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“being Teased Is Almost A Guarantee”: Development And Validation Of The Stress And Weight Stigma Scale (straws)

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"Being teased is almost a guarantee": Development and validation of the Stress and Weight Stigma Scale (STRAWS)

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Abstract

Objective: To validate The Stress and Weight Stigma Scale (STRAWS), a measure developed to assess prolonged activation and anticipatory stress related to experiences of weight stigma among individuals with overweight and obesity.

Methods: Based on an existing instrument for prolonged activation and anticipatory race-related stress, the 17-item STRAWS was developed to capture perseverative cognition, secondary appraisal, and anticipatory stress in response to a specific experience of weight stigma. Participants with a range of body mass indices (BMI; kg/m^2) and who believed they had experienced weight stigma were recruited using Amazon's Mechanical Turk (n = 301). We used confirmatory factor analysis to determine the fit of the factor structure of the STRAWS based on the 4-factor structure of the source instrument (Utsey et al., 2012). We also compared the invariance of the factor structure between participants with BMI ≥ 25 (n = 208) and those with BMI < 25 (n = 93) prior to examining construct validity of the STRAWS.

Results: Analyses supported a four-factor oblique model for our current sample of US adults, though model fit was more adequate among the group with BMI ≥ 25 ($\chi2$ (113) = 204.75, p < 0.001, RMSEA = 0.062, CFI = 0.948, TLI = 0.938, SRMR = 0.0074) compared to the group with BMI < 25 ($\chi2$ (113) = 177.48, p < 0.001, RMSEA = 0.078, CFI = 0.940, TLI = 0.927, SRMR = 0.078) . Measurement invariance analysis comparing the 4-factor oblique model fit between BMI groups revealed metric invariance, suggesting that each of the 17 items comprising the STRAWS contributes to the latent structure to a similar extent across BMI groups. The current study also provided evidence for construct validity of the STRAWS in that its total and factor scores correlated in the expected direction with scores on measures of related constructs.

Conclusion: Our findings provide support for the validity and reliability of The Stress and Weight Stigma Scale, an instrument that assesses prolonged activation and anticipatory stress related to experiences of weight stigma among individuals with overweight and obesity. The STRAWS offers a method for understanding the long-term stress response to experiences of weight stigma. Public health experts and healthcare providers may wish to utilize the STRAWS to design appropriate, effective interventions that target the connection between weight stigma stress and subsequent poor health outcomes.

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Background

There is substantial empirical evidence that overweight and obesity can have distinct and measurable consequences for physical and mental health and health-related quality of life (Dixon, 2010; Hassan et al., 2003; Williams et al., 2015). As many of the public health interventions implemented to prevent obesity have largely been unsuccessful (Chan & Woo, 2010; Warin et al., 2015), the prevalence of obesity has continued to progressively increase for all age groups over the last several decades (Dixon, 2010; Inoue et al., 2018; Skinner et al., 2018). Across the literature, it has been repeatedly found that people with obesity are at increased risk for a variety of stress-related diagnoses, including cardiovascular disease, obesity-related cancers, hypertension, and type-2 diabetes (Dixon, 2010; Foss & Dyrstad, 2011; Kelishadi, 2015). Therefore, improving understanding of stress and weight and targeting the connection in public health interventions are essential next steps to improve intervention effectiveness.

It is important to note that the health consequences associated with higher weights do not impact *all* individuals above a certain weight; rather, there is substantial variability in physical and mental health conditions among persons with overweight and obesity (Hubbard, 2000). Therefore, it is critical to identify factors that could promote or impede positive health outcomes in this population. There is increasing evidence that weight stigma is one of these key factors that drives weight gain and poor health outcomes among people with obesity (Puhl et al., 2020; Puhl & Suh, 2015; Tomiyama et al., 2018).

Experiences of weight stigma and weight-based teasing have been found to be consistently associated with disordered eating among both adults (Almeida et al., 2010; Ashmore et al., 2008; Benas & Gibb, 2006) and children (Neumark-Sztainer et al., 2010; Olvera et al., 2013; Suisman et al., 2008). Weight-based stigma is also a likely risk factor for internalized weight bias (Lee et al., 2019), meaning individuals who experience interpersonal weight stigma are more likely to believe in social stereotypes about their weight status and apply them to themselves (Lillis et al., 2009; Link & Phelan, 2001). Individuals who internalize negative obesity stereotypes are more likely to binge eat in response to those the stress of those stigmatizing experiences (Puhl et al., 2007a). Research suggests that maladaptive eating is a common strategy used by individuals with overweight and obesity to cope with stress that

comes from stigmatizing situations and internalization of weight-related stigma (Puhl et al., 2007a; Puhl & Brownell, 2006). While greater frequency of stigmatizing experiences based on weight is associated with poorer psychological functioning, lower self-esteem, and greater body image dissatisfaction (Friedman et al., 2005; Myers & Rosen, 1999), it is also associated with high body weight and further weight gain (Myers & Rosen, 1999; Puhl & Brownell, 2006), suggesting that weight stigma may be a driver of obesity through maladaptive eating.

