating behaviors, in particular, may be especially pertinent to examine as a weight control device. Food consumption is not only a linchpin in the development of obesity (Bray et al., 2017), but it is seen as a highly controllable behavior (Mycroft, 2008). Indeed, many individuals' intentional weight control strategies involve caloric restriction or other types of dietary modification (Neumark-Sztainer et al., 2006; Soeliman & Azadbakht, 2014; Talamayan et al., 2006). Ironically, however, rigid restriction can lead to more disinhibited eating (Westenhoefer et al., 1999). This is in part due to the physiological and emotional pressures of hunger (Greenway, 2015; MacLean et al., 2015; for a discussion, see; Linardon, 2018), as well as a common all-or-nothing mindset of dieting whereby any violation of restriction becomes a binge (e.g., the abstinence violation effect; Carels et al., 2004; Herman & Mack, 1975; Mooney et al., 1992; (Polivy, Herman, & Rajbir, 2010); for reviews, see Polivy & Herman, 2020; Keel & Heatherton, 2010). Although feelings of eating self-efficacy can lead to improvements in the quality of one's nutrition (e.g. Knerr et al., 2016), if that feeling of controllability leads to internalized stigma, then one may face a rebound effect whereby they are unable to act on that sense of efficacy (Pearl & Lebowitz, 2014; see; Pearl & Puhl, 2018).

To further complicate these relationships, an individual's weight may affect such weight-related health behaviors. Among people with higher weights, research suggests that weight controllability beliefs can hinder weight loss attempts (Pearl, Wadden, et al., 2020). One study (Knerr et al., 2016) found that beliefs of personal responsibility for weight increased fruit and vegetable intake, but only among individuals who did not have obesity. Moreover, people with higher weight also tend to have more experience with weight control attempts (Quinn et al., 2020; Shisslak et al., 2006; Wardle et al., 2006), often leading to cycles of frustration and self-blame if they are unsuccessful (Polivy & Herman, 1999; Quinn & Crocker, 1999; Roncolato & Huon, 1998). Indeed, both BMI and previous weight loss attempts are positively related to biological attributions for weight (Daigle et al., 2019).

Thus, despite the common weight control narrative that emphasizes personal willpower, there is conflicting evidence to its efficacy. Moreover, of the published work in this area of study, less research has been conducted in a normative weight sample, and these relationships may function differently for people with different body sizes (e.g., Knerr et al., 2016; Meadows & Higgs, 2019; Schvey & White, 2015). Finally, given links between personal weight control beliefs and internalized weight stigma, investigating how internalized weight stigma may explain any connections between weight control beliefs and eating behaviors is warranted.

In light of this collective evidence, our study aimed to test several hypotheses. First, we predicted that beliefs in personal weight controllability will have contradictory effects on eating behaviors, relating to both more restrained and more disinhibited eating patterns. Second, we expected that weight controllability beliefs will be positively associated with internalized weight stigma. Third, through the pathway of internalized weight stigma, we predicted that controllability beliefs will also be associated with more disinhibited eating patterns: uncontrolled and emotional eating. Finally, we conducted exploratory analyses to examine the relationship between weight controllability beliefs and eating behavior outcomes as moderated by body mass index (BMI). For example, it is possible the direct effect could be stronger for individuals at lower weights if they perceive weight to be more controllable than those at higher weights; conversely, those at higher weights may show stronger effects due to their greater experience attempting to control their weight (for a conceptual model, see Fig. 1).

1. Method

1.1. Participants

Participants were recruited in July 2015 through Survey Sampling International LLC (Shelton, CT; http://www.surveysampling.com), which maintains databases of more than two million active research participants and uses quotas to approximate the sex, income, and racial demographics of the U.S. Census. SSI provides a variety of incentives for participation, including research feedback, charitable donations, and monetary rewards. Data collection occurred in July 2015 as part of a larger online study on weight and health that has been reported elsewhere (e.g. Himmelstein et al., 2017; Puhl et al., 2018). In total, 3088 adults participated in the survey. However, after filtering out missing and impossible values on key demographic variables, our final sample was $N = 2702$ ($M_{age} = 44.77$, $SD_{age} = 16.99$; $M_{BMI} = 26.95$, $SD_{BMI} = 6.02$; 50.8% female; 64.1% White, non-Hispanic; see Table 1 for sample characteristics). With further missing data (e.g., no response) on psychological variables, degrees of freedom in each model differ. The University of Connecticut Institutional Review Board approved all measures and procedures before data collection began.

