



Kent Academic Repository

Mensingher, Janell, Calogero, Rachel M. and Tylka, Tracy L. (2016) *Internalized weight stigma moderates eating behaviour outcomes in high BMI women participating in a healthy living program*. *Appetite*, 102 . pp. 32-43. ISSN 0195-6663.

Downloaded from

<https://kar.kent.ac.uk/54296/> The University of Kent's Academic Repository KAR

The version of record is available from

<https://doi.org/10.1016/j.appet.2016.01.033>

This document version

Author's Accepted Manuscript

DOI for this version

Licence for this version

CC BY-NC-ND (Attribution-NonCommercial-NoDerivatives)

Additional information

Versions of research works

Versions of Record

If this version is the version of record, it is the same as the published version available on the publisher's web site. Cite as the published version.

Author Accepted Manuscripts

If this document is identified as the Author Accepted Manuscript it is the version after peer review but before type setting, copy editing or publisher branding. Cite as Surname, Initial. (Year) 'Title of article'. To be published in *Title of Journal*, Volume and issue numbers [peer-reviewed accepted version]. Available at: DOI or URL (Accessed: date).

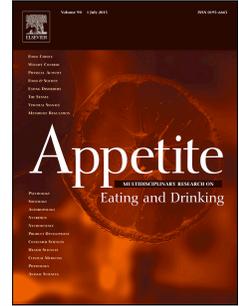
Enquiries

If you have questions about this document contact ResearchSupport@kent.ac.uk. Please include the URL of the record in KAR. If you believe that your, or a third party's rights have been compromised through this document please see our [Take Down policy](https://www.kent.ac.uk/guides/kar-the-kent-academic-repository#policies) (available from <https://www.kent.ac.uk/guides/kar-the-kent-academic-repository#policies>).

Accepted Manuscript

Internalized Weight Stigma Moderates Eating Behavior Outcomes in Women with High BMI Participating in a Healthy Living Program

Janell L. Mensinger, Ph.D., Rachel M. Calogero, Ph.D., Tracy L. Tylka, Ph.D.



PII: S0195-6663(16)30032-0

DOI: [10.1016/j.appet.2016.01.033](https://doi.org/10.1016/j.appet.2016.01.033)

Reference: APPET 2849

To appear in: *Appetite*

Received Date: 1 September 2015

Revised Date: 15 January 2016

Accepted Date: 26 January 2016

©2016. This manuscript version is made available under the CC-BY-NC-ND 4.0 license <http://creativecommons.org/licenses/by-nc-nd/4.0/>

Please cite this article as: Mensinger J.L., Calogero R.M. & Tylka T.L., Internalized Weight Stigma Moderates Eating Behavior Outcomes in Women with High BMI Participating in a Healthy Living Program, *Appetite* (2016), doi: 10.1016/j.appet.2016.01.033.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

1 Running head: INTERNALIZED WEIGHT STIGMA MODERATES EATING BEHAVIOR

2
3 **Internalized Weight Stigma Moderates Eating Behavior Outcomes**
4 **in Women with High BMI Participating in a Healthy Living Program**

5
6
7 Janell L. Mensinger, Ph.D.^{a,b}

8 Rachel M. Calogero, Ph.D.^c

9 Tracy L. Tylka, Ph.D.^d

10
11
12 ^aReading Health System
13 Sixth Avenue and Spruce Street
14 West Reading, PA 19611

15
16 *Corresponding author address (present):*

17 ^bDrexel University,
18 College of Nursing and Health Professions, USA
19 1601 Cherry Street
20 3 Parkway Building, 9th floor, MS 9503,
21 Philadelphia, PA 19102
22 janell.l.mensinger@drexel.edu

23
24 ^cUniversity of Kent
25 School of Psychology
26 Keynes College
27 Canterbury CT2 7NZ
28 R.Calogero@kent.ac.uk

29
30 ^dThe Ohio State University
31 Department of Psychology
32 225 Psychology Building
33 Columbus, OH 43210
34 tylka.2@osu.edu
35

36 Abstract

37 Weight stigma is a significant socio-structural barrier to reducing health disparities and
38 improving quality of life for higher weight individuals. The aim of this study was to examine the
39 impact of internalized weight stigma on eating behaviors after participating in a randomized
40 controlled trial comparing the health benefits of a weight-neutral program to a conventional
41 weight-management program for 80 community women with high body mass index (BMI > 30,
42 age range: 30-45). Programs involved 6 months of facilitator-guided weekly group meetings
43 using structured manuals. Assessments occurred at baseline, post-intervention (6 months), and
44 24-months post-randomization. Eating behavior outcome measurements included the Eating
45 Disorder Examination-Questionnaire and the Intuitive Eating Scale. Intention-to-treat linear
46 mixed models were used to test for higher-order interactions between internalized weight stigma,
47 group, and time. Findings revealed significant 3-way and 2-way interactions between
48 internalized weight stigma, group, and time for disordered and adaptive eating behaviors,
49 respectively. Only weight-neutral program participants with low internalized weight stigma
50 improved global disordered eating scores. Participants from both programs with low internalized
51 weight stigma improved adaptive eating at 6 months, but only weight-neutral program
52 participants maintained changes at follow-up. Participants with high internalized weight stigma
53 demonstrated no changes in disordered and adaptive eating, regardless of program. In order to
54 enhance the overall benefit from weight-neutral approaches, these findings underscore the need
55 to incorporate more innovative and direct methods to reduce internalized weight stigma for
56 women with high BMI.

57 **Key Words:** internalized weight stigma, disordered eating, intuitive eating, obesity,
58 health at every size, conventional weight-management

59

60 Introduction

61 Widespread concerns over the “obesity epidemic” have dominated the scientific literature
62 on weight for the greater part of the 21st Century. A consequence of this increased attention on
63 obesity is a pervasive stigmatization of people with a higher weight status—a stigmatization that
64 is on the rise among adults and children (Andreyeva, Puhl, & Brownell, 2008; Harriger,
65 Calogero, Witherington, & Smith, 2010; Latner & Stunkard, 2003). Indeed, weight
66 discrimination has been well-documented in educational, workplace, and healthcare settings
67 (e.g., Giel, Thiel, Teufel, Mayer, & Zipfel, 2010; Neumark-Sztainer, Story, & Harris, 1999; Puhl
68 & Latner, 2007; Puhl, Latner, King, & Luedicke, 2014; Puhl, Luedicke, & Heuer, 2011; Puhl &
69 Peterson, 2014; Ruggs, Hebl, & Williams, 2015; Sabin, Marini, & Nosek, 2012). Even
70 healthcare professionals who have chosen a career path specializing in the medical management
71 of obese patients demonstrate anti-fat attitudes, as assessed implicitly in laboratory research
72 (Schwartz, Chambliss, Brownell, Blair, & Billington, 2003). Given these data, it is no surprise
73 that higher weight individuals report avoiding preventive healthcare and suffer from receiving
74 suboptimal medical treatment (Phelan et al., 2015; Wee, McCarthy, Davis, & Phillips, 2000).

75 Weight-neutral approaches to promote health, actively attempt to reduce the perpetuation
76 of weight stigma and promote size acceptance by shifting the focus of interventions away from
77 weight loss (i.e., typical of conventional weight-management programs) to well-being and self-
78 care, regardless of weight status (Tylka et al., 2014). Notably, Health at Every Size® (HAES)
79 models characterize the weight-neutral approach (Bacon, 2010; Bombak, 2014; O'Hara & Gregg,
80 2014; Robison, Putnam, & McKibbin, 2007), and studies that have tested weight-neutral
81 programs demonstrated improvements (compared to baseline values) in many physical health,
82 eating, and well-being indices such as: lower total cholesterol, low-density lipoprotein
83 cholesterol, triglycerides, systolic blood pressure, disinhibited eating, bulimic symptomatology,

84 drive for thinness, body dissatisfaction, poor interoceptive awareness, and depression (e.g.,
85 Bacon et al., 2002; Bacon, Stern, Van Loan, & Keim, 2005; Mensinger, Calogero, Stranges, &
86 Tylka, 2016; for reviews, see Cadena-Schlam & Lopez-Guimera, 2014; Clifford et al., 2015; and
87 Schaefer & Magnuson, 2014). Although this body of research demonstrated effectiveness for
88 weight-neutral programs, what is less clear is whether there are moderators that strengthen or
89 weaken their effectiveness. Moderators answer the question of *when* or *for whom* a given
90 relationship exists or an effect occurs (Karazsia, van Dulmen, Wong, & Crowther, 2013).

91 One such mechanism that has received substantial attention and could act as a moderator
92 of weight-neutral programs' effectiveness is internalized weight stigma. *Internalized weight*
93 *stigma* refers to the adoption and personal endorsement of negative weight-based societal
94 stereotypes (Carels et al., 2013; Durso & Latner, 2008; Tylka et al., 2014). Individuals with high
95 internalized weight stigma judge themselves based on these very stereotypes (Pearl, Puhl, &
96 Dovidio, 2014)—thus, they assume personal responsibility for their weight and view their bodies
97 as unattractive and in need of modification due to their size. This self-judgment may prompt
98 additional body shame and body hatred, which may then result in decreased psychological well-
99 being and physical health (Durso et al., 2012; Muennig, 2008; Wirth, Blake, Hebert, Sue, &
100 Blair, 2014). Preliminary evidence suggests that individuals with greater internalized weight
101 stigma report lower engagement in physical activity (Carels et al., 2009; Pearl et al., 2014;
102 Vartanian & Novak, 2011), higher caloric intake during weight loss programs (Carels et al.,
103 2009; Schvey, Puhl, & Brownell, 2011), and greater eating disorder symptomatology (Carels,
104 Wott, Young, et al., 2010; Durso et al., 2012; Puhl, Moss-Racusin, & Schwartz, 2012; Schvey,
105 Roberto, & White, 2013; Schvey & White, 2015)—all of which may interfere with the
106 effectiveness of health promotion programs. It is plausible, then, that internalized weight stigma
107 poses a barrier to receiving the full benefit from participating in such programs.

108 To evaluate this proposition, the present study examined internalized weight stigma as a
109 moderator of the effectiveness of a weight-neutral program and a conventional weight-
110 management program for women of high BMI, with a particular focus on their eating behavior
111 outcomes. More specifically, we predicted that women with high internalized weight stigma
112 would be less likely to benefit from a weight-neutral program than those with low internalized
113 weight stigma. Indeed, women with high internalized weight stigma may find it harder to engage
114 in adaptive eating behaviors as well as harder to disengage from disordered eating if they have
115 internalized societal weight-based stereotypes and therefore blame themselves for their high
116 weight. Furthermore, without a special focus on interventions for reducing internalized weight
117 stigma, implementing size acceptance principles characteristic of weight-neutral programs may
118 be particularly challenging to this subset of people with high BMI. In contrast, conventional
119 weight-management programs promise a method of escaping the stigmatized group through
120 dietary prescriptions and lifestyle modifications that assure weight loss. Therefore, we predicted
121 those with high internalized weight stigma in a conventional weight-management program may
122 not differ as much in their changes in eating behaviors compared to their low internalized weight
123 stigma counterparts.

124 In summary, to test these assertions, three specific hypotheses were examined: (a)
125 internalized weight stigma would have a more negative impact on eating behaviors over time in
126 the weight-neutral program compared to the conventional weight-management program; (b)
127 participants with high levels of internalized weight stigma would see smaller declines in
128 disordered eating and less improvement in adaptive eating over time compared to those low in
129 internalized weight stigma, regardless of intervention; and (c) participants in the weight-neutral
130 program would experience greater declines in disordered eating and larger improvements in
131 adaptive eating behaviors than those in the conventional weight-management program. In

132 addition, change in internalized weight stigma between and within both programs from baseline
133 to post-treatment and follow-up was explored. If either program is able to reduce participants'
134 internalized weight stigma directly, then additional support would be accrued for the program's
135 clinical relevance.