Because experiences of weight stigma, as with many types of stigmas, are inherently stressful (Brewis & Wutich, 2012; Major et al., 2012; Tomiyama, 2014), stress appraisals associated with experiences of weight stigma elicit negative emotional responses. Specifically, as suggested by the cyclic obesity/weight-based stigma (COBWEBS) model (Tomiyama, 2014), people who experience weight stigma may experience increased shame, which can elicit cortisol secretion (Dickerson et al., 2004), in turn contributing to increased weight gain and perpetuating the cycle of weight stigma through this emotional mechanism (Tomiyama, 2014).

The chronically elevated cortisol levels associated with negative health consequences (e.g., hypertension and cardiovascular disease) among people with obesity likely do not result from transient stressors. Rather, such negative health consequences are associated with sustained stress activation and, in turn, prolonged exposure to elevated cortisol levels, which drive poor health outcomes through behavioral mechanisms (e.g., eating behaviors) and physiological mechanisms (e.g., fat storage) (Tomiyama, 2014). According to Brosschot and colleagues (2005), prolonged activation in response to a stressful experience has three components: heightened stress in response to potential future stressors, slow recovery from the stress response to current stressors, and recurrent stress related to past stressors (Brosschot et al., 2005). Based on this conceptualization of prolonged activation, it is reasonable to say that anticipatory stress and preservative cognition both contribute to prolonged activation in response to experiences of weight stigma. The cumulative burden of prolonged activation and chronic stress in response to stressful life events like weight stigma contribute to allostatic overload, a state when the burden of environmental

stressors exceeds an individual's ability to cope (Guidi et al., 2020). Allostatic overload is associated with poor physical and mental health outcomes (Beckie, 2012; Guidi et al., 2020). To help prevent poor health outcomes among individuals with overweight and obesity, it is important that researchers understand prolonged activation and stress responses related to weight stigma and their contribution to allostatic overload.

The link between chronic exposure to weight stigma and obesogenic processes that may harm health via stigma-related stress has important implications for mental health professionals, primary care physicians, endocrinologists, and other providers who care for patients with overweight and obesity. These associations also suggest that weight stigma among people with overweigh and obesity could be a valuable target for promoting health in this population. To characterize and understand stress related to weight stigma, and to identify individuals who might benefit from such interventions, it is important that researchers develop psychometrically sound instruments for measuring the stress associated with experiences of weight stigma in this population.

At present, several psychometric instruments exist that are intended to quantify weight stigma, although the most highly cited weight bias scales (e.g., Crandall, 1994; Lewis et al., 1997; Morrison & O'Connor, 1999) assess the extent to which individuals endorse biased attitudes and beliefs related to *another person's* weight or size. While such instruments may be useful for assessing the prevalence of stigmatizing attitudes related to weight, they do not improve understanding of the experience and effects of weight stigma on the stigmatized.

Alternatively, there are a smaller number of psychometric instruments (e.g., Durso & Latner, 2008; Lillis et al., 2009) that assess weight bias internalization, or the extent to which someone holds negative beliefs about themselves due to weight or size (Latner et al., 2014). Such instruments are valuable for identifying the extent of self-devaluation resulting from internalization of such stereotypes, though they do not capture an individual's appraisal and long-term stress responses to any specific experience of weight stigma.

A review of existing self-report assessment measures of weight stigma experiences found that most existing instruments measure interpersonal experiences of weight stigma and focus on assessing weight-based discrimination from general sources (e.g., from family members, rather than separating parents and siblings) (DePierre & Puhl, 2012). For example, the Stigmatizing Situations Inventory (Myers & Rosen, 1999), an existing measure used to assess experiences of weight stigma, includes a list of pre-determined examples of stigmatizing experiences (e.g., "Groups of people pointing and laughing at you in public" and "Not being hired because of your weight, shape, or size"). Respondents indicate whether they have experienced each situation on the list. An important methodological issue with this type of assessment is that it assumes each situation on the list is stressful to individuals uniformly rather than asking about individuals' own appraisals of the experience. If an individual has experienced weight stigma in a situation that is not included as an option on the checklist, the individual's experience and their stress response to it will not be captured, regardless of the emotional significance of the event for that person (Stewart & Ogden, 2021). An individual may indicate having experienced a situation from the list that is the closest representation of what they experienced resulting in overreporting of some experiences. In contrast, other individuals who experienced weight stigma in a situation that is not presented on the list may not indicate having experienced any of the possible situations, leading to underreporting of weight stigma experiences as a whole. All in all, the use of a pre-determined list of weight stigma experiences risks misrepresenting weight stigma if the experiences an individual has had are not included on the checklist.

Further, only a small number of instruments developed to measure experiences of weight stigma in adults also include items that assess participants' emotional responses to such experiences (Annis et al., 2004; Thompson et al., 1995; van den Berg et al., 2002). These instruments include items that ask about emotional responses that participants faced immediately after a stigmatizing experience (e.g., "After being teased, how upset were you?") (Thompson et al., 1995). Specifically, they measure traits (e.g., stable characteristics tied to individuals) as opposed to states (e.g., temporary stress appraisals tied to specific experiences).