1.2. Measures

After giving informed consent, participants completed relevant demographic measures such as their age, sex, race/ethnicity (a combined variable), family income, and highest education completed. Participants also provided their self-reported height and weight, which were used to calculate BMI. Following these questions, participants completed a battery of questionnaires, three of which are included as the primary measures in the current study. Correlations between the variables of interest are presented in Table 2.

1.2.1. Weight controllability beliefs

As a measure of weight controllability beliefs, participants completed the Willpower subscale of the Antifat Attitudes Questionnaire (Crandall, 1994). This three-item subscale measures the extent to which the respondent believes body weight is under one's personal control or willpower (e.g., "People who weigh too much could lose at least some part of their weight through exercise"). Responses were marked on a scale from 1 (*strongly disagree*) to 10 (*strongly agree;* $M = 6.944$; $SD = 1.823$; $\alpha = 0.709$).

1.2.2. Internalized weight stigma

Participants completed the Weight Bias Internalization Scale, Modified (Pearl & Puhl, 2014). This was adapted from the Weight Bias Internalization Scale (Durso & Latner, 2008) to apply to people of all body weights (e.g., "My weight is a major way that I judge my value as a person"; 1 = *strongly disagree*; 7 = *strongly agree*). We used the 10-item version of this scale in line with recommendations from previous psychometric research on this measure (Lee & Dedrick, 2016; $M = 3.431$; $SD = 1.602$; $\alpha = 0.892$).

1.2.3. Eating behaviors

Participants also completed the Three-Factor Eating Questionnaire (TFEQ; Karlsson et al., 2000) which is composed of three subscales: cognitive restraint (e.g., "I deliberately take small helpings as a means of controlling my weight"; $M = 16.777$; $SD = 4.089$; six-item $\alpha = 0.699$), emotional eating (e.g., "When I feel anxious, I find myself eating"; $M =$

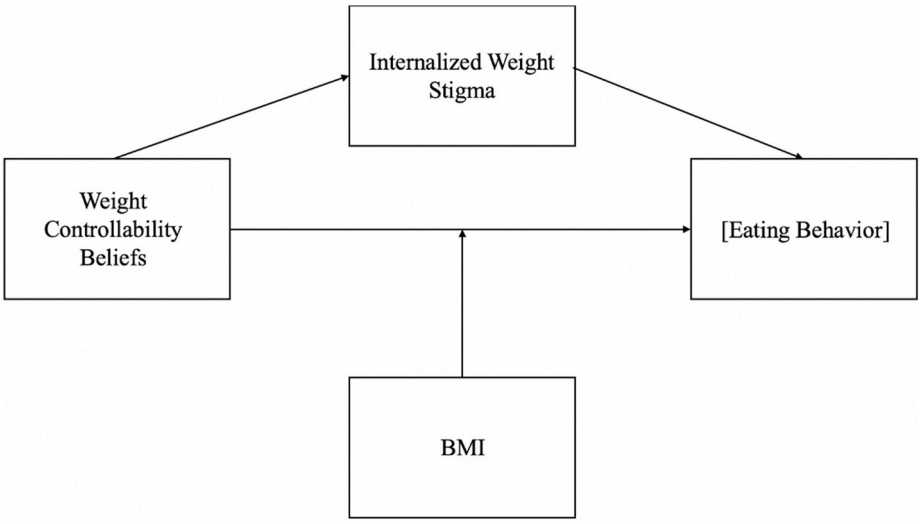

Fig. 1. Conceptual moderated mediation model.
Note. Full model includes mediation of the relationship between weight controllability and TFEQ eating behaviors by internalized weight stigma, as well as moderation of this relationship by BMI.

Table 1
Participant characteristics.

