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Gaps in Measurement: Highlighting Anti-Fat Bias as an Underrepresented Construct in the Modified Weight Bias Internalization Scale

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ABSTRACT

Increasing cross-sectional literature highlights a strong overlap of internalised weight bias (i.e., weight-based self-devaluation) with constructs like body dissatisfaction. The highest overlap is in studies that use the Modified Weight Bias Internalization Scale (WBIS-M). We argue that anti-fat bias (e.g., negative judgements of fat people) is a core feature of internalised weight bias definitions not represented in the WBIS-M, making its items less distinct from body dissatisfaction. To investigate, we examined the longitudinal relationships of anti-fat bias with internalised weight bias among 3025 sexual minority men using random intercept cross-lagged panel models. We contend that, if the WBIS-M adequately captures anti-fat bias, these constructs should be strongly associated across time. To the contrary, we found medium cross-lagged (longitudinal) relationships of these constructs over time (β s 0.07–0.08), and a small between-person association of these constructs ($\beta = 0.10$). The limited strength of these effects suggests that the WBIS-M does not adequately capture anti-fat bias to the extent that existing definitions suggest it should. Researchers must be cognisant of what measures capture, and consider what scales most appropriately capture the components of weight stigma they want to assess.

1 | Introduction

Increasing research has examined limits to the conceptualisation and measurement of internalised weight bias, defined as the self-devaluation that arises from internalisation of negative stereotypes about fatness (Durso and Latner 2008). The unifying focus of this literature is the strong relationships of internalised weight bias with distinct constructs (e.g., body dissatisfaction; Leget et al. 2023; Carels et al. 2024). Researchers have considered whether these results indicate that internalised weight bias is indistinct from related constructs; however, the current impression among researchers in this area is that measures of this construct do not adequately capture its distinctness

(Meadows and Higgs 2020; Leget et al. 2023). Dedicated investigations into how to improve measurement of internalised weight bias can aid the accurate quantification of the relationships of this construct with outcomes, and therefore guide the development and evaluation of interventions.

1.1 | An Overview of Literature on the Conceptualisation and Measurement of Internalised Weight Bias: Where Next?

Meadows and Higgs (2020) were the first to publish a dedicated investigation of conceptual clarity in internalised weight bias

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research. They questioned whether high correlations of internalised weight bias with related constructs (e.g., body image, self-esteem) may indicate the presence of a ‘jangle fallacy’ (Kelley 1927), such that researchers are using different labels to refer to ostensibly the same process. Using bifactor analyses, they found that more than three quarters of the shared variance in internalised weight bias scores (as measured by the Weight Bias Internalisation Scale; WBIS, Durso and Latner 2008) and body image measures was accounted for by an underlying body image self-judgement factor. They proposed that, rather than these results indicating that these constructs are conceptually indistinct, it may be that the measures of these constructs do not capture their distinctness. Their paper was a catalyst for several subsequent investigations into the comprehensiveness of existing measures of internalised weight bias and the potential of concept proliferation in this research area (e.g., Austen et al. 2021; Carels et al. 2024; Leget et al. 2023; Romano et al. 2022; Saunders et al. 2022).

Two meta-analyses have since summarised the extent of the overlap of internalised weight bias with related constructs. Romano et al. (2022) found large-to-very large relationships of scores on measures of internalised weight bias with distal body image constructs (e.g., positive body image; average $r = -0.58$). Likewise, Saunders et al. (2022) found strong relationships between internalised weight bias and weight, shape, and appearance dissatisfaction (average $r_s = 0.52$ and 0.62 , in community and clinical samples, respectively). Concerningly, Romano et al. (2022) found that—across all internalised weight bias measures investigated—the Modified Weight Bias Internalization Scale (WBIS-M; Pearl and Puhl 2014) had the highest level of overlap with related constructs. The WBIS-M was designed to examine internalised weight bias among people of diverse body weights, making it a popular measure for researchers in this area. Therefore, an important next step in this research area is to interrogate *why* the WBIS-M does not adequately capture internalised weight bias’s distinction from related constructs.

1.1.1 | Interrogating the WBIS-M as a Next Step to Exploring Conceptual Clarity in Internalised Weight Bias Research

We argue that *anti-fatness*, an umbrella term we use in this paper to encompass constructs like anti-fat bias (i.e., negative judgement of fat people; Latner et al. 2008) and agreement with anti-fat stereotypes, is a key feature of internalised weight bias not represented in the WBIS-M. Thus, failure to capture some aspect of anti-fatness within this measure of internalised weight bias may have contributed to its high overlap with constructs like body dissatisfaction. There is no single consensus definition of internalised weight bias; however, it is most frequently defined as a process of self-devaluation due to one’s body weight, and most definitions acknowledge that people’s awareness and/or agreement with anti-fat stereotypes *leads to* this self-devaluation (for a review of existing definitions, see Nutter et al. 2024). As such, *anti-fatness*, whether it is someone’s agreement with anti-fat stereotypes, or the anti-fat bias they hold, is a key factor that conceptually distinguishes internalised weight bias from more general body dissatisfaction.