One solution to these limitations of existing measures for weight stigma experiences is to develop a mixed-methods instrument for weight stigma that allows respondents to describe their own unique experience with weight stigma. While the lived experience of weight stigma has been studied using qualitative methods previously (e.g., Pudney et al., 2020; Puhl et al., 2007b), such studies did not involve the development of a validated instrument that assesses weight stigma and its associated stress both qualitatively and quantitatively. The knowledge we have about long-term stress responses to weight stigma and their potential connections to poor health outcomes is only as strong as the measures that exist to study these constructs. A validated instrument for prolonged weight stigma stress would allow researchers and healthcare providers to understand the nature and extent of prolonged activation and coping with weight stigma stress more clearly, and to develop interventions that target prevention of subsequent poor health outcomes. What is missing from the literature is a measure of weight stigma stress that does not use overly general items and considers the degree to which stigma induces prolonged stress arousal and anticipatory stress in relation to a specified event or experience with weight stigma.

To date, no instruments measure prolonged and anticipatory weight stigma stress specifically. However, Utsey and colleagues (2012) developed the Prolonged Activation and Anticipatory Race-Related Stress Scale (PARS), a 17-item self-report psychometric instrument developed and validated to measure prolonged race-related stress among African American adults. (*Note: See Appendix A for a full list of abbreviations used in the current study*). The PARS measures four distinct but related constructs in reference to a specific experience of racism: perseverative cognition, secondary appraisal, anticipatory stress, and the bodily alarm response (e.g., physiological stress response). Health outcomes associated with experiences of racism are widely studied separate from the health consequences of weight stigma; however, increasing evidence suggests that the theoretical components in which the PARS is grounded (e.g., perseverative cognition, secondary appraisal, anticipatory stress, physiological stress response) could also explain the onset of prolonged activation in relation to experiences of weight stigma in people with overweight and obesity.

The current study describes the development and validation of the Stress and Weight Stigma Scale (STRAWS), a measure for weight stigma-related stress that is intended to capture the prolonged physiological, psychological, and behavioral consequences of stigma-related stress in response to a specific experience of weight stigma in adults with overweight and obesity. The STRAWS is not intended to assess the cumulative effects of weight stigma stress, but rather the presence and extent of prolonged stress in the context of a specific experience of weight stigma.

The STRAWS is directly derived from the PARS (Utsey et al. 2012), substituting weight for race. To complete the PARS (Utsey et al., 2012), participants are first asked to think of an instance of racism that they or someone close to them (e.g., family or friends) experienced. An important strength of the PARS is the inclusion of these network events in assessing prolonged activation of race-related stressors. The term "network event" refers to the stress reaction in response to a stressful situation experienced not by the respondent directly, but by someone closely tied to the respondent via their social network (Kessler & McLeod, 1984). While several studies have examined network events in the context of racism (e.g., Alvarez et al., 2006), very little research is concerned with the impact of network events in the context of weight stigma. One recent qualitative study found that mothers of children with overweight and obesity frequently experience weight stigma by association (Gorlick et al., 2021), or stigma that is "spread out in waves" to others close to stigmatized individuals (Goffman, 1963). While this finding suggests that network events in the context of weight stigma are relevant between mothers and children, no studies have evaluated whether weight stigma by association causes stress across other relationships (e.g., between friends, siblings, romantic partners). To explore the impact of network events in the context of weight stigma, we preserved this component of the PARS when adapting the STRAWS, asking participants to describe an experience of weight stigma faced either by themselves or by someone close to them.

Because of their similar conceptual basis, it was hypothesized that an underlying factor structure that was consistent with the four factors of the PARS (Utsey et al., 2012) would have adequate fit with the STRAWS. In the current study, the primary aim was to confirm that the factor structure of the STRAWS

has adequate fit in adults with overweight or obesity. An exploratory aim was evaluating whether the STRAWS also fit adequately in adults with BMI < 25 (healthy weight and underweight).

A secondary aim of the current study was to establish construct validity of the STRAWS. In accordance with this objective, it was hypothesized that the four subscales of the STRAWS would correlate in the anticipated directions with scores on measures of related constructs. Specifically, it was hypothesized that higher scores on the Perseverative Cognition subscale (PCS), the Anticipatory Weight Stigma Stress subscale (AWS), and the Anticipatory Bodily Alarm Response subscale (ABARS) of the STRAWS would be positively and significantly correlated with total scores on the Everyday Discrimination Scale (EDS; Williams et al., 1997) and the Fear of Enacted Stigma subscale (FESS) of the Weight Self-Stigma Questionnaire (WSSQ; Lillis et al., 2009) because these constructs are related to but distinct from the latent construct of the STRAWS (stress related to weight stigma).