136 **Materials and Methods**

137 **Design and Procedure**

138 Participants for this longitudinal, randomized controlled trial were recruited from a
139 suburban community setting in Southeastern Pennsylvania in late Fall 2008 through a local
140 coupon magazine advertisement, flyers placed in physicians' offices, and the sponsoring
141 hospital's website. Research staff conducted phone screens with interested study applicants to
142 determine preliminary eligibility. If they met the initial criteria, applicants were instructed to
143 consult their primary care physician to obtain a signature on a requisite clearance form that
144 described the study and its eligibility criteria. They then attended an intake session with a trained
145 research assistant who garnered participants' informed consent and ascertained participants' BMI
146 by measuring body weight and height without shoes using a Detecto balance beam scale and a
147 wall-mounted stadiometer to the nearest 0.1 kilogram and 0.1 centimeter, respectively.

148 At the end of the baseline assessment, study participants were handed a sequentially
149 numbered envelope containing a randomly assigned intervention group (1:1 ratio), a welcome
150 letter, and instructions regarding the study. Follow-up assessments occurred immediately post-
151 intervention (6 months) and at 24-months post-randomization. Incentives of \$20 were provided
152 for attending follow-up assessments. Research technicians with health science training (nurses
153 and public health backgrounds) collected study measurements for all time points in the
154 laboratory of the Clinical Research Center at the sponsoring hospital. Although self-report
155 measures were used, study personnel read the questions to participants, and participants' answers

156 were provided orally in a structured interview-like format, in order to ensure clarity of all
157 questions and completeness of the data. The study protocol and procedures were approved and
158 monitored by the Institutional Review Board of the Reading Health System.

159 **Eligibility Criteria**

160 To be eligible for the study, participants had to be female, between 30 and 45 years old,
161 have a BMI between 30 and 45 kg/m², practice birth control if heterosexual and pre-menopausal,
162 and be physically inactive (i.e., scoring in either the ‘inactive’ or ‘light intensity activity’
163 categories on the Stanford Brief Activity Survey; Taylor-Piliae et al., 2006). Women were
164 excluded if they were current smokers, were not fluent in English, were taking medications
165 known to affect weight, were presently participating in a weight loss program, were pregnant or
166 intending to become pregnant, had type 1 or insulin-dependent type 2 diabetes, had or were
167 planning to have bariatric surgery, had an active neoplasm, or had a history of myocardial
168 infarction, congestive heart failure, cerebrovascular disease, renal disease, or cirrhosis. Specific
169 psychological contraindications that also warranted exclusion were a diagnosis of bulimia
170 nervosa, anorexia nervosa, or substance abuse, and psychiatric disturbances that significantly
171 disrupted daily functioning (e.g., suicidal ideation, current manic episode, schizophrenia).

172 A total of 80 women were enrolled in the study after screening 252 women for
173 eligibility. Based on the screening, 110 women did not meet the eligibility criteria listed above.
174 A further 60 women were excluded because they were unable to commit to attend the weekly
175 evening group on Wednesdays due to a conflict with pre-existing commitments on that day of
176 the week. Two additional women were excluded because they missed the deadline for submitting
177 their clearance form from their physicians. A total of 72 participants were available for
178 assessment at the 6-month assessment and 40 participants were available at the 24-month
179 assessment. Figure 1 displays the flow of participant involvement for the duration of the study.

180 Interventions

181 Forty women were randomly assigned to the weight-neutral program, and 40 women
182 were randomly assigned to the conventional weight-management program. Participants within
183 each program were divided into two cohorts of 20. Both cohorts for each program met weekly
184 for 90-minute sessions, held simultaneously on a weekday evening for the duration of 6 months.
185 The cohort sizes were based on recommendations by the developers of the program protocols
186 and consultations with the group facilitators prior to the commencement of the study. Both
187 facilitators had previous experience working with psychoeducational groups of up to 20
188 individuals. The length of the interventions, intensity of the interventions, resources provided to
189 participants, and the expertise of the facilitators (i.e., in the focus of the respective interventions)
190 were equivalent between the programs.

191 Participants in the weight-neutral program received the *HUGS Program for Better Health*
192 (Omichinski, 2007), which stands for **H**Health-focused, **U**nderstanding lifestyle, **G**roup supported,
193 and **S**elf-esteem building. HUGS is a holistic health promotion program that follows an
194 evidence-based (Omichinski, 1995) manualized curriculum (Omichinski, 2007) incorporating the
195 main components of popular weight-neutral programs such as Health at Every Size® (Bacon,
196 2010). Although the weight-neutral program underscored the HAES® tenets (ASDAH, 2015;
197 Tylka et al., 2014) and emphasized the appreciation of body size diversity and size acceptance,
198 the curriculum did not *directly* address internalized weight stigma. HUGS also taught the
199 principles of eating for well-being *and* pleasure, and engaging in physical activity for personal
200 enjoyment and fulfillment. A key aim of this program was to help participants break away from a
201 dieting mindset that often leads to a vicious cycle of bingeing and guilt due to an overly
202 restrictive lifestyle (Polivy & Herman, 1985; van Strien, Herman, & Verheijden, 2014).
203 Participants received the books *Staying Off of the Diet Roller Coaster* (Omichinski, 2000) and

204 *Tailoring Your Tastes* (Omichinski & Hildebrand, 1995), in addition to a booklet of handouts
205 including psycho-educational worksheets (e.g., exploring hunger with a hunger rating scale,
206 discerning emotional from physical hunger), and a set of affirmation CDs produced by HUGS
207 Inc. Each week participants were encouraged to further explore topics they discussed within their
208 group sessions on their own at home. For example, participants completed assigned readings
209 from the books, wrote positive affirmations about themselves and their changing daily routines to
210 bring back and share with the group the following week, kept a food and feelings journal in order
211 to reconnect with hunger and satiety cues, and engaged in new and enjoyable physical activities.
212 At the end of the 6 months, participants were encouraged to maintain their non-dieting lifestyles
213 and self-affirming attitudes about their bodies by utilizing the social support network developed
214 during the program. Email and phone number lists were created and distributed in both cohorts to
215 help facilitate this network. This program was delivered by a psychotherapist and fitness
216 professional with over 15 years of experience in providing health-centered, HAES®-oriented
217 approaches for clients with high BMI within individual and group settings.

218 Participants in the conventional weight-management program received the *LEARN*
219 *Program for Weight Management*, which stands for **L**ifestyle, **E**xercise, **A**ttitudes, **R**elationships,
220 and **N**utrition (Brownell, 2000). This evidence-based behavior modification curriculum
221 emphasizes weight loss as an ultimate goal of the program, while focusing on gaining skills to
222 overcome weight loss barriers, and, learning how to change diet and lifestyle. The LEARN
223 program has been referred to as the gold standard for weight-management programs (Gardner et
224 al., 2007; Womble et al., 2004). Participants in the LEARN program received the 10th edition of
225 the *LEARN Program for Weight Management* manual (Brownell, 2000) and the *LEARN Weight*
226 *Stabilization and Maintenance Guide* (Brownell, 2008) along with the LEARN Program CD set.
227 In addition to maintaining food diaries and physical activity logs between the scheduled program

228 meetings each week, participants were expected to complete exercises from the manual.
229 Examples of the exercises included: (a) a self-assessment of eating risk factors, (b) a worksheet
230 to prepare one with coping skills for “high risk situations” that might lead to overeating, (c) an
231 eating habits checklist, (d) a nutrition quiz, and (e) an exercise quiz. As with the weight-neutral
232 program, at the end of the 6-month program, participants in the conventional weight-
233 management program were encouraged to maintain their lifestyle changes by utilizing the social
234 support network developed during the program. Email and phone number lists were created and
235 distributed in both cohorts to help facilitate this network. This program was delivered by a
236 registered dietician with over 15 years of experience working with bariatric populations and
237 patients with type 2 diabetes within individual and group settings.

238 The two programs shared many common principles in that both emphasized the
239 importance of healthy lifestyle choices and gradual sustainable change. However, the
240 conventional weight-management program made weight loss an explicit goal and focused on
241 food intake levels based on external prescriptions and caloric restriction. In contrast, the weight-
242 neutral program taught size acceptance, self-care, and strategies to recognize and respond to
243 physiological signs of hunger and satiety to determine food intake. We ensured fidelity of the
244 programs by using checklists derived from the leaders’ manuals and randomly selecting
245 approximately 20% of the sessions for audit by a trained staff member from the Reading Health
246 System Clinical Research Center.

247 **Measures**

248 **Adaptive eating.** We defined adaptive eating as *intuitive eating*, or eating mainly in
249 response to physiological hunger and satiety cues—those who eat intuitively are attuned to and
250 trust their hunger and satiety signals to guide their eating (Tylka, 2006). Intuitive eating has been
251 described as a flexible and adaptive eating behavior (Tribole & Resch, 2012). We assessed this

252 eating style using Tylka's (2006) original Intuitive Eating Scale (IES), as the updated IES-2
253 (Tylka & Kroon Van Diest, 2013) was not yet published. The IES contains 21 items that are
254 rated along a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Items assess
255 one's ability to: (a) recognize and trust hunger and satiety cues, (b) eat in accordance to physical
256 rather than emotional cues, and (c) give oneself unconditional permission to eat. While subscale
257 scores can be generated, we averaged the 21 items to create an overall composite score, as
258 recommended by Tylka (2006). The IES has been found to show evidence of reliable and valid
259 scores among college students, indicating a higher-order factor structure (Tylka, 2006), as well
260 as among community-based samples of women (Tylka, Lumeng, & Eneli, 2015). Cronbach's
261 alpha for the the IES in the present sample was .76.

262 **Disordered eating.** Disordered eating attitudes and behaviors were measured using the
263 Eating Disorder Examination Questionnaire (EDE-Q) version 6.0 (Fairburn & Cooper, 2008;
264 Fairburn, Cooper, & O'Connor, 2008). The EDE-Q is a 28-item measure based on the Eating
265 Disorder Examination interview (Cooper & Fairburn, 1987). EDE-Q scores were conceptualized
266 along a continuum of degree, whereby progressively higher scores correspond to progressively
267 higher levels of eating psychopathology; support for this dimensional approach can be found in
268 Tylka (2004) and Tylka and Subich (1999). Because participants were excluded on the basis of a
269 diagnosis of bulimia nervosa or anorexia nervosa, a clinical cut-off score was determined to not
270 be useful and therefore not calculated in the present study. The EDE-Q consists of four subscales
271 (Restraint, Eating Concern, Weight Concern, and Shape Concern) that are summed and averaged
272 to obtain a total composite index of global eating disturbance, as was done in the present study.
273 Participants are asked to rate the frequency with which they experience a series of behaviors and
274 cognitions that are characteristic of disordered eating over the past 28 days on a 7-point scale (0
275 = *no days*, 1 = *1-5 days*, 2 = *6-12 days*, 3 = *13-15 days*, 4 = *16-22 days*, 5 = *23-27 days*, 6 =

276 *every day*). The EDE-Q has been validated in large population-based samples of community
277 women and demonstrates sound psychometric properties within these samples (Hilbert, de
278 Zwaan, & Braehler, 2012; Mond, Hay, Rodgers, & Owen, 2006; Mond, Hay, Rodgers, Owen, &
279 Beumont, 2004). Cronbach's alpha for the global EDE-Q in the present sample was .80.

280 **Internalized weight stigma.** We used the Weight Bias Internalization Scale (WBIS;
281 Durso & Latner, 2008) to measure participants' levels of internalized weight stigma. The WBIS
282 contains 11 items that are rated on a 7-point Likert scale ranging from *strongly disagree* (scored
283 as 1) to *strongly agree* (scored as 7). Items are averaged, with higher scores indicating higher
284 internalized weight stigma. In a sample of community women and men who were classified as
285 overweight or obese, scores on the WBIS demonstrated internal consistency reliability and
286 construct (i.e., convergent, incremental) validity (Durso & Latner, 2008). Cronbach's alpha for
287 the WBIS was .84 in the present sample.