$N = 2702$	*n* (%)
Sex	
Female	1369 (50.8)
Male	1325 (49.2)
Race/Ethnicity	
White, non-Hispanic, non-Latino	1731 (64.1)
Latino, Hispanic, or Mexican American	421 (15.6)
Black or African American	337 (12.5)
Asian or Pacific Islander	156 (5.8)
Other race/ethnicity	53 (2.0)
BMI Category	
Underweight	133 (4.9)
Normal weight	997 (36.9)
Overweight	863 (31.9)
Obese	691 (25.6)
Education	
Less than high school or GED	33 (1.2)
High school or GED	430 (15.9)
Vocational/technical school (2 years)	119 (4.4)
Some college	731 (27.1)
College graduate	922 (34.1)
Postgraduate degree or higher	454 (16.8)
Income	
< $25,000	409 (15.1)
$25,000 - $49.999	680 (25.2)
$50,000 - $74,999	567 (21.0)
$75,000 - $99,999	461 (17.1)
$100,000-$124,999	214 (7.9)
> $125,000	359 (13.3)

Table 2
Bivariate correlations.

Variable	1	2	3	4	5
1: BMI	–				
2: Weight Controllability Beliefs	-.046*	–			
3: WBIS-M	.293***	.050*	–		
4: Cognitive Restraint	.022	.134***	.186***	–	
5: Uncontrolled Eating	.105***	.100***	.563***	.100***	–
6: Emotional Eating	.162***	.073***	.573***	.122***	.754***

Note: BMI = Body Mass Index; Weight controllability beliefs were measured using the Willpower subscale of the Antifat Attitudes Questionnaire (Crandall, 1994); WBIS-M = Weight Bias Internalization Scale, Modified (Pearl & Puhl, 2014); Cognitive restraint, uncontrolled eating, and emotional eating were from the Three-Factor Eating Questionnaire (Karlsson et al., 2000).
*$p < .05$; ***$p < .001$.

6.448; $SD = 2.725$; three-item $\alpha = 0.898$), and uncontrolled eating (e.g., "Sometimes when I start eating, I just can't seem to stop"; $M = 18.987$; $SD = 6.348$; nine-item $\alpha = 0.907$). Each item response ranged from 1 (*definitely false*) to 4 (*definitely true*) and was then summed to create the subscales. Higher values indicate greater engagement in that behavior.

1.3. Data analytic plan

All analyses included sex, age, race/ethnicity, education, and income as covariates, as these have been found to be predictive of health behaviors (e.g. Daw et al., 2017; Freisling et al., 2013) and stigma beliefs (Puhl et al., 2018). Because these results are cross-sectional, there is no clear justification to have either controllability beliefs or eating behavior as the predictor versus the outcome. However, previous health behavior change models set beliefs before behavior (e.g. Theory of Planned Behavior; Ajzen, 1985), and previous research situates obesity beliefs (Pearl, Wadden, et al., 2020; Pearl & Lebowitz, 2014) and control attributions (Anastasiou et al., 2015; Hospers et al., 1990) as predictive of health behaviors. Therefore, we designed our models to include weight controllability beliefs as the exogenous variable and eating behavior as endogenous variables.

After establishing the relationship between weight controllability beliefs and eating behaviors, we tested both the question of moderation by BMI and mediation via internalized weight stigma in one omnibus model for each outcome using the PROCESS macro for SPSS (v3.4; Hayes, 2017) with coefficients obtained from 5000 bootstrapped samples and 95% confidence intervals. We standardized all variables before their inclusion in the moderated mediation models in order to achieve standardized coefficients and standard errors (see recommendations in Hayes, 2017). Here, too, we controlled for sex, age, race/ethnicity, education, and income.

2. Results

2.1. Hypothesis testing

To begin, we regressed our eating behavior variables onto weight controllability beliefs, while controlling for relevant demographic data:

BMI, sex, age, race/ethnicity, education, and income (for a complete reporting of regressions, see Table 3). Weight controllability beliefs were positively related to dietary cognitive restraint, β = 0.135, *SE* = 0.021, *p* < .001, ΔR^2 = 0.018: those who believe more in the personal controllability of weight were also more likely to restrict their eating (e.g., by keeping tempting foods out of the house or deliberately taking smaller portions). However, these beliefs were also related to more uncontrolled eating, β = 0.123, *SE* = 0.020, *p* < .001, ΔR^2 = 0.015, and more emotional eating, β = 0.106, *SE* = 0.020, *p* < .001, ΔR^2 = 0.011. Collectively, these findings suggest that while participants took active steps to restrain their caloric intake, they also face rebound effects of disinhibited eating after restriction (see Table 3).