Further, it was hypothesized that the Anticipatory Weight Stigma Stress subscale (AWS) of the STRAWS would be positively and statistically significantly correlated with the Self-Devaluation subscale (SDS) of the Weight Self-Stigma Questionnaire (WSSQ; Lillis et al., 2009), and inversely corelated with the Self-Kindness subscale (SK) and Self-Judgement subscale (SJ) of the Self-Compassion Scale (SCS-26; Neff, 2003). It was also hypothesized that the Secondary Appraisal subscale (SAS) of the STRAWS would be inversely corelated with total scores on the Perceived Stress Scale (PSS; Cohen et al., 1983).

Given that previous research has found a link between experiences of weight stigma and disordered eating through anticipatory stress (Hunger et al., 2020), it was hypothesized that scores on the Perseverative Cognition subscale (PCS), the Anticipatory Weight Stigma Stress subscale (AWS), and the Anticipatory Bodily Alarm Response subscale (ABARS) of the STRAWS would be positively correlated with a measure of global eating disorder psychopathology (EDE-Q global score) and that scores on the Secondary Appraisal subscale (SAS) of the STRAWS would be inversely correlated with the global score from the EDE-Q.

As part of the Everyday Discrimination Scale (EDS; Williams et al., 1997), participants were asked to select from a list all of the reasons why they have ever experienced discrimination. As the

STRAWS was developed to measure weight stigma stress, we also hypothesized that "Weight" would be the most commonly selected reason for discrimination on the Everyday Discrimination Scale (EDS; Williams et al., 1997) for both BMI groups. Further, while some researchers have used an intersectionality framework to understand the additive burden of weight stigma and racism (Himmelstein et al., 2017; Reece, 2018), less is known about whether weight stigma intersects with other stigmatized identities and conditions. Therefore, an exploratory aim of the current study is to identify other identities that individuals most commonly face alongside weight stigma.

Finally, because there is limited research concerning the relevance of network events in the context of weight stigma across different relationship types, a tertiary aim of the current study involved analyzing participants' qualitative descriptions of their experiences and examining the total STRAWS scores between participants who described direct experiences of weight stigma and participants who described weight stigma experienced by a close other. From this preliminary content analysis, we will explore the extent to which network events are associated with prolonged activation in this context.

Methods and Procedures

Scale Development

The items for the STRAWS were created to closely parallel the 17-item PARS (Utsey et al., 2012). The 17-items capture key conceptual components of the prolonged activation stress response to a specific experience of weight stigma (e.g., perseverative cognition, secondary appraisal, and anticipatory stress). The 17-item STRAWS also measures the bodily alarm response to weight stigma (e.g., physiological stress response). Items from the 17-item PARS and the 17-item STRAWS are presented in Table 1.

To adapt the PARS for use with individuals with overweight or obesity, the language was adjusted to refer to body weight and size as a reason for discrimination (rather than having a focus on race, as in the PARS). For example, Item 13 on the Anticipatory Race-Related Stress subscale (ARS) of the PARS states, "*I believe there is a good chance that I will experience racism in the future*" (Utsey et al., 2012). This item was adjusted on the STRAWS for use in individuals with overweight or obesity to

state, "*I believe there is a good chance that I will experience weight stigma in the future*." Some of the language for certain items was changed for clarity. Further, while most of the items on the STRAWS correspond directly to items on the PARS, the order of items 10 and 11 were switched for the STRAWS such that Item 10 from the STRAWS corresponds with Item 11 on the PARS, and Item 11 on the STRAWS corresponds with Item 10 from the PARS. This was done because Item 10 on the STRAWS ("*I believe that most people with overweight or obesity will experience some sort of weight stigma similar to the situation I am thinking of in the future*") refers directly to the experience that participants described initially, whereas the following STRAWS items (11-17) do not pertain specifically to the described situation and participants are instructed to answer these following items according to their general thoughts and experiences. If items used language that did not reference any specific form of stigma, wording was kept consistent (Utsey et al., 2012).

The Stress and Weight Stigma Scale (STRAWS) was developed to expand upon existing measures of weight stigma, most of which aim to capture the extent to which weight stigma was experienced, rather than stress. In contrast, the STRAWS captures the prolonged activation stress response in reference to a specific experience of weight stigma.

Participants were 301 adults who responded to recruitment language to complete a survey on "opinions about weight, discrimination, and health". Participants were recruited using Amazon's Mechanical Turk, a web-based recruitment platform. Research suggests that data collected using this method for studies in the social sciences are more demographically diverse and equally reliable as data collected using more traditional methods (Buhrmester et al., 2016). MTurk has been used for data collection in several previous studies on weight stigma (Hayward et al., 2018; Nutter et al., 2020; Puhl et al., 2017). To be eligible for the current study, participants needed to be over 21 years old and live in the United States. All participants provided informed consent electronically prior to completing surveys. Participants were retained in analyses if they provided valid responses for height and weight, attention checks, and open-ended descriptions of their experience of weight stigma as part of the STRAWS.

Data collection occurred between January and February 2022. A total of 1,103 individuals entered the survey, but 794 (72.0%) were excluded for providing invalid data (e.g., failed attention checks, illogical or incomprehensible open-ended responses), and eight more responses (0.7%) were removed for having missing data for the STRAWS items.