288 **Data Analysis**

289 Statistical tests were performed in SPSS (Version 22.0, Armonk, NY: IBM Corp.). Using
290 independent samples *t*-tests for continuous variables and chi-square tests for categorical variables
291 (e.g., race/ethnicity, marital status), study non-completers were compared to study completers on
292 all baseline levels of the outcome variables as well as the participant demographic characteristics
293 reported in Table 1 in order to determine how attrition may have influenced the findings. We
294 applied linear mixed models with the intention-to-treat principle to test the primary hypotheses:
295 (a) a third order interaction effect (group \times time \times internalized weight stigma); (b) a second-order
296 interaction effect (internalized weight stigma \times time); and (c) a second-order interaction effect of
297 the group differences in mean changes in the outcomes over time (group \times time). In addition to
298 testing these hypotheses, the models provided estimates for the between-group differences in
299 change from baseline to 6-month and 24-month assessments, the within-group effects of time

300 (including *post hoc* comparisons using the Least Significance Difference test), and the main
301 effect of internalized weight stigma on disordered and adaptive eating behaviors. Internalized
302 weight stigma was also explored over time with an intention-to-treat linear mixed model
303 examining the within and between-group effects as well as the group by time interaction effect.
304 The compound symmetry assumption was used to fit the covariance matrices for the models.
305 Sample size determination was based on data from a previous trial comparing a weight-neutral to
306 a conventional weight-management intervention with 78 obese women and a 50% attrition rate at
307 the 24-month follow-up (Bacon et al., 2005). We determined that with 20 participants per
308 intervention by long-term follow-up, we would have adequate power (.80) to detect differences
309 of a moderate effect size.

310 Higher-order interaction effects were descriptively probed using the standard “pick-a-
311 point” approach that was developed for fixed effects regression models (Rogosa, 1980; Aiken &
312 West, 1991) and further extended to multi-level, or growth-curve models with subject-specific
313 random effects (Bryk & Raudenbush, 1987; Willet, Singer, & Martin, 1998). Trajectories of
314 change depicting individuals who scored 1 standard deviation (*SD*) above the mean on
315 internalized weight stigma and those who scored 1 *SD* below the mean were used as anchors on
316 the graphs.

317 **Results**

318 Table 1 displays the baseline sample characteristics grouped by program. No significant
319 differences were demonstrated between the programs on any of the measures (all *ps* > .05),
320 indicating that the randomization was successful in creating adequately comparable groups.
321 At 6 months (immediately after the program ended), 90% of the participants were available for
322 assessments. At 24 months, 50% of the participants were available for follow-up assessments.
323 Attrition analyses indicated no differences between the completers and non-completers on any of

324 the baseline scores for the outcome variables or demographic characteristics, with the exception
325 of race/ethnicity. Of the five participants who identified as a racial minority, none completed the
326 24-month assessment (Fisher's Exact Test; $p = .055$). To further ensure that attrition had no
327 impact on the present findings, we entered a dropout variable into the linear mixed models;
328 results were unchanged after doing so.

329 Table 2 reports the estimated marginal means at baseline, 6 months, and 24 months from
330 the intention-to-treat linear mixed analyses for each outcome variable¹. These values are based
331 on models that include the main effects for internalized weight stigma (WBIS scores), group
332 (weight-neutral program versus conventional weight-management program), time (baseline, 6
333 months, 24 months), as well as all 2-way interactions (group \times time; group \times internalized weight
334 stigma; time \times internalized weight stigma), and the 3-way (group \times time \times internalized weight
335 stigma) interaction effect on these variables. When internalized weight stigma was the outcome,
336 the model included the group and time main effects as well as the group by time interaction. All
337 models also examined between-group differences in change from baseline to 6 months and 24
338 months, as well as the within-group effects of time. Table 2 reports the F -statistics, p -values,
339 parameter estimates, and 95% confidence intervals for all of the effects reported below.

340 **Adaptive Eating**

341 For the first hypothesis, the 3-way interaction effect between group, time, and
342 internalized weight stigma trended towards significance, suggesting that the influence of
343 internalized weight stigma on adaptive eating was marginally different for the two programs. The
344 second hypothesis was supported by the significant 2-way interaction between internalized
345 weight stigma and time, suggesting that internalized weight stigma influenced the degree to
346 which participants changed their adaptive eating behaviors over the course of the study,
347 regardless of program type.

348 To interrogate the meaning of the interactions involving internalized weight stigma, we
349 plotted a graph utilizing the model's parameter estimates to demonstrate the changes in adaptive
350 eating between women with high (1 *SD* above the mean) internalized weight stigma and low (-1
351 *SD* below the mean) internalized weight stigma for each program over the time points. Figure 2
352 demonstrates that women with high internalized weight stigma in both programs did not
353 demonstrate improvements in adaptive eating at the 6-month or 24-month assessments. In
354 contrast, women with low internalized weight stigma reported improved adaptive eating at the 6-
355 month assessment (internalized weight stigma \times time effect). The significant 3-way interaction
356 effect (group \times time \times internalized weight stigma) provides evidence that of the individuals with
357 low internalized weight stigma, the greatest improvement occurred among women in the weight-
358 neutral program.

359 The third hypothesis was also supported by the significant 2-way interaction between
360 group and time, suggesting that changes in adaptive eating behaviors over time were different
361 according to the assigned program. Significant between-group differences in mean change from
362 baseline were found at post-intervention for adaptive eating behaviors. Specifically, the
363 improvement in adaptive eating behaviors was greater in the weight-neutral program compared
364 to the conventional weight-management program between the baseline and 6-month assessment
365 ($t = -2.60, p = .011$). At the 24-month assessment, the mean difference in change from baseline
366 was no longer significantly different between the two programs for adaptive eating ($t = -1.38, p =$
367 $.169$).

368 Within-group effects of time for adaptive eating were evident in both programs. Overall
369 improvements between baseline and the 6-month assessment were demonstrated for the weight-
370 neutral program ($p < .001$) and conventional weight-management program ($p = .008$). However,
371 only the weight-neutral program participants sustained improvements above baseline levels at

372 the 24-month assessment (weight-neutral $p = .001$ vs. conventional weight-management $p =$
373 .462).

374 **Disordered Eating**

375 **Global EDE-Q scores.** For the first hypothesis, the 3-way interaction between group,
376 time, and internalized weight stigma was statistically significant, indicating that the influence of
377 internalized weight stigma on global disordered eating over time was not equivalent for the two
378 programs. The second hypothesis was supported by the significant 2-way interaction between
379 internalized weight stigma and time, suggesting that internalized weight stigma influenced the
380 degree to which participants decreased disordered eating behaviors over the course of the study
381 regardless of assigned program.

382 To interrogate the meaning of the interaction effects involving internalized weight
383 stigma, we plotted a graph utilizing the model's parameter estimates to depict how women with
384 high (1 *SD* above the mean) internalized weight stigma compared to women with low (-1 *SD*
385 below the mean) internalized weight stigma on disordered eating behaviors within each program.
386 Figure 3 reveals that women with high internalized weight stigma did not show reductions in
387 disordered eating at the 6-month or 24-month assessment, regardless of the assigned program. In
388 comparison, women with low internalized weight stigma did show reductions in disordered
389 eating at the 6-month assessment (internalized weight stigma \times time effect), with the largest
390 decrements observed for women with low internalized weight stigma within the weight-neutral
391 program, providing support for the first hypothesis (group \times time \times internalized weight stigma
392 effect). The difference in mean change for the weight-neutral program from baseline to the 6-
393 month assessment for high versus low internalized weight stigma was 1.32, while the difference
394 in mean change for the conventional weight-management program from baseline to the 6-month
395 assessment was 0.40. Notably, the 6-month assessment mean for women with lower than average

396 internalized weight stigma within the weight-neutral program was 0.50 *SD* units *below* the global
397 EDE-Q mean derived from age and sex equivalent population norms (women between 33-37
398 years-old; Mond et al., 2006) and 1.56 *SD* units below the global EDE-Q mean derived from a
399 population-based community sample of women between the ages of 16 and 50 with a BMI >30
400 (Rø, Reas, & Rosenvinge, 2012).

401 The third hypothesis was also supported by the significant 2-way interaction between
402 group and time, suggesting that changes in disordered eating behaviors over time were different
403 according to the assigned program. Specifically, women in the weight-neutral program
404 demonstrated significantly greater reductions in disordered eating than women in the
405 conventional weight-management program between baseline and the 6-month assessment ($t =$
406 $3.36, p = .001$); however, these differences between the programs were no longer significant at
407 the 24-month assessment ($t = 1.31, p = .194$).

408 Within-group effects of time for global disordered eating scores were evident only in the
409 weight-neutral program. Participants reported reductions in global disordered eating at the 6-
410 month assessment ($p < .001$), and these reductions were sustained at the 24-month assessment (p
411 $= .001$).

412 **EDE-Q subscales.** In order to further understand the patterns of change and provide
413 context for the overall findings in global disordered eating, we conducted a supplementary
414 analysis for each EDE-Q-subscale as an outcome in lieu of the total global disordered eating
415 score. As reported in Table 2, the 3-way interaction effect for group, time, and internalized
416 weight stigma as well as the 2-way interactions between time and internalized weight stigma on
417 the Weight Concern and Shape Concern subscales closely align with the results for global
418 disordered eating. Although the group by time interaction effects for Weight Concern and Shape
419 Concern were not significant, there was a strong group by time interaction for the Restraint

420 subscale. Whereas Restraint scores in the conventional weight-management program
421 significantly increased (hence become more disordered), those in the weight-neutral program did
422 not change over the course of the study. The 3-way interaction effect was not significant for the
423 Eating Concerns subscale, suggesting that the effect of internalized weight stigma did not differ
424 between the weight-neutral program and the conventional weight-management program.
425 However, both hypothesized 2-way interactions (internalized weight stigma \times time, group \times
426 time) trended towards significance for Eating Concerns.

427 **Internalized Weight Stigma**

428 In addition to the tests of the main hypotheses, we also explored whether there was a
429 group by time interaction effect for internalized weight stigma, and examined the associated
430 between-group and within-group effects of time (see Figure 4 and bottom section of Table 2).
431 The group by time interaction effect did not reach statistical significance, and there were no
432 between-group differences in mean changes from baseline to the 6-month or 24-month
433 assessment. Within-group effects of time were evident in both the weight-neutral program and
434 the conventional weight-management program. Overall improvements in internalized weight
435 stigma between baseline and the 6-month assessment were reported by those in the weight-
436 neutral program ($p < .001$) and those in the conventional weight-management program ($p <$
437 $.001$). These positive changes in internalized weight stigma were further sustained at the 24-
438 month assessment for the weight-neutral program ($p < .001$) and the conventional weight-
439 management program ($p = .010$). The difference between the means in internalized weight
440 stigma was negligible at baseline (Cohen's $d = 0.21$), but large effect sizes were noted between
441 the programs at the 6-month assessment (Cohen's $d = -1.73$) and the 24-month assessment
442 (Cohen's $d = -2.00$). The means of the weight-neutral program were lower than the means of the
443 conventional weight-management program in the two latter assessments.

444 **Discussion**

445 This study examined the moderating effect of internalized weight stigma on eating
446 behavior outcomes over time when comparing a weight-neutral program to a conventional
447 weight-management program for women with high BMI. Women with high levels of internalized
448 weight stigma showed less improvement in their eating behaviors (i.e., adaptive eating and
449 disordered eating) regardless of intervention type, whereas women with low internalized stigma
450 showed meaningful improvements in both adaptive and disordered eating behavior—this was
451 especially the case for the weight-neutral program. Specifically, at the end of the intervention,
452 women with low internalized stigma had global EDE-Q scores below (.50 *SD* units) age and
453 gender-matched population averages reported in the literature (Mond et al., 2006) and well
454 below (1.56 *SD* units) population averages reported for women with high BMI (>30) (Rø et al.,
455 2012). Furthermore, women in the weight-neutral program showed significantly greater
456 improvement in adaptive and disordered eating behaviors between baseline and post-intervention
457 compared to women in the conventional weight-management program, independent of
458 internalized weight stigma. In fact, women in the conventional weight-management program did
459 not sustain positive changes in adaptive eating at the 24-month assessment, nor did they
460 demonstrate significant within-group changes over time in global disordered eating.