Next, we tested the relationship between weight controllability beliefs and internalized weight stigma. Still including sex, age, race/ethnicity, education, income, and BMI in the model, those who expressed greater willpower beliefs also reported more internalized weight stigma, β = .085, *SE* = 0.019, *p* < .001, ΔR^2 = 0.007. Even when controlling for BMI, among other personal factors, those who endorsed weight controllability beliefs tended to have higher internalization of weight stigma (see Table 3).

The linear regressions reported above examine the relationship between weight controllability beliefs and our variables of interest while controlling for one's BMI. However, it is reasonable to suspect that BMI may influence these relationships as well. Indeed, in examining bivariate correlations, BMI was significantly negatively related to weight controllability beliefs: those at higher weights believed less in the notion of personal control than those at lower weights (see Table 2); thus, BMI may be a moderating influence on these beliefs. Moreover, greater weight controllability beliefs may be associated with greater internalized weight stigma: the more one believes that one is personally responsible for their weight, the more they may internalize stigmatizing messages about their own body. To assess these relationships, we first tested our moderated mediation model with the TFEQ cognitive restraint subscale as the outcome (see Fig. 2a). Weight controllability beliefs were still positively associated with cognitive restraint regarding food, but this effect was, indeed, moderated by BMI, such that the effect was stronger for individuals with lower BMIs, whose weight controllability beliefs were more strongly associated with their own eating restraint compared to individuals with higher BMI, β = −0.059, *SE* = 0.020, *p* = .003. Those with higher BMIs reported fewer restraint behaviors overall, β = −0.046, *SE* = 0.022, *p* = .038. Not only did BMI moderate the relationship between controllability beliefs and cognitive restraint, but internalized weight stigma mediated the association as well, as indicted by the confidence intervals of the indirect effect, β = .014, *SE* = 0.005, 95% CI [0.005, 0.024]. That is, greater weight controllability beliefs were associated with greater internalized weight stigma, which in turn was associated with greater cognitive restraint (see Fig. 2a).

Next, we tested uncontrolled eating as an outcome (see Fig. 2b). Once again, there was a positive relationship between weight controllability beliefs and uncontrolled eating, and this relationship was moderated by BMI, β = −.034, *SE* = 0.017, *p* = .042. As before, the effect was stronger for those at lower weights compared with those at higher weights. Similar to the model for cognitive restraint, internalized weight stigma also mediated this relationship: weight controllability beliefs were related to greater internalized weight stigma, and this internalized stigma was associated with greater uncontrolled eating as well: indirect effect β = 0.035, *SE* = 0.012, 95% CI [0.012, 0.057].

Finally, in testing emotional eating, the direct effect of weight controllability beliefs was again significantly associated with self-reported emotional eating; however, unlike previous eating behaviors, BMI did not moderate this effect, β = 0.012, *SE* = 0.017, *p* = .485. Still, there remained an indirect effect through internalized weight stigma, β = 0.035, *SE* = 0.012, 95% CI [0.012, 0.058] (see Fig. 2c). Thus, weight controllability beliefs were related to greater internalized weight stigma, and this stigma was related to more emotional eating.

2.2. Post-hoc tests of group differences

Race and ethnicity were asked as a combined variable to which participants responded with a single answer. Although outside the central aims of this paper, the sample lends itself to analyses of racial/ethnic differences (differences in internalized weight stigma among this sample are described elsewhere; Himmelstein et al., 2017). In examining eating behaviors, and excluding the "other" identified participants (*n* = 53), only emotional eating showed any group differences (*F*(3, 2496) = 3.231, *p* = .022); Bonferroni tests revealed that White, non-Hispanic participants had higher means than other racial groups.