Stress and Weight Stigma Scale (STRAWS)

The Stress and Weight Stigma Scale (STRAWS) is a 17-item self-report measure of prolonged activation and anticipatory stress associated with experiences of weight stigma. The STRAWS was adapted from the Prolonged Activation and Anticipatory Race-Related Stress Scale (PARS; Utsey et al., 2012), an instrument developed to measure prolonged activation and anticipatory race-related stress among African American adults. Some of the language used on the STRAWS is modified to better address a population with overweight or obesity who have experienced weight stigma (e.g., instead of "race-related stress", the STRAWS asks about "stress related to experiences of weight stigma"). The response options from the PARS are identical to the response options for the STRAWS. The item content for the STRAWS is consistent with the PARS, with the focus being weight stigma stress rather than racism stress.

To complete the STRAWS, participants were instructed to think of a specific situation or event when they believe that they or someone close to them experienced weight stigma. A time frame for this experience was not specified, so participants were allowed to describe events that may have occurred during childhood or adolescence or more recently. Participants were then asked to describe the event in detail. Upon completion of this qualitative component, participants are asked to complete the 17-item STRAWS, referencing the specific event they just described in their responses for most items.

The first item asks participants to quantify how stressful the event was that they just described above using a 7-point Likert-type scale (1 = *Not at all stressful* to 7 = *Extremely stressful*). For the next four items, participants are asked to consider, in reference to the specific event they described above, the duration (1 = *Did not think about it at all* to 7 = *I still think about it*), frequency (1 = *Not at all* to 7 = *More than 3 times a day*), intensity (1 = *Did not think about it at all* to 7 = *Could not stop thinking about*

it), and controllability (e.g., "Thought about it when I didn't mean to"; 1 = *Never,* 6 = *All of the time*) of their thoughts related to the specific event in the time since it occurred. The first five items comprise the Perseverative Cognition subscale (PCS). The Perseverative Cognition subscale (PCS) measures the extent to which an individual who has experienced or witnessed weight stigma continues to think about a specific stigmatizing experience. Higher scores on this subscale suggest greater preservative cognition about the specific situation that the participant described initially.

For the remaining items, participants use a 7-point Likert-type scale to indicate the extent to which they agree or disagree with each statement (1 = *Strongly Disagree*, 7 = *Strongly Agree*).

For items 6 through 9, participants are asked to indicate the extent to which they felt they had the physical and cognitive resources to cope with the situation they described above (e.g., "At the time the situation occurred, I felt prepared to deal with it"). These four items comprise the Secondary Appraisal subscale (SAS). The Secondary Appraisal subscale (SAS) measures the degree to which respondents feel they have the necessary resources available to them to manage the weight stigma situation they described initially (both during the situation, and in the time since the situation occurred). Higher scores on this subscale indicate greater confidence in one's appraisal of their coping resources in reference to the specific event they described previously.

Items 10 through 13 ask participants to indicate the likelihood that they believe they will experience another situation or event where they are stigmatized because of their weight in the future (e.g., "I believe there is a good chance that I will experience weight stigma in the future"). These four items comprise the third subscale, the Anticipatory Weight Stigma Stress subscale (AWS). The Anticipatory Weight Stigma Stress subscale (AWS) measures the degree to which participants cognitively anticipate future encounters with weight stigma similar to the one they described previously. Higher scores on this subscale suggest participants' have greater expectations and beliefs that they will face further stigmatizing experiences in the future.

The final four items, 14 through 17, ask participants to rate their physiological responses in anticipation of a potential future experience of weight stigma (e.g., "I can feel my hands start to shake

whenever I think someone is about to make fun of my weight"). For these four items, participants are instructed to consider a general experience of weight stigma and they do not specifically reference the situation they described initially. These four items comprise the fourth and final subscale, the Anticipatory Bodily Alarm Response subscale (ABARS), and are intended to measure the extent of participants' physiological reactions to an anticipated future experience with weight stigma. Higher scores on this subscale indicate more intense bodily alarm response (e.g., racing heartbeat, shaking or sweaty hands) to an anticipated stigmatizing experience. *(Note: The Stress and Weight Stigma Scale is presented in Appendix B).*

To calculate a total score for the STRAWS, the scores for the items on the Perseverative Cognition subscale (PCS), the Anticipatory Weight Stigma Stress subscale (AWS), and the Anticipatory Bodily Alarm Response subscale (ABARS) were summed. Items on the Secondary Appraisal subscale (SAS) were reverse scored, and these reverse scores were summed to generate total scores for the Secondary Appraisal subscale (SAS). Scores for each subscale were then summed to calculate total STRAWS scores for each participant.

The following factor analyses will evaluate whether the four subscales described above as identified by Utsey et al. (2012) are appropriate for measuring anticipatory stress and prolonged activation related to experiences of weight stigma in our sample.

Procedures

Following approval from the institutional review board, study participants (n = 1,103) were recruited from Amazon's Mechanical Turk (MTurk). Participants were compensated $0.50 USD for completing the survey in its entirety and providing minimally valid responses.