461 When dimensions of disordered eating were investigated separately (i.e., EDE-Q
462 subscales), weight and shape concerns largely mirrored the global EDE-Q findings. Significant
463 between-group differences were evident in restraint behaviors at the 6-month and 24-month
464 assessments. Restraint increased from baseline to post-intervention in the conventional weight-
465 management program while no significant changes were evident for the weight-neutral program.
466 A trend in the group by time effect also indicated more pronounced improvements in eating
467 concerns in the weight-neutral program compared to the conventional weight-management

468 program; this effect was driven by significant between-group differences in changes from
469 baseline to 6 months.

470 These findings are consistent with previous research that has demonstrated the
471 effectiveness of weight-neutral programs for reducing disordered eating and improving adaptive
472 eating among women with high BMI (e.g., Bacon et al., 2005; Carrier, Steinhardt, & Bowman,
473 1994; Mensinger et al., 2016; Provencher et al., 2009; Watkins, Ebbeck, & Levy, 2014).
474 Moreover, this study extends prior research by highlighting internalized weight stigma as a
475 potential factor that may mitigate the effectiveness of weight-neutral *and* conventional weight-
476 management programs. Indeed, research shows that those with high levels of internalized weight
477 stigma view themselves through the fat-phobic lens that is omnipresent within Western culture
478 (Brownell, Puhl, Schwartz, & Rudd, 2005; Crandall, 1994; Puhl & Latner, 2008; Sikorski et al.,
479 2011), and internalized weight stigma can contribute to harsher self-judgments, more body
480 shame, and less self-care (for a review, see Tylka et al., 2014).

481 Likewise, researchers are investigating new theoretical models for how weight stigma in
482 Western culture has become embodied in high BMI individuals (Brewis, 2014; Puhl & Heuer,
483 2010; Tomiyama, 2014; Tylka et al., 2014). These models posit multiple mechanisms that result
484 in higher weight (e.g., physiological stress, psychosocial stress, social relationships,
485 intergenerational effects), even amidst individuals' efforts to reduce their size through changes in
486 eating patterns. It is important to note here that the widespread conflation of weight and health,
487 as well as fusing eating with weight variables, is itself a structural form of weight stigma
488 perpetuated in the scientific and medical literatures, which fuels the internalization of weight
489 stigmatizing messages (Calogero, Tylka, & Mensinger, 2016). Indeed, being mindful of the
490 tendency to conflate these variables in the scientific literature, and to avoid making weight a
491 central variable in a study focused on changes in disordered and adaptive eating, we did not

492 report results for BMI and weight changes in this paper. As indicated earlier, these results are
493 available upon request from the first author and will be reported in a relevant paper where we
494 tested specific hypotheses related to BMI and weight changes (Mensinger et al., 2016).

495 The importance of internalized weight stigma for health-related outcomes is further
496 underscored by recent research demonstrating that internalized weight stigma and physical
497 activity were the *only* significant predictors of physical health-related quality of life in a sample
498 of adults who were classified as overweight or obese, even after controlling for age, BMI,
499 medical conditions, and medication use (Latner, Durso, & Mond, 2013). Research on weight
500 dissatisfaction (i.e., a subjective and affective self-evaluation based on one's ideal versus actual
501 weight) similarly demonstrates how psychological perceptions and beliefs about one's body can
502 have a stronger impact on indicators of health and well-being (e.g., blood pressure, onset of type
503 2 diabetes) than actual BMI status (Blake et al., 2013; Muennig, Jia, Lee, & Lubetkin, 2008;
504 Wirth et al., 2014; Wirth, Blake, Hebert, Sui, & Blair, 2015).

505 **Clinical Implications and Limitations**

506 Regardless of program type, it was clear from the findings that the eating behaviors of
507 those with high internalized weight stigma were not improved. Although weight-neutral
508 programs (e.g., Bacon et al., 2002; Provencher et al., 2009; Robison et al., 2007), such as Health
509 at Every Size® and the curriculum employed in the present study (Omichinski, 2007), emphasize
510 body and self-acceptance by challenging weight bias and discrimination, specific intervention
511 components designed for the explicit purpose of reducing internalized weight stigma are largely
512 missing. In light of the growing body of evidence on the ubiquitous scope of institutionalized
513 weight stigma (Brochu & Esses, 2009; Malterud & Ulriksen, 2011; Phelan et al., 2014; Phelan et
514 al., 2015; Pomeranz & Puhl, 2013), it is imperative that the psychological impact of the
515 structural inequities faced by people living in larger-sized bodies is directly addressed. Thus,

516 lowering internalized weight stigma should be a critical target for all healthy living programs. As
517 demonstrated in the present study, both programs lowered internalized weight stigma over time;
518 however, a non-significant group by time effect ($p = .173$) may have been due to a small sample
519 size. When comparing the means between programs at the 6-month and 24-month assessments,
520 large effect sizes were noted, suggesting that women in the weight-neutral program reported
521 lower means in internalized weight stigma at these assessments.

522 Working to directly lower internalized weight stigma within conventional weight-
523 management programs may prove to be more challenging because a goal of weight loss (and
524 having to “reduce” to be viewed as “better” and “healthier” human beings) may be inherently
525 stigmatizing. For example, Murakami and Latner (2015) recently demonstrated that weight
526 dissatisfaction on the part of obese targets led to significantly greater stigmatizing and biased
527 responses from participants compared to obese targets who expressed size acceptance. In
528 contrast to conventional weight-management programs, a weight-neutral program explicitly
529 promotes size acceptance, which would address internalized weight stigma more directly and
530 potentially facilitate rejection of this stigma over time.

531 There are a number of practical strategies for directly targeting internalized weight stigma
532 in weight-neutral programs, such as assigning portions of Bacon and Aphramor’s (2014) *Body*
533 *Respect* for participants to read. We also propose borrowing elements from body image programs
534 developed during the anti-dieting movement of the late 1980s and early 1990s (Garner & Wooly,
535 1991; Polivy & Herman, 1992). Additionally, interventions targeting thin-ideal internalization
536 would be suitable to adapt within weight-neutral programs to address internalized weight stigma,
537 given that greater internalized weight stigma has been found to be associated with a stronger pro-
538 thin bias (Carels & Musher-Eizenman, 2010). For example, mounting evidence supports a
539 cognitive dissonance strategy as successful in helping female participants reject the thin ideal

540 and pro-weight loss attitudes, and thereby reduce their disordered eating behaviors (e.g., Stice &
541 Presnell, 2007; Stice, Rohde, Gau, & Shaw, 2009). Cognitive dissonance strategies could also be
542 designed to have participants advocate for higher weight individuals and verbally criticize anti-
543 fat bias in order to reinforce new positive attitudes and behaviors around weight and shape.

544 Ultimately, a predominant underlying theme of a successful weight-neutral program
545 should be that optimal self-care evolves out of self-compassion and self-acceptance (Breines &
546 Chen, 2012; Daye, Webb, & Jafari, 2014; Magnus, Kowalski, & Mchugh, 2010; Schoenefeld &
547 Webb, 2013). Interventions to increase self-compassion can reduce body shame (Albertson,
548 Neff, & Dill-Shackleford, 2014), which is a potential barrier to more fully actualizing adaptive
549 treatment effects, and is likely to coincide with high internalized weight stigma. Reducing body
550 shame and dissatisfaction in Western culture will involve teaching body image flexibility and
551 body appreciation, which involve relinquishing social norms for beauty, appreciating the body's
552 unique qualities, and approaching body image threats (e.g., external pressures to be thin) with
553 mindful awareness and self-compassion while pursuing meaningful and valued activities (Moore,
554 Masuda, Hill, & Goodnight, 2014; Sandoz, Wilson, Merwin, Kellum, 2013; Tylka & Wood-
555 Barcalow 2015; Webb, 2015; Webb, Wood-Barcalow, & Tylka, 2015).

556 Although the present study offered important findings regarding the benefits of a weight-
557 neutral program for improving eating behavior, it is not without limitations. Having knowledge
558 about the degree to which our participants utilized their newly formed support systems during the
559 post-intervention phase would have been useful data for understanding the behavioral changes
560 demonstrated. In addition, our small sample was primarily White, middle class, all female, and
561 within a relatively narrow age range, thus limiting the generalizability of the results. Future
562 research with larger, more diverse populations in gender, age, and race/ethnicity are needed to

563 understand how internalized weight stigma impacts eating-related outcomes in the context of
564 weight-neutral and conventional weight-management programs for these groups.

565 One of the biggest limitations involved the high attrition rate at long-term follow-up.
566 Although this is not atypical for studies involving weight reduction (e.g., Dalle et al, 2005;
567 Douketis, Macie, Thabane, & Williamson, 2005; Fabricatore et al., 2009), attrition in weight-
568 neutral programs has been shown to be better in comparison to conventional weight-management
569 programs (Bacon et al., 2002, 2005). Given that the attrition analyses revealed little evidence to
570 suggest characteristics that were predictive of study completion (aside from the significant
571 association with race/ethnicity), we can only speculate about what could have been done
572 differently to encourage better adherence at the 24-month follow-up. Perhaps incentives to return
573 at 24 months should have been incrementally larger as opposed to equal to the 6-month
574 incentives of \$20. Smaller groups at the start of the program, in addition to more active strategies
575 to maintain group cohesion during post-intervention and follow-up (such as sponsoring a
576 celebratory gathering every 3 to 6 months), may have helped with loyalty and commitment to the
577 program and overall study. Past research has examined the dropout phenomenon among weight-
578 loss interventions as a threat to validity through overestimates of treatment effect for weight
579 (Kaplan & Atkins, 1987); it is possible similar threats to validity could occur with outcomes
580 other than weight. As such, cautious interpretations of the present study's results are warranted.

581 As a result of attrition, we only had adequate power to detect a moderate effect or larger
582 in this study. In the 6-month and 24-month assessments, power was reduced to a point that small
583 effect sizes were not statistically significant. Larger sample sizes and reduced attrition may have
584 revealed these small effect sizes to be significant; for example, perhaps the 3-way interaction
585 (group \times time \times internalized weight stigma) for adaptive eating behaviors would move from

586 marginally significant to significant, and perhaps a group \times time effect would be noted for
587 internalized weight stigma as the outcome.

588 **Conclusion**

589 There has been a recent call for more empirical research on weight-neutral programs for
590 health promotion among those with high BMI (Penney & Kirk, 2015). The current study has
591 responded to this call, and addresses a gap in the literature by focusing on the mechanisms that
592 may enhance or undermine the success of weight-neutral programs. Our findings underscore the
593 importance of developing program interventions that include a specific focus on internalized
594 weight stigma. Such programs would directly address negative social stereotypes about higher
595 weights, as well as the body shame that often accompanies inhabiting a larger body in a culture
596 where these bodies are stigmatized. In summary, with weight stigma gaining increased attention
597 in the public health discourse (Puhl & Latner, 2008; Puhl & Peterson, 2014; Ramos, 2015), the
598 literature has made it clear that the next generation of research on weight-neutral programs
599 would benefit from considering both experienced and internalized weight stigma as primary
600 variables of interest in the development of interventions for improving health and well-being.

601

602 **Acknowledgements/Disclosure of Conflicts**

603 The authors declare no conflicts of interest. The research conducted for this article was supported
604 by a grant awarded to the first author from the Edna G. Kynett Memorial Foundation.

605 The funder had no role in the content or decision to submit this manuscript. We wish to thank
606 the funders, the study volunteers, the Reading Health System, and the Reading Hospital Clinical
607 Research staff for providing the infrastructure to allow this project to happen.