We argue that, despite anti-fatness being key to distinguishing internalised weight bias from general body dissatisfaction, the WBIS-M does not sufficiently capture any element of anti-fatness. Items in the WBIS-M were modified from the original WBIS (Durso and Latner 2008) to be more applicable to people of all body sizes; for example, ‘I hate myself for being overweight’ in the original WBIS was modified to ‘I hate myself for my weight’ in the WBIS-M. As suggested by Romano et al. (2022), these modified items reflect a general dissatisfaction with one’s body that is less explicitly linked to one’s anti-fat bias.

If the WBIS-M and measures of anti-fatness (e.g., anti-fat bias, stereotype agreement) were assessing facets of the same thing, such that anti-fatness is subsumed in internalised weight bias, then scores on measures of these constructs should be strongly related. However, Romano et al. (2022) found only small-to-moderate relationships between measures of anti-fat bias and internalised weight bias in existing literature (95% confidence interval for average r : 0.14, 0.26). Notably, these relationships are much smaller than those demonstrated between internalised weight bias and conceptually distinct constructs like positive body image ($r = -0.58$). Romano et al. also found that the relationship of anti-fat bias with internalised weight bias was stronger for samples with higher average BMIs, which the authors argue may be because anti-fat bias is more front-of-mind for people with higher average BMIs given they are, on average, more likely to experience weight stigma. The authors argue that these small-to-moderate relationships of internalised weight bias with measures of anti-fat bias, which they describe as ‘trivial’ in magnitude (p. 9), indicate that measures of internalised weight bias may not encompass anti-fat bias to the extent that existing definitions suggest they should.

Measures of internalised weight bias that fully capture the processes subsumed in its definition are central to: (1) accurately quantifying how strongly internalised weight bias relates to outcomes (e.g., depression, anxiety, disordered eating; Pearl and Puhl 2018), and (2) developing and evaluating the effectiveness of interventions to reduce internalised weight bias and its outcomes. Given that the WBIS-M is a widely used measure, dedicated investigations into what specific facets of internalised weight bias may be missing from this scale can help researchers make informed decisions around what measures they should use in future. For example, if anti-fatness appears to be under-represented in the WBIS-M, this highlights that researchers should incorporate measures of anti-fatness into their research if they wish to provide a reliable picture of how internalised weight bias contributes to outcomes.

1.1.2 | Why the WBIS-M? Distinguishing Internalised Weight Bias From Attitudes Captured by Other Existing Measures

Our core argument is that, as a measure of internalised weight bias, the WBIS-M should capture all processes encompassed in its definition, wherein negative attitudes about fatness (i.e., other-directed attitudes) lead to self-devaluation (i.e., self-directed attitudes). In this, it is important to acknowledge that

there are different self- and other-directed attitudes measured in weight stigma research that are not the focus of this paper. For example, the Anti-fat Attitudes Questionnaire (AAQ; Crandall 1994) includes three subscales, two of which assess other-directed anti-fat attitudes (i.e., Dislike and Willpower), and one that assesses self-directed anti-fat attitudes (Fear of Fat). The Fat Attitudes Assessment Toolkit (FAAT; Cain et al. 2022) includes eight subscales, seven of which assess other-directed attitudes (e.g., Attractiveness, Responsibility) and one that assesses self-directed (i.e., Body Acceptance).

In the validation papers for both the AAQ (Crandall 1994) and the FAAT (Cain et al. 2022), the other-directed subscales were either weakly correlated or not significantly correlated with the self-directed subscales. We argue that the self- and other-directed attitudes captured by these scales (e.g., perceived attractiveness of fat people vs. body acceptance; Cain et al. 2022) are conceptually distinct enough that one would not expect them to be strongly associated. In contrast, theoretical definitions of internalised weight bias *do* encompass negative attitudes about fatness that *lead to* weight-based self-devaluation (i.e., they are assumed to be closely interlinked). This is why we, echoing Romano et al. (2022), argue that scores on the WBIS-M should be more strongly correlated with measures of anti-fatness than evidenced in existing literature. In sum, there are alternative measures of self- and other-directed attitudes in existing weight stigma literature that were not developed with the purpose of capturing internalised weight bias and are therefore not the focus of this paper.