Prior to the survey, participants read an electronic consent form that explained the study procedures, the purpose of the study, and the rights of and potential risks to participants. The consent form also included the contact information for the principal investigator in case respondents had any questions or concerns about their participation in the study. Participants indicated their consent by checking a box and proceeding with the survey.

Individuals were eligible to participate if they were 21 years of age or older. Recruitment materials and the consent form also specified that participants would be eligible if they had larger bodies and believed they had experienced weight stigma. However, participants with a BMI below the overweight threshold also completed the survey. Given the pervasiveness of weight stigma, we decided to validate the STRAWS among participants with BMI ≥ 25 and also compare the invariance of the factor structure between those with BMI ≥ 25 and those with BMI < 25.

Once they consented, participants completed the 17-item STRAWS and several additional questionnaires that were used to assess the STRAWS' construct validity. These additional instruments are described in "Measures".

Participants

Among the 301 respondents who were included in the current study, 95 (31.6%) were male, 205 (68.1%) were female, and 1 (0.3%) declined to report their sex. Participants ranged in age from 21 to 70 years, with a mean age of 37.45 (SD = 10.69). The majority of the sample reported their race as White (227; 75.4%). There were 19 participants (6.3%) who reported their race as Asian or Asian American, 29 participants (9.6%) who reported their race as Black or African American, one participant (0.3%) who reported their race as Native Hawaiian or Pacific Islander, four participants (1.3%) who reported their race as American Indian or Alaska Native, 14 participants (4.7%) who identified as more than one race, and seven participants (2.3%) who declined to report their race. There were 29 participants (9.6%) who identified as Hispanic or Latinx. Participant demographic characteristics by BMI group are presented in Table 2.

Measures

Participants were first asked to complete a demographic questionnaire that included questions about age, height and weight, primary language, country of birth and country of current residence, race and ethnicity, biological sex, gender identity, sexual orientation, educational status, and marital status. The following additional scales were included in the survey to assess validity of the STRAWS.

Body Mass Index (BMI)

Body mass index (BMI; kg/m^2) was calculated using participants' self-reported height and weight. Studies suggest that online self-reported height and weight is a valid method for collecting data on height and weight and for subsequent calculation of BMI (Pursey et al., 2014).

Everyday Discrimination Scale (EDS)

General everyday discrimination was measured using the Detroit Area Study Everyday Discrimination Scale (EDS; Williams et al., 1997). To complete the 9-item EDS, participants are asked to indicate the frequency with which they experience various forms of discrimination or mistreatment in their daily lives. Each item presents an example of general mistreatment that the participant may have previously experienced (or currently experiences) (e.g., "You are treated with less courtesy than other people are" and "You are treated with less respect than other people are"). Participants indicate the frequency that they have had such experiences using a 6-Point Likert-type scale (1 = *Never*; 2 = *Less than once a year;* 3 = *A few times a year*; 4 = *A few times a month*; 5 = *At least once a week*; 6 = *Almost every day*). Items were summed to generate a total score for each participant ranging from 9 to 54. Higher scores indicate greater frequency and variety of discrimination in day-to-day life. Cronbach's alpha for the Everyday Discrimination Scale in our STRAWS sample supported strong internal consistency (α = 0.92).

Weight Self-Stigma Questionnaire (WSSQ)

The Weight Self-Stigma Questionnaire (WSSQ; Lillis et al., 2009) assessed internalized weight stigma among respondents. The 12-item WSSQ measures internalized weight stigma through two distinct constructs: fear of enacted stigma (e.g., "Others will think I lack self-control because of my weight problems") and self-devaluation (e.g., "I became overweight because I am a weak person"). Participants were asked to rate the extent to which they agreed or disagreed with each statement using a 5-point Likert-type scale (1 = *Completely disagree*; 5 = *Completely agree*). Scores were calculated for each subscale by adding each item within the scale (Self-Devaluation subscale (SDS) = items 1-6; Fear of Enacted Stigma subscale (FESS) = items 7-12). Total sum scores were computed for each participant by

summing the scores for each of the 12 items, with higher scores indicating greater internalized weight stigma. Among the current STRAWS sample, Cronbach's alpha for the WSSQ yielded internally consistent scores for the Fear of Enacted Stigma subscale (α = 0.88), the Self-Devaluation subscale (α = 0.83), and the total scores (α = 0.90).

Self-Compassion Scale

The Self-Compassion Scale (SCS-26; Neff, 2003) measured self-compassion. The 26-item SCS measures the degree to which individuals tend to be compassionate toward themselves when facing challenges via six distinct subscales. There are three positive subscales: Self-Kindness (e.g., "I try to be loving towards myself when I'm feeling emotional pain"), Common Humanity (e.g., "I try to see my failings as part of the human condition"), and Mindfulness (e.g., "When I fail at something important to me, I try to keep things in perspective"). Higher scores on the positive subscales indicate greater self-compassion during difficult times.

In contrast, there are three negative subscales: Self-Judgment (e.g., "When times are really difficult, I tend to be tough on myself"), Isolation (e.g., "When I fail at something that's important to me, I tend to feel alone in my failure"), and Overidentification (e.g., "When I fail at something important to me I become consumed by feelings of inadequacy"). After reverse-scoring, higher scores on the negative subscales indicate greater self-compassion during difficult times.