608

609 References

- 610 Aiken, L. S., & West, S.G. (1991). *Multiple regression: Testing and interpreting interactions*.
611 Newbury Park, CA: Sage.
- 612 Albertson, E. R., Neff, K. D., & Dill-Shackleford, K. E. (2014). Self-compassion and body
613 dissatisfaction in women: A randomized controlled trial of a brief meditation
614 intervention. *Mindfulness*. doi: 10.1007/s12671-014-0277-3
- 615 Andreyeva, T., Puhl, R. M., & Brownell, K. D. (2008). Changes in perceived weight
616 discrimination among Americans, 1995-1996 through 2004-2006. *Obesity*, 16, 1129-
617 1134. doi: 10.1038/oby.2008.35
- 618 Association for Size Diversity and Health (2015). HAES ® Principles. Retrieved from ASDAH
619 online. <https://www.sizediversityandhealth.org/content.asp?id=152>
- 620 Bacon, L. (2010). *Health at every size: The surprising truth about your weight*. Dallas, TX:
621 BenBella Books Inc.
- 622 Bacon, L., & Aphramor, L. (2014). *Body respect: What conventional health books get wrong,*
623 *leave out, and just plain fail to understand about weight*. Dallas, TX: BenBella Books
624 Inc.
- 625 Bacon, L., Keim, N. L., Van Loan, M. D., Derricote, M., Gale, B., Kazaks, A., & Stern, J. S.
626 (2002). Evaluating a 'non-diet' wellness intervention for improvement of metabolic
627 fitness, psychological well-being and eating and activity behaviors. *International Journal*
628 *of Obesity and Related Metabolic Disorders*, 26, 854-865. doi: 10.1038/sj.ijo.0802012
- 629 Bacon, L., Stern, J. S., Van Loan, M. D., & Keim, N. L. (2005). Size acceptance and intuitive
630 eating improve health for obese, female chronic dieters. *Journal of the American Dietetic*
631 *Association*, 105, 929-936. doi: 10.1016/j.jada.2005.03.011

- 632 Blake, C. E., Hébert, J. R., Lee, D., Adams, S. A., Steck, S. E., Sui, X., ... Blair, S. N. (2013).
633 Adults with greater weight satisfaction report more positive health behaviors and have
634 better health status regardless of BMI. *Journal of Obesity*, 2013, 13. doi:
635 10.1155/2013/291371
- 636 Bombak, A. (2014). Obesity, health at every size, and public health policy. *American Journal of*
637 *Public Health*, 104, e60-67. doi: 10.2105/ajph.2013.301486
- 638 Brewis, A. A. (2014). Stigma and the perpetuation of obesity. *Social Science and Medicine*,
639 118c, 152-158. doi: 10.1016/j.socscimed.2014.08.003
- 640 Breines, J. G., & Chen, S. (2012). Self-compassion increases self-improvement motivation.
641 *Personality and Social Psychology Bulletin*, 38, 1133-1143.
642 doi:10.1177/0146167212445599
- 643 Brochu, P. M., & Esses, V. M. (2009). Weight prejudice and medical policy: Support for an
644 ambiguously discriminatory policy is influenced by prejudice-colored glasses. *Analyses*
645 *of Social Issues and Public Policy*, 9, 117-133. doi: 10.1111/j.1530-2415.2009.01175.x
- 646 Brownell, K. D. (2000). *The LEARN program for weight management* (10th ed.). Dallas, TX:
647 American Health Publishing Company.
- 648 Brownell, K. (2008). *The LEARN weight stabilization and maintenance guide*. Dallas, TX:
649 American Health Publishing Company.
- 650 Brownell, K. D., Puhl, R. M., Schwartz, M. B., & Rudd, L. (Eds.) (2005). *Weight bias: Nature,*
651 *consequences and remedies*. New York, NY: The Guilford Press.
- 652 Bryk, A. S., & Raudenbush, S. W. (1987). Application of hierarchical linear models to assessing
653 change. *Psychological Bulletin*, 101, 147-158.
- 654 Cadena-Schlam, L., & Lopez-Guimera, G. (2014). Intuitive eating: An emerging approach to
655 eating behavior. *Nutricion Hospitalaria*, 31, 995-1002. doi: 10.3305/nh.2015.31.3.7980

- 656 Calogero, R. M., Tylka, T.L., & Mensinger, J. L. (in press). Scientific weightism: A view of
657 mainstream weight stigma research through a feminist lens. In T-A. Roberts, N. Curtin,
658 L. Cortina, & L. E. Duncan (Eds.), *Best practices in feminist psychological science:
659 Gender beyond difference*. New York, NY: Springer.
- 660 Carels, R. A., Burmeister, J., Oehlhof, M. W., Hinman, N., LeRoy, M., Bannon, E.,
661 ...Ashrafloun, L. (2013). Internalized weight bias: Ratings of the self, normal weight, and
662 obese individuals and psychological maladjustment. *Journal of Behavioral Medicine*, *36*,
663 86-94. doi: 10.1007/s10865-012-9402-8
- 664 Carels, R. A., & Musher-Eizenman, D. R. (2010). Individual differences and weight bias: Do
665 people with an anti-fat bias have a pro-thin bias? *Body Image*, *7*, 143-148. doi:
666 10.1016/j.bodyim.2009.11.005
- 667 Carels, R. A., Young, K. M., Wott, C. B., Harper, J., Gumble, A., Oehlof, M. W., & Clayton, A.
668 M. (2009). Weight bias and weight loss treatment outcomes in treatment-seeking adults.
669 *Annals of Behavioral Medicine*, *37*, 350-355. doi: 10.1007/s12160-009-9109-4
- 670 Carrier, K. M., Steinhardt, M. A., & Bowman, S. (1994). Rethinking traditional weight
671 management programs: A 3-year follow-up evaluation of a new approach. *The Journal of
672 Psychology*, *128*, 517-535. doi: 10.1080/00223980.1994.9914910
- 673 Clifford, D., Ozier, A., Bundros, J., Moore, J., Kreiser, A., & Morris, M. N. (2015). Impact of
674 non-diet approaches on attitudes, behaviors, and health outcomes: A systematic review.
675 *Journal of Nutrition Education and Behavior*, *47*, 143-155. doi:
676 10.1016/j.jneb.2014.12.002
- 677 Cooper, Z., & Fairburn, C. (1987). The Eating Disorder Examination: A semi-structured
678 interview for the assessment of the specific psychopathology of eating disorders.

- 679 *International Journal of Eating Disorders*, 6, 1-8. doi: 10.1002/1098-
680 108X(198701)6:1<1::AID-EAT2260060102>3.0.CO;2-9
- 681 Crandall, C. S. (1994). Prejudice against fat people: Ideology and self-interest. *Journal of*
682 *Personality and Social Psychology*, 66, 882-894. doi: 10.1037/0022-3514.66.5.882
- 683 Dalle Grave, R., Calugi, S., Molinari, E., Petroni, M. L., Bondi, M., Compare, A., . . . Group, Q.
684 S. (2005). Weight loss expectations in obese patients and treatment attrition: An
685 observational multicenter study. *Obesity Research*, 13, 1961-1969. doi:
686 10.1038/oby.2005.241
- 687 Daye, C., Webb, J., & Jafari, N. (2014). Exploring self-compassion as a refuge against recalling
688 the body-related shaming of caregiver eating messages on dimensions of objectified body
689 consciousness in college women. *Body Image*, 11, 547-556.
690 doi:10.1016/j.bodyim.2014.08.001
- 691 Douketis, J. D., Macie, C., Thabane, L., & Williamson, D. F. (2005). Systematic review of long-
692 term weight loss studies in obese adults: Clinical significance and applicability to clinical
693 practice. *International Journal of Obesity and Related Metabolic Disorders*, 29, 1153-
694 1167.
- 695 Durso, L. E., & Latner, J. D. (2008). Understanding self-directed stigma: Development of the
696 Weight Bias Internalization Scale. *Obesity*, 16 Suppl 2, S80-86. doi:
697 10.1038/oby.2008.448
- 698 Durso, L. E., Latner, J. D., White, M. A., Masheb, R. M., Blomquist, K. K., Morgan, P. T., &
699 Grilo, C. M. (2012). Internalized weight bias in obese patients with binge eating disorder:
700 Associations with eating disturbances and psychological functioning. *International*
701 *Journal of Eating Disorders*, 45, 423-427. doi: 10.1002/eat.20933
- 702 Fabricatore, A. N., Wadden, T. A., Moore, R. H., Butryn, M. L., Gravallesse, E. A., Erondy, N.

- 703 E., . . . Nguyen, A. M. (2009). Attrition from randomized controlled trials of
704 pharmacological weight loss agents: a systematic review and analysis. *Obesity Reviews*,
705 10, 333-341. doi: 10.1111/j.1467-789X.2009.00567.x
- 706 Fairburn, C. G., & Cooper, Z. (2008). Eating Disorder Examination Questionnaire (EDE Q 6.0).
707 In C. G. Fairburn (Ed.), *Cognitive therapy and eating disorders* (pp. 309-313). New
708 York, NY: Guilford Press.
- 709 Fairburn, C. G., Cooper, Z., & O'Connor, M. E. (2008). Eating Disorder Examination (Edition
710 16.0 D). In C. G. Fairburn (Ed.), *Cognitive therapy and eating disorders* (pp. 265-308).
711 New York, NY: Guilford Press.
- 712 Gardner, C. D., Kiazand, A., Alhassan, S., Kim, S., Stafford, R. S., Balise, R. R., . . . King, A. C.
713 (2007). Comparison of the Atkins, Zone, Ornish, and LEARN diets for change in weight
714 and related risk factors among overweight premenopausal women: The A TO Z weight
715 loss study: A randomized trial. *Journal of the American Medical Association*, 297, 969-
716 977. doi: 10.1097/01.ogx.0000269084.43998.38
- 717 Garner, D. M., & Wooley, S. C. (1991). Confronting the failure of behavioral and dietary
718 treatments for obesity. *Clinical Psychology Review*, 11, 729-780. doi: 10.1016/0272-
719 7358(91)90128-H
- 720 Giel, K. E., Thiel, A., Teufel, M., Mayer, J., & Zipfel, S. (2010). Weight bias in work settings -
721 A qualitative review. *Obesity Facts*, 3, 33-40. doi: 10.1159/000276992
- 722 Harriger, J. A., Calogero, R. M., Witherington, D. C., & Smith, J. E. (2010). Body size
723 stereotyping and internalization of the thin ideal in preschool girls. *Sex Roles*, 63, 609-
724 620. doi: 10.1007/s11199-010-9868-1

- 725 Hilbert, A., de Zwaan, M., & Braehler, E. (2012). How frequent are eating disturbances in the
726 population? Norms of the Eating Disorder Examination-Questionnaire. *PloS One*, *7*,
727 e29125. doi: 10.1371/journal.pone.0029125
- 728 Kaplan, R. M., & Atkins, C. J. (1987). Selective attrition causes overestimates of treatment
729 effects in studies of weight loss. *Addictive Behaviors*, *12*, 297-302.
- 730 Karazsia, B. T., van Dulmen, M. H., Wong, K., & Crowther, J. H. (2013). Thinking meta-
731 theoretically about the role of internalization in the development of body dissatisfaction
732 and body change behaviors. *Body Image*, *10*, 433-441. doi: 0.1016/j.bodyim.2013.06.005
- 733 Latner, J. D., Durso, L. E., & Mond, J. M. (2013). Health and health-related quality of life
734 among treatment-seeking overweight and obese adults: Associations with internalized
735 weight bias. *Journal of Eating Disorders*, *1*, 3. doi: 10.1186/2050-2974-1-3
- 736 Latner, J. D., & Stunkard, A. J. (2003). Getting worse: The stigmatization of obese children.
737 *Obesity Research*, *11*, 452-456. doi: 10.1038/oby.2003.61
- 738 Magnus, C., Kowalski, K., & Mchugh, T. (2010). The role of self-compassion in women's self-
739 determined motives to exercise and exercise-related outcomes. *Self and Identity*, *9*, 363-
740 382. doi: 10.1080/15298860903135073
- 741 Malterud, K., & Ulriksen, K. (2011). Obesity, stigma, and responsibility in health care: A
742 synthesis of qualitative studies. *International Journal of Qualitative Studies on Health
743 and Well-being*, *6*. doi: 10.3402/qhw.v6i4.8404
- 744 Mensinger, J. L., Calogero, R. M., Stranges, S., Tylka, T. L. (2016). *A weight-neutral versus
745 weight-loss approach for health promotion in women with high BMI: A randomized-
746 controlled trial*. Manuscript submitted for publication.
- 747 Moore, M., Masuda, A., Hill, M., & Goodnight, B. (2014). Body image flexibility moderates the
748 association between disordered eating cognition and disordered eating behavior in a non-