1.2 | The Utility of Longitudinal Models in Examining the Relationship of Internalised Weight Bias With Anti-Fat Bias

While Romano et al. (2022) invaluablely summarise the strength of the relationship between internalised weight bias and anti-fat bias in the literature, all existing evidence is cross-sectional. Longitudinal studies are crucial for accurately quantifying the magnitude and direction of these relationships. Random intercept cross-lagged panel models (RI-CLPMs; Hamaker et al. 2015) partition the between- and within-person variation in observed scores and model bidirectionality in relationships, which can enable more accurate inferences regarding the strength and direction of effects. Failure to separate within- and between-person variation in relationships can lead to inaccurate effect estimates (Hamaker et al. 2015). In the context of internalised weight bias and anti-fat bias, RI-CLPMs may reveal stronger/weaker relationships than previously observed, providing clarity around whether the WBIS-M encompasses anti-fatness to the extent existing definitions suggest it should. In addition, modelling bidirectional relationships via RI-CLPMs can determine whether anti-fat bias indeed *leads to* self-devaluation via internalisation of this bias (as proposed in existing definitions) and/or vice-versa, providing conceptual clarity into how internalised weight bias operates. Overall, RI-CLPMs are a useful tool for accurately quantifying the relationships of anti-fat bias and internalised weight bias, which has implications for how internalised weight bias is defined and measured.

1.3 | The Current Study

We aimed to build on Romano et al. (2022) work by providing further evidence that the WBIS-M might not sufficiently capture anti-fat bias. To more accurately quantify these relationships, we modelled the bidirectional, longitudinal relationships of a measure of anti-fat bias with the WBIS-M via a secondary analysis of data from a large ($N = 3025$) cohort study of sexual minority (e.g., gay, bisexual) men's body image.

We argue that sexual minority men are a useful population among which to investigate limitations to measurement of internalised weight bias. Relative to heterosexual men, sexual minority men report higher levels of both weight bias and internalised weight bias (Austen et al. 2020; Puhl et al. 2019). Thus, if the WBIS-M sufficiently captures anti-fat bias, the relationships between scores on this measure and a measure of anti-fat bias should be strong among sexual minority men, for whom these phenomena are particularly potent.

Figure 1 visualises our RI-CLPM. We hypothesised a significant positive within-person relationship between anti-fat bias and internalised weight bias: increases in anti-fat bias would predict higher internalised weight bias at the next timepoint. We also expected these constructs to be associated between-persons: higher average anti-fat bias would be associated with higher average internalised weight bias. However, in line with effect sizes in existing meta-analyses, and suspicions that anti-fat bias are not adequately captured within the WBIS-M (Romano et al. 2022), we expected these relationships to be small.

2 | Method

2.1 | Open Science Framework

Our deidentified data and analytic code are available on the Open Science Framework (<https://osf.io/97ues/>).

2.2 | Participants and Procedure

Participants were sexual minority men recruited as part of Gay Bodies Worldwide—a 5-year cohort study of sexual minority men's body image that commenced in 2019 and finished in February 2024. This paper presents a secondary analysis of the data from four timepoints, spanning 2 years of the project. Of available data from 3275 participants, we excluded data from people with insufficient survey progress ($< 10\%$; $n = 199$), and from those who identified as heterosexual ($n = 31$). In line with ethics requirements, we also excluded data from participants who were under 18 years old ($n = 20$).

Our final (post-exclusion) sample were 3025 sexual minority men (for participant characteristics, see Table 1). The recruitment dates and sample sizes for each timepoint (T) were: T0 (demographic measures only; February–May 2019): 3025; T1 (August–November 2019): 2259; T2 (February–May 2020): 1935; T3 (August–November 2020): 1731; T4 (February–May 2021): 1072. The reason the total sample size (3025) differs from the T1

TABLE 1 | Participant characteristics.

Variable	<i>n</i>	%
Race		
White	406	62.36
Black	62	9.60
Hispanic, Latino, or Spanish	51	7.93
Asian	23	3.58
More than one racial identity	97	15.09
Another racial identity	9	1.40
Gender identity		
Cis-gender man	2855	94.38
Another gender identity	163	5.38
Sexual identity		
Gay	2471	81.68
Bisexual	397	13.11
Another sexual identity	154	5.22
Country		
United States of America	1317	43.53
United Kingdom	661	21.85
Australia	642	21.22
Canada	336	11.10
	<i>M</i>	<i>SD</i>
Age		
T1	37.70	13.70
T2	38.70	13.60
T3	40.40	14.00
T4	41.50	13.70
SES		
T1	6.00	1.90
T2	5.99	1.88
T3	6.07	1.90
T4	6.19	1.83
BMI		
T1	26.70	6.20
T2	27.00	6.20
T3	27.20	6.30
T4	27.20	6.40

with a fat person') on a seven-point Likert-type scale (1 = *strongly disagree*, 7 = *strongly agree*). The scale demonstrated good internal consistency across all timepoints (α s for T1, T2 = 0.90; T3, T4 = 0.91).