Participants are asked to indicate the extent to which they tend to relate to each statement using a 5-point Likert-type scale (1 = *Almost never*; 5 = *Almost always*). Items from the negative subscales (Self-Judgment, Isolation, and Overidentification) were reverse scored prior to calculating the total mean for each participant. Cronbach's alpha from validation studies of the SCS-26 demonstrate strong internal consistency (0.92), with subscales ranging from 0.75 to 0.81 (Neff, 2003). Cronbach's alpha for the SCS-26 supported the internal consistency of the Self-Kindness subscale (α = 0.87), the Common Humanity subscale (α = 0.81), the Mindfulness subscale (α = 0.78), the self-Judgement subscale (α = 0.88), the Isolation subscale (α = 0.87), the Overidentification subscale (α = 0.84), and the total SCS-26 scores (α = 0.94).

Perceived Stress Scale (PSS)

Perceived stress was measured using the well-validated Perceived Stress Scale (PSS; Cohen et al., 1983). This 10-item scale measures the degree to which individuals perceive their lives as stressful over the last month. The items present general statements that do not refer to any particular events or situations (e.g., "In the last month, how often have you felt that you were unable to control the important things in your life?"). Participants are asked to indicate the frequency that they have related to each statement over the last month using a 5-point Likert-type scale (0 = *Never*, 4 = *Very Often*). Four of the ten items (Items 4, 5, 7, and 8) were reverse scored prior to calculating total sum scores for each participant. Once summed, total scores for the PSS ranged from 0 to 40, with higher scores indicating greater levels of perceived stress over the last month. Cronbach's alpha for the PSS supported strong internal consistency ($\alpha = 0.86$).

Eating Disorders Examination Questionnaire (EDE-Q)

Disordered eating behaviors and cognitions were measured using the Eating Disorders Examination – Questionnaire (EDE-Q; Fairburn & Bèglin, 1994), a self-report instrument that assesses eating psychopathology over the previous 28 days. The current study used a brief version of the EDE-Q, which, in addition to the binge eating and purging items that assess the frequency of these behaviors, includes three subscales.

The first subscale, Dietary Restraint, is comprised of three items where participants are asked to indicate the frequency which, over the last 28 days, they have engaged in certain behaviors related to eating and weight (e.g., "Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)?", "Have you tried to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?", "Have you tried to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your shape or weight (whether or not you have succeeded)?"). Participants indicate frequency using the following response category options: 0 = *No days*; 1 = *1 – 5 days*; 2 = *6 – 12 days*; 3

= *13 – 15 days*; 4 = *16 – 22 days*; 5 = *23 – 27 days*; 6 = *Everyday*. Higher scores on the Dietary Restraint subscale indicate greater frequency of eating restriction behaviors.

The remaining two subscales, Overvaluation and Body Dissatisfaction, are both comprised of two items where participants are asked to indicate the intensity with which they have experienced thoughts related to body weight and shape over the last 28 days. Response options for the Overvaluation of weight and shape subscale (assessed using items "Has your weight (Has your shape) influenced how you think about (judge) yourself as a person?") and the Dissatisfaction of weight and shape subscale (assessed using items "How dissatisfied have you been with your weight (with your shape)?") range from 0 (*Not at all*) to 6 (*Markedly*), with higher scores indicating more intense valuation of body weight and shape and greater dissatisfaction with body weight and shape, respectively.

The brief version of the EDE-Q used in the current study has demonstrated superior psychometric properties in both clinical and nonclinical studies compared with those from the original measure across various samples (Grilo et al., 2012; Grilo et al., 2014; Machado et al., 2017).

Mean scores for the Restraint subscale, the Overevaluation subscale, and the Dissatisfaction subscale were calculated for each participant, and a Global mean was generated for each participant by taking the average of the first seven items. Cronbach's alpha for the brief EDE-Q supported internal consistency for the Restraint subscale ($\alpha = 0.88$), the Overevaluation subscale ($\alpha = 0.87$), the Dissatisfaction subscale ($\alpha = 0.89$), and the Global EDE-Q mean scores ($\alpha = 0.86$).

Statistical Analyses

All statistical analyses were conducted using R Statistical Software (v4.1.2; R Core Team, 2021). Prior to analyses, the data were screened for outliers. Among the total combined sample (n = 301), no outliers were found to exceed the 75th percentile for total STRAWS scores, as determined visually using box-and-whisker plots.

The main objectives of these analyses were: (**1**) to determine the fit of the factor structure of the STRAWS based on the PARS factor structure (Utsey et al., 2012) using confirmatory factor analysis, and

(2) to examine construct validity of the STRAWS by evaluating correlations of the STRAWS subscales with related but distinct validated measures.