In post-hoc exploratory tests, we re-ran the moderated-mediation models separated by racial or ethnic group. Both the moderation (cognitive restraint: β = −0.056, *SE* = 0.025, *p* = .023; uncontrolled eating: β = −0.043, *SE* = 0.020, *p* = .031; emotional eating: β = −0.003, *SE* = 0.021, *p* = .879) and mediation (cognitive restraint: β = 0.011, *SE* = 0.006, 95% CI [0.001, 0.023]; uncontrolled eating: β = 0.030, *SE* = 0.015, 95% CI [0.001, 0.060]; emotional eating: β = 0.030, *SE* = 0.015, 95% CI [0.001, 0.060]) results held for all models among White participants. However, there were no significant moderation effects among any of the other racial or ethnic groups (all *p* > .052). Among non-White participants, the mediating effect of internalized weight stigma held only among Hispanic or Latino participants when examining uncontrolled eating (β = 0.073, *SE* = 0.028, 95% CI [0.019, 0.129]) and emotional eating (β = 0.082, *SE* = 0.031, 95% CI [0.021, 0.144]). In both of these cases the pattern was the same: greater controllability beliefs were associated with greater internalized weight stigma, which in turn was associated with greater disinhibited eating patterns.

Additionally, we examined sex as a potential group difference in these effects (for a description of sex differences in internalized weight stigma, see Himmelstein et al., 2017). The mediation effects held for both men (all β > 0.016) and women (all β > 0.012) when examining all eating outcomes; however, the moderation was not significant for

Table 3
Multiple regressions.

Variable	Cognitive Restraint		Uncontrolled Eating		Emotional Eating		Internalized Weight Stigma	
	N = 2254		*N* = 2254		*N* = 2252		*N* = 2305	
	β	*p*	β	*p*	β	*p*	β	*p*
Age	<.001	.984	-.338	<.001	-.232	<.001	-.319	<.001
Race	.021	.342	.088	<.001	.092	<.001	.124	<.001
Gender	-.066	.003	-.047	.023	-.149	<.001	-.093	<.001
Education	.093	<.001	.027	.210	.043	.049	.006	.787
Income	.010	.660	-.011	.614	-.006	.780	-.056	.006
BMI	.034	.111	.163	<.001	.210	<.001	.339	<.001
Weight Controllability Beliefs	.135	<.001	.123	<.001	.106	<.001	.085	<.001
Total Adj. R^2	**.028**		**.132**		**.116**		**.206**	

Note. BMI = Body Mass Index. Race was coded −1 = *Non-White*; 1 = *White*. Gender was coded −1 = *Female*; 1 = *Male*.