2.3.3 | Demographics

Participants self-reported their age, socioeconomic status (SES), sexual orientation, height, and weight (used to calculate BMI). SES was assessed with the one-item MacArthur Scale of

Subjective Social Status (Adler et al. 2000), with scores from 1 (lowest) to 10 (highest).

2.4 | Statistical Analyses

We used RI-CLPMs to investigate the bidirectional longitudinal relationships of internalised weight bias with anti-fat bias, following recommendations outlined by Hamaker et al. (2015). RI-CLPMs control for the between-person variation in observed scores via the inclusion of a random intercept for each variable, which enables the examination of two types of within-person relationships between study variables: (1) the cross-lagged effects (e.g., anti-fat bias at T1 predicting internalised weight bias at T2, and vice-versa), which were our primary effects of interest, and (2) the auto-regressive effects (e.g., anti-fat bias at T1 predicting anti-fat bias at T2). In our RI-CLPMs, we regressed our random intercepts onto our observed variables, with factor loadings set to one. We then regressed our random intercepts onto our covariates (SES, BMI, and age). We constrained the strength of our cross-lagged effects to be the same across timepoints because there is no theoretical reason that the strength would vary. Finally, we used full information maximum likelihood for estimating missing data, which estimates missing data for each participant at any given timepoint using their available data at other timepoints.

Cross-lagged effects between variables are, on average, smaller than the cross-sectional association of two variables (Orth et al. 2022); therefore, effect size cut-offs for cross-lagged effects differ from commonly used cut-offs for interpreting standardised regression coefficients. We interpreted the strength of our standardised cross-lagged effects using Orth et al. (2022) cut-offs: 0.03 (small), 0.07 (medium), and 0.12 (large). Interpretation of effect sizes for standardised between-person effects in an RI-CLPM are equivalent to standardised regression coefficients: 0.1 (small), 0.3 (medium), and 0.5 (large; Cohen 1988).

2.4.1 | Statistical Power

We conducted a post-hoc power analysis using the *powRCLPM* package in R (Mulder 2023) to determine our level of achieved power with our available sample size. Results from 10,000 Monte-Carlo simulations indicated we had 72.5% and 82.5% to detect cross-lagged effects of 0.07 and 0.08, respectively. Therefore, we are confident we were sufficiently powered to detect medium-sized cross-lagged effects.

3 | Results

Table 2 presents descriptive statistics (e.g., *M*, *SD*, range of observed values) for internalised weight bias and anti-fat bias at each timepoint.

Table 3 presents correlations between our study variables. Anti-fat bias and internalised weight bias were weakly positively associated within the same timepoint and were not significantly

TABLE 2 | Means and standard deviations, possible range, and observed range for IWB and AFB across each timepoint.

Variable	Timepoint	<i>M</i>	<i>SD</i>	Possible range	Observed range	
					Minimum	Maximum
IWB	T1	3.58	1.53	1–7	1	7
	T2	3.66	1.54		1	7
	T3	3.63	1.54		1	7
	T4	3.63	1.53		1	7
AFB	T1	3.08	0.92	1–7	1	6.65
	T2	3.03	0.92		1	6.35
	T3	3.00	0.93		1	6.40
	T4	3.04	0.93		1	6.55

Abbreviations: AFB = anti-fat bias, IWB = internalised weight bias.

TABLE 3 | Bivariate correlations between focal study variables and covariates.

Variable	AFB T1	AFB T2	AFB T3	AFB T4	IWB T1	IWB T2	IWB T3	IWB T4	BMI T1	SES T1	Age T1
AFB T1	1										
AFB T2	0.79*	1									
AFB T3	0.75*	0.81*	1								
AFB T4	0.77*	0.80*	0.81*	1							
IWB T1	0.05*	0.03	0.04	−0.01	1						
IWB T2	0.01	0.07*	0.05	−0.01	0.84*	1					
IWB T3	0.03	0.05	0.10*	0.03	0.81*	0.85*	1				
IWB T4	0.02	0.07	0.06	0.06*	0.78*	0.85*	0.86*	1			
BMI T1	−0.12*	−0.12*	−0.14*	−0.14*	0.37*	0.35*	0.32*	0.32*	1		
SES T1	0.02	0.08*	0.08*	0.04	−0.26*	−0.25*	−0.27*	−0.28*	−0.14*	1	
Age T1	0.08*	0.08*	0.13*	0.10*	−0.18*	−0.18*	−0.15*	−0.20*	0.14*	0.13*	1

Abbreviations: AFB = anti-fat bias, IWB = internalised weight bias.