- 749 clinical sample of women: A cross-sectional investigation. *Eating Behaviors*, *15*, 664-
750 669. doi:10.1016/j.eatbeh.2014.08.021
- 751 Mond, J. M., Hay, P. J., Rodgers, B., & Owen, C. (2006). Eating Disorder Examination
752 Questionnaire (EDE-Q): Norms for young adult women. *Behaviour Research and
753 Therapy*, *44*, 53-62. doi: 10.1016/j.brat.2004.12.003
- 754 Mond, J. M., Hay, P. J., Rodgers, B., Owen, C., & Beumont, P. J. V. (2004). Validity of the
755 Eating Disorder Examination Questionnaire (EDE-Q) in screening for eating disorders in
756 community samples. *Behaviour Research and Therapy*, *42*, 551-567. doi:
757 10.1016/S0005-7967(03)00161-X
- 758 Muennig, P. (2008). The body politic: The relationship between stigma and obesity-associated
759 disease. *BMC Public Health*, *8*, 128. doi: 10.1186/1471-2458-8-128
- 760 Muennig, P., Jia, H., Lee, R., & Lubetkin, E. (2008). I think therefore I am: Perceived ideal
761 weight as a determinant of health. *American Journal of Public Health*, *98*, 501-506. doi:
762 10.2105/AJPH.2007.114769
- 763 Murakami, J. M., & Latner, J. D. (2015). Weight acceptance versus body dissatisfaction: Effects
764 on stigma, perceived self-esteem, and perceived psychopathology. *Eating Behaviors*, *19*,
765 163-167. doi: 10.1016/j.eatbeh.2015.09.010.
- 766 Neumark-Sztainer, D., Story, M., & Harris, T. (1999). Beliefs and attitudes about obesity among
767 teachers and school health care providers working with adolescents. *Journal of Nutrition
768 Education*, *31*, 3-9. doi: 10.1016/S0022-3182(99)70378-X
- 769 O'Hara, L., & Gregg, J. (2014). Health at Every Size: A weight-neutral approach for
770 empowerment, resilience and peace. *International Journal of Social Work and Human
771 Services Practice*, *2*, 272-282.

- 772 Omichinski, L. (1995). New frontiers in nondiet counselling: Empowered clients make healthier
773 choices. *Healthy Weight Journal*, 9, 7-10.
- 774 Omichinski, L. (2000). *Staying off the diet roller coaster*. Manitoba, Canada: HUGS
775 International Inc.
- 776 Omichinski, L. (2007). *The HUGS Program group leaders guide: Health-focused, centered on*
777 *Understanding lifestyle behaviors, Group supported, Self-esteem building*. Portage la
778 Prairie, Canada: HUGS International Inc.
- 779 Omichinski, L., & Hildebrand, H. W. (1995). *Tailoring your tastes*. Winnepeg, WB: Tamos
780 Books Inc.
- 781 Pearl, R. L., Puhl, R. M., & Dovidio, J. F. (2014). Differential effects of weight bias experiences
782 and internalization on exercise among women with overweight and obesity. *Journal of*
783 *Health Psychology*, 19, 1-7.
- 784 Penney, T. L., & Kirk, S. F. (2015). The Health at Every Size paradigm and obesity: Missing
785 empirical evidence may help push the reframing obesity debate forward. *American*
786 *Journal of Public Health*, e1-e5. doi: 10.2105/ajph.2015.302552
- 787 Phelan, S. M., Burgess, D. J., Yeazel, M. W., Hellerstedt, W. L., Griffin, J. M., & van Ryn, M.
788 (2015). Impact of weight bias and stigma on quality of care and outcomes for patients
789 with obesity. *Obesity Reviews*, 16, 319-326. doi: 10.1111/obr.12266
- 790 Phelan, S. M., Dovidio, J. F., Puhl, R. M., Burgess, D. J., Nelson, D. B., Yeazel, M. W., . . . van
791 Ryn, M. (2014). Implicit and explicit weight bias in a national sample of 4,732 medical
792 students: the medical student CHANGES study. *Obesity*, 22, 1201-1208. doi:
793 10.1002/oby.20687
- 794 Polivy, J., & Herman, C. P. (1985). Dieting and bingeing: A causal analysis. *American*
795 *Psychologist*, 40, 193-201. doi: 10.1037/0003-066X.40.2.193

- 796 Polivy, J., & Herman, C. P. (1992). Undieting: A program to help people stop dieting.
797 *International Journal of Eating Disorders, 11*, 261-268.
- 798 Pomeranz, J. L., & Puhl, R. M. (2013). New developments in the law for obesity discrimination
799 protection. *Obesity, 21*, 469-471. doi: 10.1002/oby.20094
- 800 Provencher, V., Begin, C., Tremblay, A., Mongeau, L., Corneau, L., Dodin, S., Boivin, S.,
801 Lemieux, S. (2009). Health-At-Every-Size and eating behaviors: 1-year follow-up results
802 of a size acceptance intervention. *Journal of the American Dietetic Association, 109*,
803 1854-1861. doi: 10.1016/j.jada.2009.08.017
- 804 Puhl, R. M., & Heuer, C. A. (2010). Obesity stigma: Important considerations for public health.
805 *American Journal of Public Health, 100*, 1019-1028. doi: 10.2105/AJPH.2009.159491
- 806 Puhl, R. M., & Latner, J. D. (2007). Stigma, obesity, and the health of the nation's children.
807 *Psychological Bulletin, 133*, 557-580. doi: 10.1037/0033-2909.133.4.557
- 808 Puhl, R., & Latner, J. (2008). Weight bias: New science on an significant social problem.
809 *Obesity, 16*(suppl2), S1-S2. doi: 10.1038/oby.2008.460
- 810 Puhl, R. M., Latner, J. D., King, K. M., & Luedicke, J. (2014). Weight bias among professionals
811 treating eating disorders: Attitudes about treatment and perceived patient outcomes.
812 *International Journal of Eating Disorders, 47*, 65-75. doi: 10.1002/eat.22186
- 813 Puhl, R. M., Luedicke, J., & Heuer, C. (2011). Weight-based victimization toward overweight
814 adolescents: Observations and reactions of peers. *Journal of School Health, 81*, 696-703.
815 doi: 10.1111/j.1746-1561.2011.00646.x
- 816 Puhl, R. M., Moss-Racusin, C. A., & Schwartz, M. B. (2007). Internalization of weight bias:
817 Implications for binge eating and emotional well-being. *Obesity, 15*, 19-23. doi:
818 10.1038/oby.2007.521

- 819 Puhl, R. M., & Peterson, J. L. (2014). The nature, consequences, and public health implications
820 of obesity stigma. In P. W. Corrigan (Ed.), *The stigma of disease and disability:
821 Understanding causes and overcoming injustices* (pp. 183-203). Washington, DC:
822 American Psychological Association.
- 823 Ramos, S. X. (2015). The ineffectiveness and unintended consequences of the public health war
824 on obesity. *Canadian Journal of Public Health, 106*, e79-81. doi:
825 10.17269/cjph.106.4757
- 826 Rø, Ø., Reas, D. L., & Rosenvinge, J. (2012). The impact of age and BMI on Eating Disorder
827 Examination Questionnaire (EDE-Q) scores in a community sample. *Eating Behaviors,
828 13*, 158-161. doi: 10.1016/j.eatbeh.2011.12.001
- 829 Robison, J., Putnam, K., & McKibbin, L. (2007). Health at Every Size: A compassionate,
830 effective approach for helping individuals with weight-related concerns--part I. *AAOHN
831 Journal: Official Journal of the American Association of Occupational Health Nurses,
832 55*, 143-150.
- 833 Rogosa, D. (1980). Comparing nonparallel regression lines. *Psychological Bulletin, 88*, 307-321.
- 834 Ruggs, E. N., Hebl, M. R., & Williams, A. (2015). Weight isn't selling: The insidious effects of
835 weight stigmatization in retail settings. *Journal of Applied Psychology*. Advance online
836 publication. doi: 10.1037/apl0000017
- 837 Sabin, J. A., Marini, M., & Nosek, B. A. (2012). Implicit and explicit anti-fat bias among a large
838 sample of medical doctors by BMI, race/ethnicity and gender. *PloS One, 7*, e48448. doi:
839 10.1371/journal.pone.0048448
- 840 Sandoz, E. K., Wilson, K. G., Merwin, R. M., & Kellum, K. K. (2013). Assessment of body
841 image flexibility: The Body Image-Acceptance and Action Questionnaire. *Journal of
842 Contextual Behavioral Science, 2*, 39-48. doi:10.1016/j.jcbs.2013.03.002

- 843 Schaefer, J. T., & Magnuson, A. B. (2014). A review of interventions that promote eating
844 by internal cues. *Journal of the Academy for Nutrition and Dietetics*, *114*, 734-760. doi:
845 <http://dx.doi.org/10.1016/j.jand.2013.12.024>
- 846 Schoenefeld, S. J., & Webb, J. B. (2013). Self-compassion and intuitive eating in college
847 women: examining the contributions of distress tolerance and body image acceptance and
848 action. *Eating Behaviors*, *14*, 493-496. doi: 10.1016/j.eatbeh.2013.09.001
- 849 Schwartz, M. B., Chambliss, H. O., Brownell, K. D., Blair, S. N., & Billington, C. (2003).
850 Weight bias among health professionals specializing in obesity. *Obesity Research*, *11*,
851 1033-1039. doi: 10.1038/oby.2003.142
- 852 Schvey, N. A., Puhl, R. M., & Brownell, K. D. (2011). The impact of weight stigma on caloric
853 consumption. *Obesity (Silver Spring)*, *19*, 1957-1962. doi: 10.1038/oby.2011.204
- 854 Schvey, N. A., Roberto, C. A., & White, M. A. (2013). Clinical correlates of the Weight Bias
855 Internalization Scale in overweight adults with binge and purge behaviours. *Advances in*
856 *Eating Disorders*, *1*, 213-223. doi: 10.1080/21662630.2013.794523
- 857 Schvey, N. A., & White, M. A. (2015). The internalization of weight bias is associated with
858 severe eating pathology among lean individuals. *Eating Behaviors*, *17*, 1-5. doi:
859 <http://dx.doi.org/10.1016/j.eatbeh.2014.11.001>
- 860 Sikorski, C., Lupp, M., Kaiser, M., Glaesmer, H., Schomerus, G., Konig, H. H., & Riedel-
861 Heller, S. G. (2011). The stigma of obesity in the general public and its implications for
862 public health: A systematic review. *BMC Public Health*, *11*, 661. doi: 10.1186/1471-
863 2458-11-661
- 864 Stice, E., & Presnell, K. (2007). *The body project: Promoting body acceptance and preventing*
865 *eating disorders: Facilitator's guide*. New York: Oxford University Press.
- 866 Stice, E., Rohde, P., Gau, J., & Shaw, H. (2009). An effectiveness trial of a dissonance-based

- 867 eating disorder prevention program for high-risk adolescent girls. *Journal of Consulting*
868 *and Clinical Psychology*, 77, 825-834.
- 869 Taylor-Piliae, R. E., Norton, L. C., Haskell, W. L., Mahbouda, M. H., Fair, J. M., Iribarren, C.,
870 Hlatky, M. A., Go, A. S., & Fortmann, S. P. (2006) Validation of a new brief physical
871 activity survey among men and women aged 60-69 years. *American Journal of*
872 *Epidemiology*, 164, 598-606.
- 873 Tomiyama, A. J. (2014). Weight stigma is stressful. A review of evidence for the cyclic
874 obesity/weight-based stigma model. *Appetite*, 82, 8-15. doi: 10.1016/j.appet.2014.06.108
- 875 Tribole, E., & Resch, E. (2012). *Intuitive eating: A revolutionary program that works* (3rd ed.).
876 New York: St. Martin's Press.
- 877 Tylka, T. L. (2004). The relation between body dissatisfaction and eating disorder
878 symptomatology: An analysis of moderating variables. *Journal of Counseling*
879 *Psychology*, 51, 178-191. doi: 10.1037/0022-0167.51.2.178
- 880 Tylka, T. L. (2006). Development and psychometric evaluation of a measure of intuitive eating.
881 *Journal of Counseling Psychology*, 53, 226-240. doi: [http://dx.doi.org/10.1037/0022-](http://dx.doi.org/10.1037/0022-0167.53.2.226)
882 0167.53.2.226
- 883 Tylka, T. L., Annunziato, R. A., Burgard, D., Daniélsdóttir, S., Shuman, E., Davis, C., &
884 Calogero, R. M. (2014). The weight-inclusive versus weight-normative approach to
885 health: Evaluating the evidence for prioritizing well-being over weight loss. *Journal of*
886 *Obesity*, 1-18. doi: 10.1155/20144/983495
- 887 Tylka, T. L., & Kroon Van Diest, A. M. (2013). The Intuitive Eating Scale-2: Item refinement
888 and psychometric evaluation with college women and men. *Journal of Counseling*
889 *Psychology*, 60, 137.