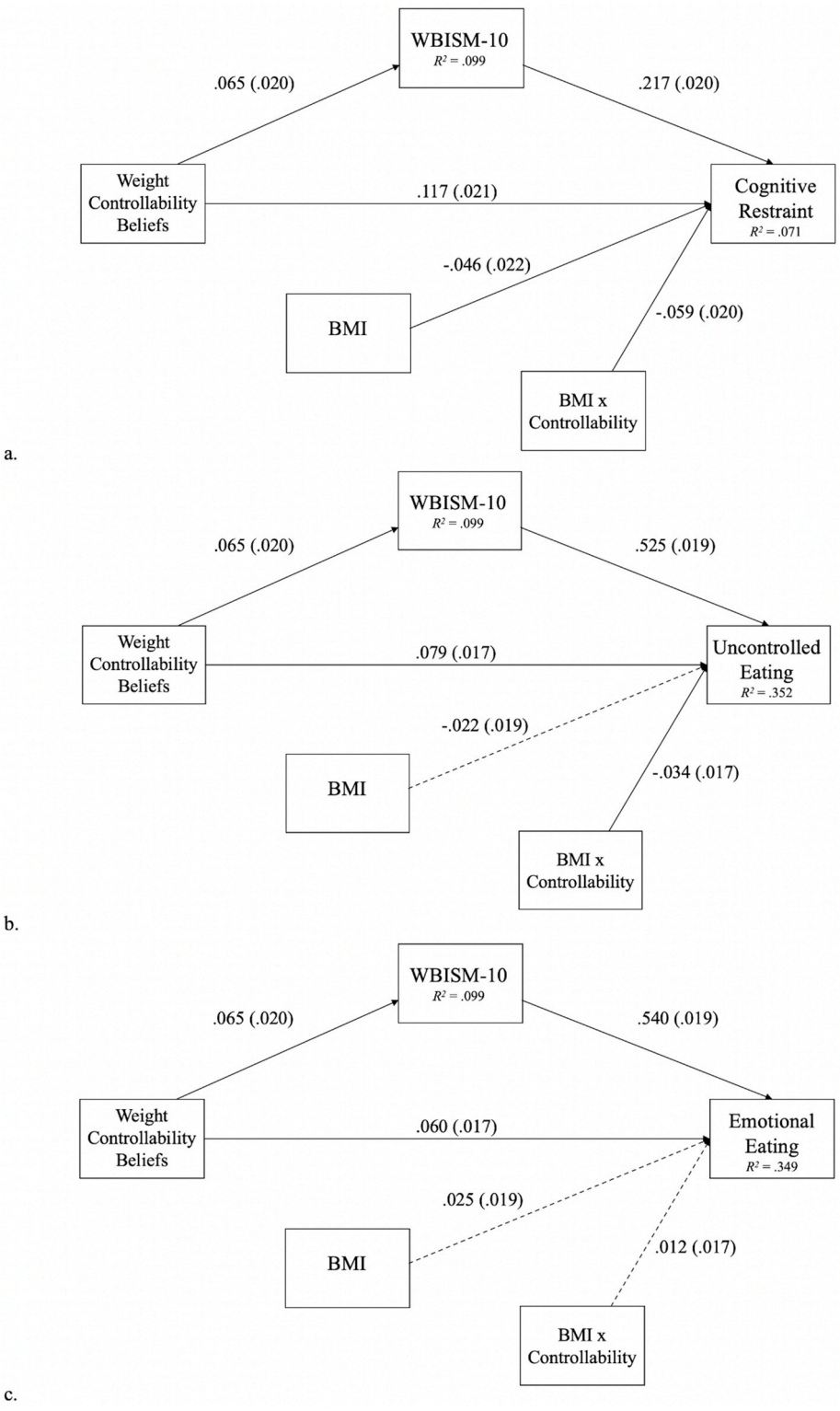

Fig. 2. a–cFull moderated mediation models of cognitive restraint (2a), uncontrolled eating (2b), and emotional eating (2c).
Note. Solid lines indicate significance at $p < .05$. Coefficients are standardized; standard errors are printed in parentheses.

women when examining uncontrolled eating ($\beta = -0.018$, $SE = 0.022$, $p = .419$), and non-significant for men when examining cognitive restraint ($\beta = -0.045$, $SE = 0.033$, $p = .169$).

3. Discussion

The present study provides novel insights about the relationships between weight controllability beliefs and eating behavior within a normative weight sample. In particular, our findings indicate that participants who endorse stronger weight controllability beliefs exhibit seemingly contrary eating behaviors: they report more cognitive restraint in eating, while also reporting more disinhibited eating. This can be explained in part by internalized weight stigma, which was positively related to weight controllability beliefs and mediated the relationship

between controllability beliefs and eating behavior. In this way, internalized weight stigma may act as a double-edged sword: initially encouraging weight maintenance behaviors of cognitive restraint regarding food, while also encouraging uncontrolled and emotional eating (see also Carels et al., 2019; Lawson et al., 2020; Major et al., 2020; Meadows & Higgs, 2019; O'Brien et al., 2016), which could result in difficulties achieving and maintaining weight loss (Pearl, Puhl, et al., 2020). Furthermore, these results may indicate a boomerang effect between dietary control and dietary disinhibition, analogous to the influence internalized weight stigma has on weight cycling (or "yo-yo" dieting; Quinn et al., 2020) and long-term weight regain (Olson et al., 2018; Pearl, Puhl, et al., 2020). Ultimately, these findings imply that notions of personal control and perseverance as weight loss strategies, although intuitive, may backfire.

BMI moderated the relationship between weight controllability beliefs and two of the eating behaviors examined: cognitive restraint and uncontrolled eating. Individuals with lower BMIs and with stronger controllability beliefs reported engaging in more cognitive restraint approaches to control their eating. However, there was also a main effect of BMI where individuals with higher BMIs engaged in fewer cognitive restraint strategies, overall. The interaction between BMI and weight controllability beliefs in predicting uncontrolled eating was weaker, but still showed the same pattern of results: those with lower BMIs who endorsed stronger willpower beliefs also reported engaging in more uncontrolled eating patterns; this relationship was less defined among those with higher BMIs. It could be that individuals with higher body weight, especially those who have struggled with losing or maintaining their weight in the past, are aware from their own experiences that notions of personal control/willpower are unrelated to their weight management outcomes (see Leske et al., 2017). This explanation is supported in the negative correlation observed between weight controllability beliefs and BMI in our sample (see Table 2) but is as of yet inconsistent and underexplored in the literature (e.g., Paxton & Sculthorpe, 1999; Radcliff et al., 2018; Rumpel & Harris, 1994). This account warrants further investigation, particularly in longitudinal studies. Finally, our ad-hoc exploration of racial and sex group differences suggests that further exploration is warranted. In particular, the finding that internalized weight stigma appears to act as a mediator for White and Hispanic/Latino participants, but not Black or Asian individuals, will be important to examine in future studies with racially/ethnically diverse samples.