* $p < 0.05$.

associated across timepoints. Table 4 presents the results for our RI-CLPMs, adjusted for covariates (baseline SES, BMI and Age).

In our RI-CLPM, anti-fat bias and internalised weight bias reciprocally predicted each other within-persons/longitudinally: increases in anti-fat bias predicted increases in internalised weight bias at the next timepoint, and vice-versa (medium effect sizes). Anti-fat bias and internalised weight bias were positively associated between-persons: higher average internalised weight bias was associated with higher average anti-fat bias (small effect size).

4 | Discussion

We suspected that scores on the WBIS-M overlap strongly with measures of body dissatisfaction because the WBIS-M does not sufficiently reflect an element of anti-fatness within its items. To examine this, we modelled the longitudinal relationships of scores on a measure of anti-fat bias and the WBIS-M. We hypothesised that anti-fat bias and internalised weight bias would be positively associated within-persons (longitudinally) and between-persons, but that these relationships would be small. Consistent with our predictions, anti-fat bias and

internalised weight bias were positively associated between-persons (cross-sectionally) and within-persons (longitudinally), which constituted small and medium effect sizes, respectively. Finally, we observed an unexpected cross-lagged effect of internalised weight bias on anti-fat attitudes, whereby increases in internalised weight bias predicted increases in anti-fat bias at the next timepoint (medium effect size).

4.1 | Interpretation of Findings

Consistent with expectations, we found that anti-fat bias and internalised weight bias were associated between-persons. The significant between-person relationships were small, corroborating effect sizes in existing cross-sectional literature (Romano et al. 2022). We found significant within-person effect of anti-fat bias on internalised weight bias, with increases in anti-fat bias predicting increases in internalised weight bias at the next timepoint—this was a medium cross-lagged effect. We note that although our longitudinal effects were medium-sized (Orth et al. 2022), these are nonetheless much smaller than the expected effect size for two constructs that are very closely conceptually related. For comparison, the standardised cross-lagged effect of internalised weight bias on psychological quality of life, a

TABLE 4 | Standardised and unstandardised estimates for our RI-CLPM examining the bidirectional relationships of internalised weight bias and anti-fat bias. Model parameters are adjusted for covariates (baseline socioeconomic status, age, and BMI).

Relationship	<i>b</i>	SE	95% CI for <i>b</i>		β	SE	95% CI for β	
Between-person association of AFB and IWB	0.16	0.02	0.11	0.20	0.11	0.02	0.08	0.14
Within-person (longitudinal) effects								
Model 1 ^a								
AFB → IWB	0.12	0.05	0.02	0.22	0.07	0.03	0.01	0.13
IWB → AFB	0.05	0.02	0.01	0.10	0.08	0.04	0.01	0.15
AFB → AFB	0.17	0.04	0.09	0.26	0.17	0.04	0.09	0.25
IWB → IWB	0.19	0.04	0.11	0.28	0.18	0.04	0.10	0.26

Note: **Bold** = significant effect ($p < 0.05$).

Abbreviations: AFB = anti-fat bias, IWB = internalised weight bias.

^aModel fit: $\chi^2(35) = 80.197$, $p < 0.001$, CFI = 0.99, SRMR = 0.02, RMSEA = 0.02.

conceptually distinct construct, was 0.12 (a large effect) in a study using data from three timepoints of the same dataset (Austen and Griffiths 2022). Overall, the effect sizes we observed corroborate the ‘trivial’ effects revealed by Romano and colleagues (2022) review of existing cross-sectional literature, and together suggest that the WBIS-M may not adequately capture anti-fatness to the extent existing definitions suggest it should.

Interestingly, we found that increases in internalised weight bias reciprocally predicted increases in anti-fat bias, with increases in anti-fat bias predicting increases in internalised weight bias at the next timepoint, and vice-versa. This contrasts existing definitions of internalised weight bias that infer a unidirectional relationship in which anti-fatness leads to self-devaluation and suggests that increases in self-devaluation may lead some people to hold more anti-fat bias about other people. Although no literature has considered bidirectionality in these relationships, these findings align with self-compassion research that indicates facilitating positive attitudes towards oneself (i.e., self-compassion) can engender more positive feelings towards others (Zhang et al. 2020). Future research should further explore the possibility of bidirectionality in these relationships, as this has implications for intervention development: encouraging people to hold positive feelings towards their own bodies may be an avenue to reduce the amount of anti-fat bias people hold about other people.