- 890 Tylka, T. L., Lumeng, J. C., & Eneli, I. U. (2015). Maternal intuitive eating as a moderator of the
891 association between concern about child weight and restrictive child feeding. *Appetite*,
892 95, 158-165. doi: 10.1016/j.appet.2015.06.023
- 893 Tylka, T. L., & Subich, L. M. (1999). Exploring the construct validity of the eating disorder
894 continuum. *Journal of Counseling Psychology*, 46, 268-276. doi: 10.1037//0022-
895 0167.46.2.268
- 896 Tylka, T. L., & Wood-Barcalow, N. L. (2015). What is and what is not positive body image?
897 Conceptual foundations and construct definition [Special series]. *Body Image*, 14, 118-
898 129. doi: 10.1016/j.bodyim.2015.04.001
- 899 van Strien, T., Herman, C. P., & Verheijden, M. W. (2014). Dietary restraint and body mass
900 change. A 3-year follow up study in a representative Dutch sample. *Appetite*, 76, 44-49.
901 doi: 10.1016/j.appet.2014.01.015
- 902 Vartanian, L. R., & Novak, S. A. (2011). Internalized societal attitudes moderate the impact of
903 weight stigma on avoidance of exercise. *Obesity*, 19, 757-762. doi:
904 10.1038/oby.2010.234
- 905 Watkins, P. L., Ebbeck, V., & Levy, S. S. (2014). Overcoming weight bias: Promoting physical
906 activity and psychosocial health. *Ethnicity and Inequalities in Health and Social Care*, 7,
907 187-197. doi: 10.1108/EIHSC-11-2013-0043
- 908 Webb, J. B. (2015). Body image flexibility contributes to explaining the link between body
909 dissatisfaction and body appreciation in white college-bound females. *Journal of*
910 *Contextual Behavioral Science*, 4, 176-183. doi:10.1016/j.jcbs.2015.06.001
- 911 Webb, J. B., Wood-Barcalow, N. L., & Tylka, T. L. (2015). Assessing positive body image:
912 Contemporary approaches and future directions [Special series]. *Body Image*, 14, 130-
913 145. doi: 10.1016/j.bodyim.2015.03.010

- 914 Wee, C. C., McCarthy, E. P., Davis, R. B., & Phillips, R. S. (2000). Screening for cervical and
915 breast cancer: Is obesity an unrecognized barrier to preventive care? *Annals of Internal*
916 *Medicine*, *132*, 697-704.
- 917 Willet, J. B., Singer, J. D., & Martin, N. C. (1998). The design and analysis of longitudinal
918 studies of development and psychopathology in context: Statistical models and
919 methodological recommendations. *Development and Psychopathology*, *10*, 395-426.
- 920 Wirth, M. D., Blake, C. E., Hebert, J. R., Sui, X., & Blair, S. N. (2014). Chronic weight
921 dissatisfaction predicts type 2 diabetes risk: Aerobic center longitudinal study. *Health*
922 *Psychology*, *33*, 912-919. doi: 10.1037/hea0000058
- 923 Wirth, M. D., Blake, C. E., Hebert, J. R., Sui, X., & Blair, S. N. (2015). Metabolic syndrome and
924 discrepancy between actual and self-identified good weight: Aerobics Center
925 Longitudinal Study. *Body Image*, *13*, 28-32. doi: 10.1016/j.bodyim.2014.11.003
- 926 Womble, L. G., Wadden, T. A., McGuckin, B. G., Sargent, S. L., Rothman, R. A., &
927 Krauthamer-Ewing E. S. (2004). A randomized controlled trial of a commercial Internet
928 weight loss program. *Obesity Research*, *12*, 1011-1118.
- 929

930

Footnote

931

¹Program differences in changes in BMI for individuals as a function of internalized

932

weight stigma are available upon request by contacting the first author at

933

Janell.L.Mensing@rexel.edu.

934

ACCEPTED MANUSCRIPT

935 Figure Captions

936 *Figure 1.* Flowchart of participant involvement. * No significant differences were observed
937 between programs on completion rates ($p = .37$).

938

939 *Figure 2.* Internalized weight stigma as a moderator of adaptive eating in a weight-neutral versus
940 conventional weight-management program. IWS = Internalized Weight Stigma. WN = Weight-
941 Neutral Program. CWM = Conventional Weight-Management Program.

942

943 *Figure 3.* Internalized weight stigma as a moderator of disordered eating in a weight-neutral
944 program versus a conventional weight-management program. EDE-Q = Eating Disorder
945 Examination Questionnaire. IWS = Internalized Weight Stigma. WN = Weight-Neutral Program.
946 CWM = Conventional Weight-Management Program.

947

948 *Figure 4.* Changes in internalized weight stigma after participating in a weight-neutral program
949 versus a conventional weight-management program. WBIS = Weight Bias Internalization Scale.
950 WN = Weight-Neutral Program. CWM = Conventional Weight-Management Program.

Table 1. Baseline Characteristics of the Study Sample

| Characteristic | Weight-Neutral Program | Conventional Weight-Management Program | <i>p</i> -value [†] |
|---|---------------------------|--|------------------------------|
| | <i>n</i> (%) [§] | <i>n</i> (%) [§] | |
| Education | | | .066 |
| High School Diploma, or Some High School | 8 (20) | 14 (35) | |
| Some College (or Technical School) | 17 (43) | 21 (53) | |
| College Graduate (Bachelor's Degree) | 10 (25) | 4 (10) | |
| Graduate or Professional Degree | 5 (13) | 1 (3) | |
| Employment Status, <i>n</i> (%) | | | .378 |
| Employed for Wages Full-Time | 22 (55) | 31 (78) | |
| Employed for Wages Part-Time | 11 (28) | 6 (15) | |
| Not Working | 7 (18) | 3 (8) | |
| Race/Ethnicity | | | .644 |
| African American/Black Non-Hispanic | 0 (0) | 1 (3) | |
| Hispanic | 3 (8) | 1 (3) | |
| White Non-Hispanic | 37 (93) | 38 (95) | |
| Relationship Status | | | .962 |
| Married | 28 (70) | 28 (70) | |
| Member of an Unmarried Couple | 4 (10) | 4 (10) | |
| Divorced | 2 (5) | 3 (7) | |
| Never Been Married | 6 (15) | 5 (12) | |
| Mean Age (<i>SD</i>), <i>y</i> | 39.83 (4.34) | 39.35 (3.91) | .609 |
| Mean Body Mass Index (<i>SD</i>), kg/m² | 37.42 (0.57) | 38.56 (0.65) | .191 |
| Median Household Income (min-max), US\$[†] | 68,750 (18,000-180,000) | 60,000 (12,000-130,000) | .504 |
| Median Individual Income (min-max), US\$[*] | 29,500 (0-120,000) | 30,000 (5,000-75,000) | .916 |

[§] Percentages are rounded to the higher integer when value => .5 causing totals to exceed 100%

[†] *p*-values based on *t*-tests, chi-squares, and Mann-Whitney U-tests as appropriate for variable types

[‡] Household income data missing for 2 Weight-Neutral Program participants

^{*} Individual income data missing for 1 Conventional Weight-Management program participant

Table 2. Estimated Marginal Means for Eating Behaviors and Internalized Weight Stigma (IWS) by Group over Time