Several limitations to this study should be noted. First, all variables, including BMI, were self-reported, and should be interpreted in light of potential self-report bias. Second, the data are cross-sectional, therefore inferences of causality cannot be claimed. Similarly, although we used a mediational model (which is implicitly causal), without temporal data we cannot say for certain that these paths are causal or unidirectional (see also Maxwell & Cole, 2007). However, beliefs are often conceptualized as precursors to behavior (e.g. Ajzen, 1985), and weight stigma is often used as a predictor of health behaviors (e.g. Meadows & Higgs, 2019; Vartanian & Novak, 2011); therefore, we are reasonably confident in this order of variables. In addition, it is important to note that our measure of weight controllability beliefs was framed in a general sense (e.g. talking about "people"), rather than directed toward the self; thus, it is unclear if participants were considering these beliefs in regard to their own or others' weight controllability. Given its positive relationship to internalized weight bias, however, it seems likely that participants were either implicitly self-reflecting in their responses, or that such general beliefs positively correlate with their personal body weight beliefs. Regardless, a more direct measure would be appropriate. Furthermore, we used the TFEQ subscales as our measures of eating behaviors and are therefore limited in the behaviors we can examine. It will be important in the future to look at different types of eating behaviors as well as the motivations behind these patterns. Finally, future work should examine these constructs in weight-loss treatment samples, to determine whether the findings observed in our study replicate in individuals actively trying to lose weight or maintaining weight loss.

Societal messages about body weight continue to perpetuate the notion that weight is controllable, and that personal willpower and perseverance will help people achieve their weight-related goals. However, rather than improving one's eating behaviors, this sense of personal controllability of weight may instead interfere, contributing to increased feelings of internalized weight stigma and a boomerang effect of more disinhibited eating, both of which can worsen weight-related health behaviors and health outcomes. Ultimately, more work is needed to advance our understanding of the connections between weight stigma and controllability beliefs, particularly in how they affect weight behaviors. However, our findings suggest that both weight controllability beliefs and internalized weight stigma may be key points of intervention for practitioners aiming to help their patients regulate their eating patterns: being careful to avoid prescribing a model of dietary willpower and being sensitive to the possible harm enacted by stigmatizing messages of personal responsibility.

Ethics statement

This manuscript is submitted in compliance with all Ethical Guidelines put forth by Elsevier. This includes, but is not limited to:

This research was conducted in accordance with APA regulations regarding the use of human participants and was approved by the University of Connecticut Institutional Review Board (Protocol #X15-093).
This is an original manuscript, not previously published, and is not under concurrent consideration for publication elsewhere.
All sources have been properly cited using APA guidelines.
Funding sources had no involvement in the design or implementation of the study and no involvement in the interpretation or reporting of the data.
All authors take responsibility for this work and have approved of the reported author contributions. All authors have made significant contributions to the manuscript.
The lead author (MAR) can provide the original data for review to the journal editor(s) and/or reviewers, if necessary.
There are no conflicts of interest to report.

Author contributions

Mora A. Reinka: conceptualization, data curation, formal data analysis, writing—original draft, review, and editing.

Diane M. Quinn: Funding acquisition, conceptualization, writing—review and editing.

Rebecca M. Puhl: Funding acquisition, writing—review and editing.

Funding source

This project was funded by a University of Connecticut Research Excellence Program (REP) Award to Quinn (P.I.) & Puhl (Co–P.I.). The funders had no influence on study design, data collection, analysis or interpretation of the data, nor in the writing of this report.

Data availability

Reinka has full access to the data presented herein. Data may be obtained from Reinka, Quinn, or Puhl upon request.

Declaration of competing interest

None.

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