4.2 | Important Considerations Surrounding Our Sample and Measure of Anti-Fat Bias

Our use of a pre-existing data set limited us to examining the association of scores on the WBIS-M with just one measure of anti-fat bias, the UMB-FAT (Latner et al. 2008), and among a very targeted sample (sexual minority men). The UMB-FAT is one version of the universal measure of bias, whose variations change the target of the item statements to be applicable across different types of bias (e.g., bias against gay people and Muslims). Thus, the UMB-FAT contains some items that are arguably less relevant the context of weight stigma (e.g., ‘I would like having a fat person at my place of worship or community centre’). Nonetheless, the UMB-FAT is a validated measure of anti-fat bias and demonstrates respectable psychometric quality relative to other measures of anti-fat bias. Lacroix et al. (2017)

evaluated the psychometric quality of 40 self-report measures of weight bias measures across eight criteria. They found that the UMB-FAT met criteria for six of eight indicators of psychometric quality (i.e., internal consistency, theoretical clarity, and content, structural, convergent, and discriminant validity) but had not been evaluated for test-retest reliability or sensitivity to change. This placed the UMB-FAT among some of the highest performing measures in the study, with 19 measures fulfilling fewer than half of the criteria. Overall, we argue that, although its test-retest reliability and sensitivity to change need to be evaluated, the UMB-FAT is suitable for a first-step investigation into the representation of anti-fat bias within the WBIS-M.

Second, our sample were exclusively sexual minority men, who tend to report higher levels of internalised weight bias than heterosexual men (Austen et al. 2020); therefore, the strength of relationships in our study may not generalise to other populations. However, sexual minority men are a particularly useful sample among which to assess these relationships: one would expect the relationships of these constructs to smaller in samples less prone to internalising weight bias and holding anti-fat bias (e.g., heterosexual men; Austen et al. 2020; Puhl et al. 2019). Future research could replicate the current study with alternative indices of anti-fatness, including agreement with anti-fat stereotypes (e.g., Responsibility subscale of the FAAT; Cain et al. 2022), and investigate whether the strength of these relationships vary among other demographic groups. It may be worth prioritising these investigations in samples of women, who are particularly prone to both experiencing and internalising weight bias due to patriarchal pressures (e.g., the male gaze) that lead to greater surveillance of women’s appearances and punishment of their deviation from feminine body ideals (i.e., thinness; Fikkan and Rothblum 2012; Purton et al. 2019).

4.3 | Implications for Measurement and Intervention Development

Our findings suggest that the WBIS-M does not reflect anti-fat bias to the extent that existing definitions suggest that it should. Taken together with existing literature discussing the limits to the measurement of internalised weight bias (e.g., Meadows and Higgs 2020; Romano et al. 2022), these findings provide impetus for researchers to be cognisant of what they are measuring when

considering different internalised weight bias measures, and that the WBIS-M may not be fully representative of this process.

Continuing to use measures that are not fully representative of internalised weight bias will have meaningful negative impacts on intervention development. To reliably model the extent that internalised weight bias contributes to negative outcomes, and through what mechanisms, researchers must use measures that capture (as much as possible) all facets in its definition (e.g., stereotype agreement, self-devaluation). Given that the WBIS-M is a very popular measure, researchers in this area need to be aware that this measure might not capture every facet of this construct represented in current definitions. Looking forward, we do not suggest that researchers stop using the WBIS-M; rather, the measure may be modified, or used in conjunction with other measures, to comprehensively capture the many facets of internalised weight bias. One promising development is Cain et al. (2022) Fat Attitudes Assessment Toolkit (FAAT): a measure that contains several subscales examining different facets of weight stigma (e.g., empathy, attributions of personal responsibility). Using subscales of the FAAT in addition to the WBIS-M might aid the development of more comprehensive models of how the various facets of internalised weight bias (e.g., stereotype agreement, self-devaluation) contribute to each other, and to outcomes, which will reveal what parts of this construct are worth prioritising in interventions.

Notably, Pearl et al. (2023) emphasise the difficulty in capturing the more implicit processes involved in internalised weight bias, including anti-fat bias. They note that people may be hesitant to self-report, or be unaware that they hold, anti-fat bias; as such, they emphasise the need for creative ways of tapping into these attitudes to enhance the validity of measures. We suggest that asking people whether they endorse negative weight stereotypes in relation to themselves may be one creative workaround for assessing people's anti-fat bias without explicitly asking if they hold negative attitudes about fat people; for example: 'When I gain weight, I feel lazy' or 'When I gain weight, I feel gluttonous'. Future research might explore the merit of these kinds of items if aiming to create a more comprehensive measure of internalised weight bias.