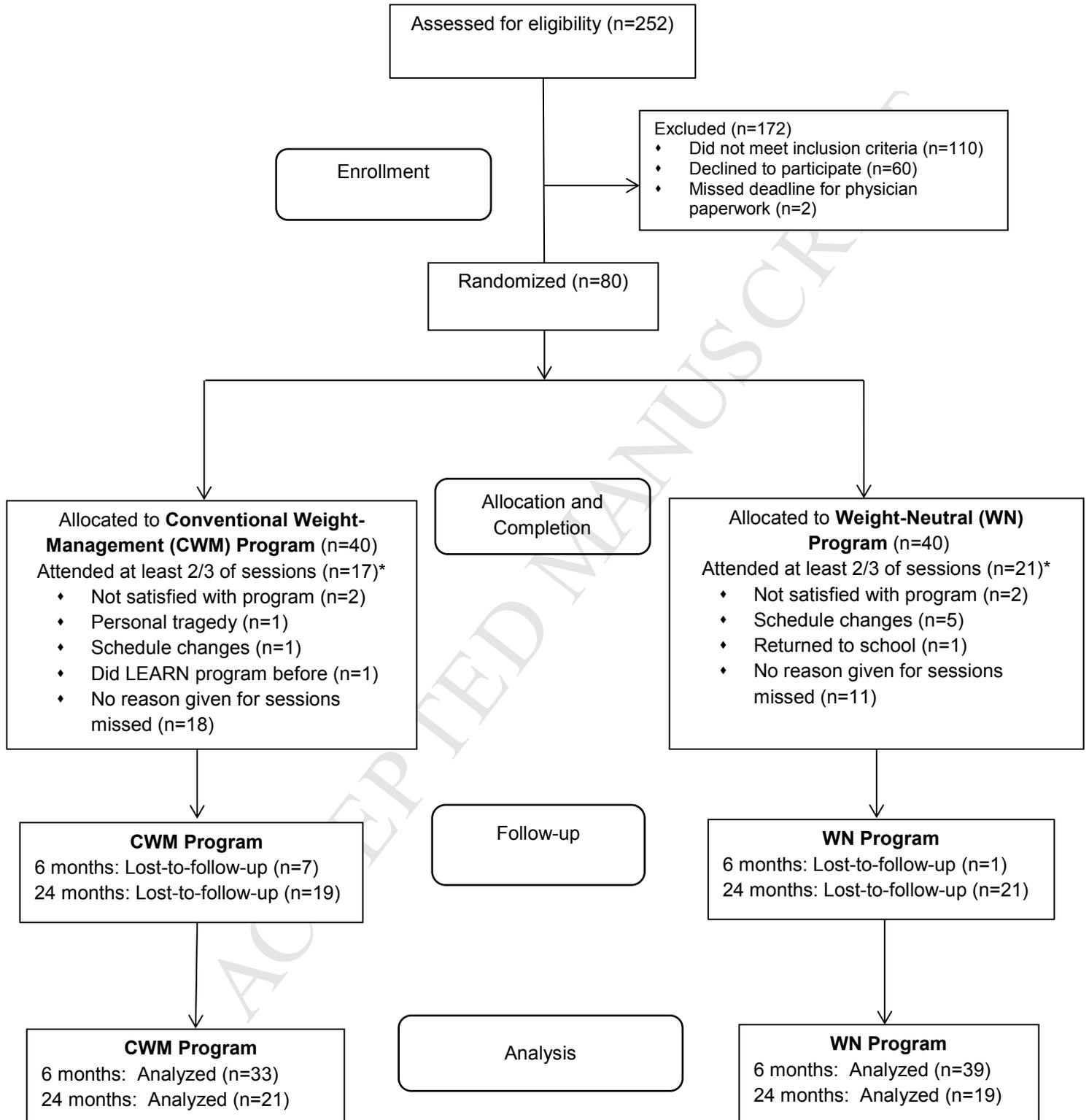
| | Weight-Neutral Program | Conventional Weight-Management Program | Between-Group Differences [†] (95% CI) | IWS x Group x Time | IWS x Time | Group x Time | IWS Main Effect |
|--|------------------------|--|---|--------------------|----------------|----------------|-----------------|
| | N | N | | F (df) | F (df) | F (df) | F (df) |
| Adaptive Eating (IES) | | | | | | | |
| Baseline | 40 | 40 | | | | | |
| 6 months | 37 | 33 | -0.23 (-0.41 to -0.06) | 2.26 (2, 115) | 4.74 (2, 115) | 3.43 (2, 106) | 29.27 (1, 162) |
| 24 months | 19 | 21 | -0.15 (-0.37 to 0.07) | $p = .109$ | $p = .011$ | $p = .036$ | $p < .001$ |
| Within-group effects, F (df) | 22.69 (2, 107) | 3.71 (2, 106) | | | | | |
| Global Disordered Eating (EDE-Q) | | | | | | | |
| Baseline | 40 | 40 | | | | | |
| 6 months | 37 | 33 | 0.66 (0.27 to 1.05) | 4.20 (2, 130) | 8.93 (2, 130) | 5.67 (2, 115) | 70.36 (1, 139) |
| 24 months | 19 | 21 | 0.32 (-0.16 to 0.77) | $p = .017$ | $p < .001$ | $p = .004$ | $p < .001$ |
| Within-group effects, F (df) | 19.29 (2, 116) | 1.22 (2, 114) | | | | | |
| EDE-Q Weight Concern | | | | | | | |
| Baseline | 40 | 40 | | | | | |
| 6 months | 37 | 33 | 0.24 (-0.21 to 0.70) | 6.14 (2, 134) | 9.45 (2, 134) | 0.73 (2, 117) | 90.99 (1, 130) |
| 24 months | 19 | 21 | 0.27 (-0.28 to 0.81) | $p = .003$ | $p < .001$ | $p = .490$ | $p < .001$ |
| Within-group effects, F (df) | 26.22 (2, 118) | 13.70 (2, 116) | | | | | |
| EDE-Q Shape Concern | | | | | | | |
| Baseline | 40 | 40 | | | | | |
| 6 months | 37 | 33 | 0.42 (-0.13 to 0.96) | 2.91 (2, 125) | 13.13 (2, 124) | 1.50 (2, 110) | 90.89 (1, 140) |
| 24 months | 19 | 21 | 0.46 (-0.19 to 1.11) | $p = .058$ | $p < .001$ | $p = .229$ | $p < .001$ |
| Within-group effects, F (df) | 31.88 (2, 110) | 13.65 (2, 109) | | | | | |
| EDE-Q Eating Concern | | | | | | | |
| Baseline | 40 | 40 | | | | | |
| 6 months | 37 | 33 | 0.46 (0.01 to 0.91) | 0.76 (2, 115) | 2.84 (2, 115) | 2.20 (2, 105) | 15.43 (1, 160) |
| 24 months | 19 | 21 | 0.37 (-0.17 to 0.92) | $p = .469$ | $p = .063$ | $p = .119$ | $p < .001$ |
| Within-group effects, F (df) | 15.10 (2, 106) | 4.19 (2, 105) | | | | | |
| EDE-Q Restraint | | | | | | | |
| Baseline | 40 | 40 | | | | | |
| 6 months | 37 | 33 | 1.54 (0.89 to 2.20) | 1.40 (2, 136) | 1.13 (1, 130) | 11.11 (2, 120) | 0.39 (1, 130) |
| 24 months | 19 | 21 | 1.02 (0.23 to 1.81) | $p = .250$ | $p = .325$ | $p < .001$ | $p = .531$ |
| Within-group effects, F (df) | 1.58 (2, 121) | 18.38 (2, 118) | | | | | |
| Internalized Weight Stigma (WBIS) | | | | | | | |
| Baseline | 40 | 40 | | | | | |
| 6 months | 37 | 33 | 0.36 (-0.11 to 0.82) | | | 1.79 (2, 104) | |

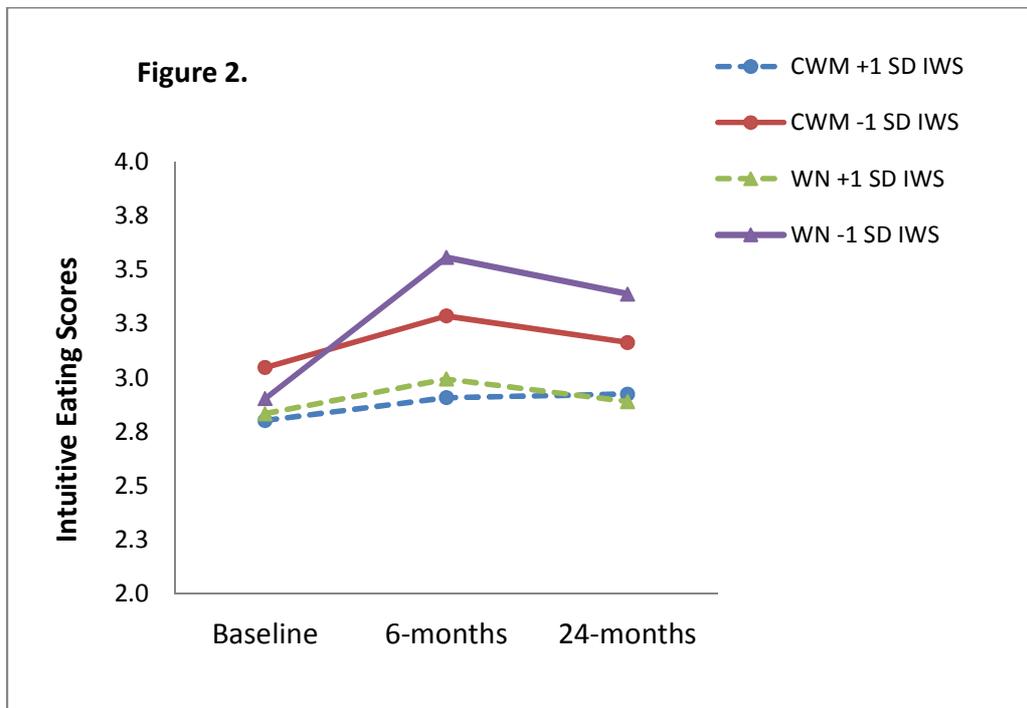
| | | | | | | | | | |
|-------------------------------|----------------|--------------|---------------|--------------|----------------------|----|----|------------|----|
| 24 months | 19 | 3.31 (0.22)* | 21 | 3.75 (0.22)* | 0.48 (-0.09 to 1.05) | NA | NA | $p = .173$ | NA |
| Within-group effects, $F(df)$ | 24.73 (2, 103) | $p < .001$ | 8.86 (2, 105) | $p < .001$ | | | | | |

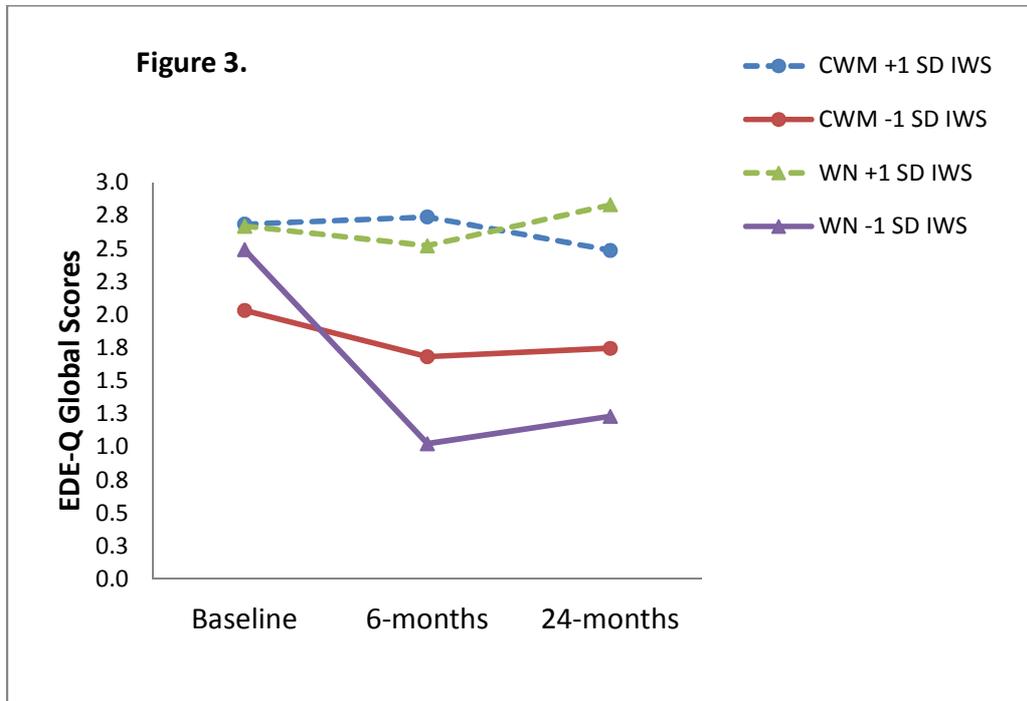
[†] Mean differences in change from baseline at 6 months and 24 months after controlling for IWS (except where IWS is the outcome), group, time, and all 2-way and 3-way interactions in the linear mixed model

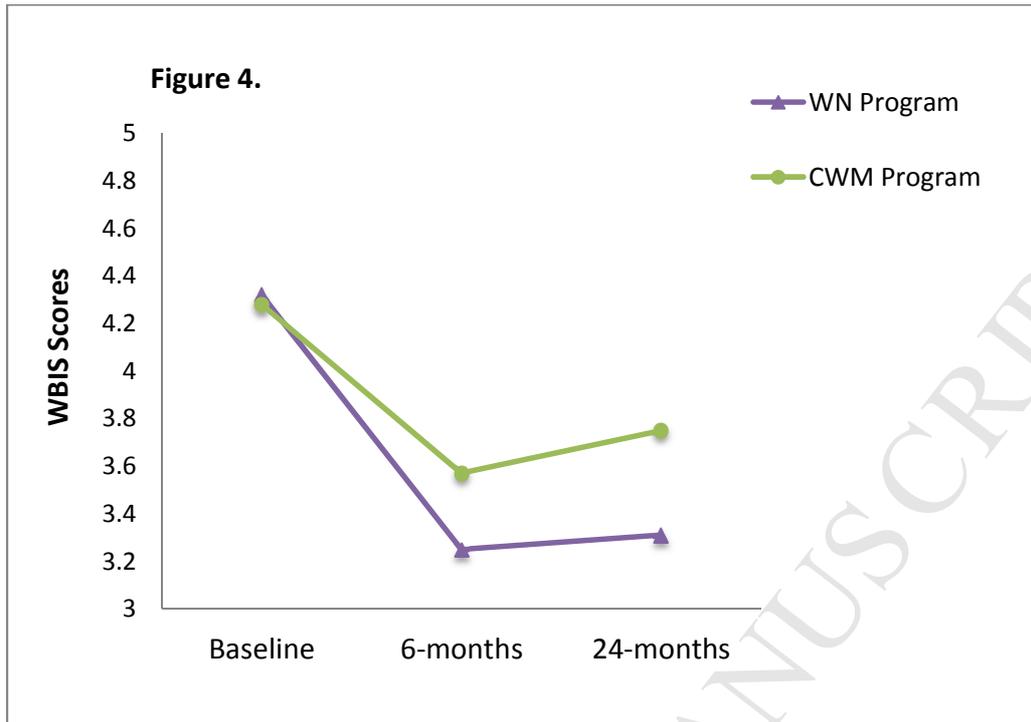
* Significant within-group difference from baseline ($p < .05$)

Figure 1.









Highlights

- Women with high BMI participated in a weight-neutral or conventional weight-management program.
- Impact of internalized weight stigma (IWS) on women's eating behaviors was explored.
- Women in the weight-neutral program with low IWS improved disordered and adaptive eating.
- Women with high IWS did not improve disordered or adaptive eating in either program.