Finally, our findings demonstrate that research that aims to accurately examine the strength and direction of relationships among weight stigma and its outcomes should use longitudinal models that separate within- and between-person variation in observed scores (e.g., RI-CLPMs). Separating these sources of variation leads to more accurate estimates of effect sizes. Further, these different types of relationships have distinct implications for research and practice: while between-person results can highlight what groups of people may be most prone to internalising weight bias or holding anti-fat bias, within-person results can guide intervention targets by revealing how these relationships operate on an individual level.

4.4 | Conclusion

In conclusion, we found that anti-fat bias and internalised weight bias were positively associated between- and within-persons/longitudinally, but that these relationships were weaker

than should be the case if anti-fat bias is (by definition) subsumed in internalised weight bias. These findings begin to answer calls to investigate what features of internalised weight bias are absent from measurement (e.g., Austen et al. 2021; Romano et al. 2022), highlighting anti-fat bias as one feature present in existing definitions but arguably underrepresented in the WBIS-M. Measures that comprehensively map onto existing theoretical definitions of internalised weight bias are key to accurately quantifying its adverse effects and developing effective interventions.

Author Contributions

Emma Austen: conceptualization, formal analysis, data curation, writing – original draft, writing – review and editing. **Jeffrey M. Hunger:** conceptualization, methodology, writing – review and editing. **Sarah Bonell:** conceptualization, writing – review and editing. **Scott Griffiths:** conceptualization, methodology, resources, writing – review and editing, funding acquisition.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Our de-identified data and analytic code are freely available on the Open Science Framework: <https://osf.io/97ues/>.

References

- Adler, N. E., E. S. Epel, G. Castellazzo, and J. R. Ickovics. 2000. "Relationship of Subjective and Objective Social Status With Psychological and Physiological Functioning: Preliminary Data in Healthy, White Women." *Health Psychology* 19, no. 6: 586–952. <https://doi.org/10.1037//0278-6133.19.6.586>.
- Austen, E., K. H. Greenaway, and S. Griffiths. 2020. "Differences in Weight Stigma Between Gay, Bisexual, and Heterosexual Men." *Body Image* 35: 30–40. <https://doi.org/10.1016/j.bodyim.2020.08.002>.
- Austen, E., and S. Griffiths. 2022. "Weight Stigma Predicts Reduced Psychological Wellbeing and Weight Gain Among Sexual Minority Men: A 12-Month Longitudinal Cohort Study Using Random Intercept Cross-Lagged Panel Models." *Body Image* 40: 19–29. <https://doi.org/10.1016/j.bodyim.2021.10.006>.
- Austen, E., R. L. Pearl, and S. Griffiths. 2021. "Inconsistencies in the Conceptualisation and Operationalisation of Internalized Weight Stigma: A Potential Way Forward." *Body Image* 36: iii–v. <https://doi.org/10.1016/j.bodyim.2020.12.002>.
- Cain, P., N. Donaghue, and G. Ditchburn. 2022. "Development and Validation of the Fat Attitudes Assessment Toolkit (FAAT): A Multi-dimensional Nonstigmatizing Measure of Contemporary Attitudes Toward Fatness and Fat People." *Journal of Applied Social Psychology* 52, no. 12: 1121–1145. <https://doi.org/10.1111/jasp.12882>.
- Carels, R. A., E. Jansen, L. Mansour, R. Byrd, and A. L. Metzler. 2024. "An Examination of the Unique Contributions of Body Image and Internalized Weight Bias to Psychological Well-Being Outcomes." *Body Image* 48: 101668. <https://doi.org/10.1016/j.bodyim.2023.101668>.

- Cohen, J. 1988. *Statistical Power Analysis for the Behavioral Sciences*. 2nd ed. Lawrence Erlbaum Associates.
- Crandall, C. S. 1994. "Prejudice Against Fat People: Ideology and Self-Interest." *Journal of Personality and Social Psychology* 66, no. 5: 882–894. <https://doi.org/10.1037/0022-3514.66.5.882>.
- Durso, L. E., and J. D. Latner. 2008. "Understanding Self-Directed Stigma: Development of the Weight Bias Internalization Scale." *Supplement, Obesity* 16, no. S2: S80–S86. <https://doi.org/10.1038/oby.2008.448>.
- Fikkan, J. L., and E. D. Rothblum. 2012. "Is Fat a Feminist Issue? Exploring the Gendered Nature of Weight Bias." *Sex Roles* 66, no. 9: 575–592. <https://doi.org/10.1007/s11199-011-0022-5>.
- Hamaker, E. L., R. M. Kuiper, and R. P. P. P. Grasman. 2015. "A Critique of the Cross-Lagged Panel Model." *Psychological Methods* 20, no. 1: 102–116. <https://doi.org/10.1037/a0038889>.
- Kelley, T. L. 1927. *Interpretation of Educational Measurements*. Macmillan.
- Lacroix, E., A. Alberga, S. Russell-Mathew, L. McLaren, and K. Von Ranson. 2017. "Weight Bias: A Systematic Review of Characteristics and Psychometric Properties of Self-Report Questionnaires." *Obesity Facts* 10, no. 3: 223–237. <https://doi.org/10.1159/000475716>.
- Latner, J. D., K. S. O'Brien, L. E. Durso, L. A. Brinkman, and T. Macdonald. 2008. "Weighing Obesity Stigma: The Relative Strength of Different Forms of Bias." *International Journal of Obesity* 32, no. 7: 1145–1152. <https://doi.org/10.1038/ijo.2008.53>.
- Leget, D. L., L. J. LaCaille, and R. L. Pearl. 2023. "Comparing Measurement of Internalized Weight Stigma and Body Dissatisfaction." *Body Image* 47: 101622. <https://doi.org/10.1016/j.bodyim.2023.101622>.
- Meadows, A., and S. Higgs. 2020. "A Bifactor Analysis of the Weight Bias Internalization Scale: What Are We Really Measuring?" *Body Image* 33: 137–151. <https://doi.org/10.1016/j.bodyim.2020.02.013>.
- Mulder, J. D. 2023. "Power Analysis for the Random Intercept Cross-Lagged Panel Model Using the powRCLPM R-Package." *Structural Equation Modeling: A Multidisciplinary Journal* 30, no. 4: 645–658. <https://doi.org/10.1080/10705511.2022.2122467>.
- Nutter, S., J. F. Saunders, and R. Waugh. 2024. "Current Trends and Future Directions in Internalized Weight Stigma Research: A Scoping Review and Synthesis of the Literature." *Journal of Eating Disorders* 12, no. 1: 98. <https://doi.org/10.1186/s40337-024-01058-0>.
- Orth, U., L. L. Meier, J. L. Bühler, et al. 2022. "Effect Size Guidelines for Cross-Lagged Effects." *Psychological Methods* 29, no. 2: 421–433. <https://doi.org/10.1037/met0000499>.
- Pearl, R. L., and R. M. Puhl. 2014. "Measuring Internalized Weight Attitudes Across Body Weight Categories: Validation of the Modified Weight Bias Internalization Scale." *Body Image* 11, no. 1: 89–92. <https://doi.org/10.1016/j.bodyim.2013.09.005>.
- Pearl, R. L., and R. M. Puhl. 2018. "Weight Bias Internalization and Health: A Systematic Review." *Obesity Reviews* 19, no. 8: 1141–1163. <https://doi.org/10.1111/obr.12701>.
- Pearl, R. L., T. A. Wadden, L. C. Groshon, H. F. Fitterman-Harris, C. Bach, and E. M. Lafata. 2023. "Refining the Conceptualization and Assessment of Internalized Weight Stigma: A Mixed Methods Approach." *Body Image* 44: 93–102. <https://doi.org/10.1016/j.bodyim.2022.12.002>.
- Puhl, R. M., M. S. Himmelstein, R. L. Pearl, A. C. Wojtanowski, and G. D. Foster. 2019. "Weight Stigma Among Sexual Minority Adults: Findings From a Matched Sample of Adults Engaged in Weight Management." *Obesity* 27, no. 11: 1906–1915. <https://doi.org/10.1002/oby.22633>.
- Purton, T., J. Mond, D. Cicero, et al. 2019. "Body Dissatisfaction, Internalized Weight Bias and Quality of Life in Young Men and Women." *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation* 28, no. 7: 1825–1833. <https://doi.org/10.1007/s11136-019-02140-w>.
- Romano, K. A., K. E. Heron, C. M. Sandoval, L. M. Howard, R. I. MacIntyre, and T. B. Mason. 2022. "A Meta-Analysis of Associations Between Weight Bias Internalization and Conceptually-Related Correlates: A Step Towards Improving Construct Validity." *Clinical Psychology Review* 92: 102127. <https://doi.org/10.1016/j.cpr.2022.102127>.
- Saunders, J. F., S. Nutter, and S. Russell-Mayhew. 2022. "Examining the Conceptual and Measurement Overlap of Body Dissatisfaction and Internalized Weight Stigma in Predominantly Female Samples: A Meta-Analysis and Measurement Refinement Study." *Frontiers in Global Women's Health* 3: 877554. <https://doi.org/10.3389/fgwh.2022.877554>.
- Zhang, J. W., S. Chen, and T. K. Tomova Shakur. 2020. "From Me to You: Self-Compassion Predicts Acceptance of Own and Others' Imperfections." *Personality and Social Psychology Bulletin* 46, no. 2: 228–242. <https://doi.org/10.1177/0146167219853846>.