In addition, because a substantial minority of participants had a BMI below the overweight threshold yet reported experiencing weight stigma, we were able to explore the factor structure and measure characteristics between individuals with overweight and obesity and those with a health body weight and underweight. Specifically, exploratory objectives were: (**1**) to test measurement invariance between the group with BMI $\geq$ 25 and the group with BMI < 25, and (**2**) to examine mean differences in total STRAWS scores and scores on each subscale of the STRAWS between individuals with BMI < 25 and BMI $\geq$ 25.

Further exploratory aims were: **(3)** provide descriptive statistics of the STRAWS (e.g., means, standard deviations) and differences by demographic variables, **(4)** examine other identities that are commonly stigmatized in conjunction with weight using the Everyday Discrimination Scale (EDS; Williams et al., 1997), and to determine if these intersecting identities differ between BMI groups, and **(5)** explore the impact of network events (as identified in participants' qualitative responses) on participants' total STRAWS scores.

It is suggested that variables measured on different scales be standardized prior to conducting statistical analyses (Milligan et al., 1988). Because the four subscales of the STRAWS were not measured using identical scales, the data for these items were standardized prior to conducting the CFA using the "scale" function (R Core Team, 2021).

To achieve the first main objective, we conducted confirmatory factor analyses using the "cfa" function from the lavaan R package (v0.6.9; Rosseel, 2012). We examined the fit of three models: (**a**) a single-factor model, (**b**) a 4-factor, 17-item model with orthogonal rotation, and (**c**) the hypothesized 4-factor, 17-item model with oblique rotation (Utsey et al., 2012). Since no theoretical argument exists regarding the independence of the four constructs measured by the STRAWS specifically among individuals who have experienced weight stigma, we explicitly tested alternative models with different rotations (e.g., oblique versus orthogonal) in the current study.

To achieve the first exploratory objective, we used the 4-factor, 17-item model with oblique rotation that was confirmed using the PARS (Utsey et al., 2012) and that best fit our current combined sample to examine model fit within each BMI group separately.

Analysis of variance (ANOVAs; R Core Team, 2021) were used to achieve the second exploratory objective, and the fourth exploratory objective was achieved using Chi square tests of independence (R Core Team, 2021).

To achieve our final exploratory objective, participants' qualitative responses were examined by the first author (JW) and coded based on whether the described situation was experienced by the participant directly, or if it was experienced by a close other. For participants who did describe a network event, the relationship between the respondent and the stigmatized was noted (e.g., friends, siblings, parent/child, etc.). Analysis of variance (ANOVAs; R Core Team, 2021) were then used to examine mean differences in total STRAWS scores and scores on each subscale of the STRAWS between participants who described direct experiences of weight stigma and participants who described network events. We also conducted an ANOVA within the group that described network events to assess mean differences in total STRAWS scores and scores in each subscale of the STRAWS between participants who shared different relationships with the individual they described as experiencing weight stigma.

Shapiro Wilk Tests for Normality were used to assess normality of the data for each individual item on the STRAWS. All 17 items had distributions that differed significantly from the normal distribution. The data did not meet the normality assumption that is required for CFA (Li, 2015). To address the nonnormality of the data, the maximum-likelihood estimation with robust standard errors (MLR) was used to extract the variances from the data, and we performed a Bollen-Stine bootstrapping procedure (Bollen & Stine, 1992) on 1,000 samples using the MLR estimator.

Because all participants, regardless of BMI, reported having experienced weight stigma, all models (single-factor, 4-factor oblique, and 4-factor orthogonal) were tested on the combined sample (both BMI $\geq$ 25 and BMI < 25, n = 301). The model that was determined to fit the combined sample most adequately was then tested by BMI group separately. Several fit indices were considered to evaluate

model fit, including the comparative fit index [CFI]; the Tucker Lewis Index [TLI]; the root-mean-square error of approximation [RMSEA]; and the standardized root-mean-square residual [SRMR]). A known limitation of the model chi-square test is that it is very sensitive to sample size (Kline, 2015). As such, a statistically significant result for the model chi-square test alone is not sufficient to determine model fit, and it should be considered in association with other indices of model fit (Bollen, 1989).

In line with recommendations by Hu and Bentler (1999), the following cutoff criteria were used to evaluate the goodness of model fit: CFI and TLI > 0.95, SRMR < 0.08, and RMSEA < 0.06. Cronbach's alpha coefficients were computed for each subscale based on the model results and used to assess reliability. Based on recommendations from Nunnally (1978) values > 0.70 were considered acceptable.

Tests of measurement invariance between BMI groups involved a series of four hierarchical multi-group models. The identification rules for multi-group factorial invariance in ordinal categorial variables used for the current analyses were based on those developed by Millsap and Yun-Tein (2004). Model 1, the least restrictive model of the four models, reflected equivalence in factor structure only. Each successive model became increasingly conservative in terms of factor loadings, thresholds, and error terms being allowed to vary across BMI groups. Model 2 assumed that factor loadings were equivalent across groups, while thresholds and error terms were still allowed to vary across groups. Model 3 assumed equivalence for both factor loadings and thresholds. Finally, Model 4, the most restrictive model, assumed equivalence for factor loadings and thresholds (as in Model 3) and also constrained residual variances to be equal across groups.

Results

Descriptive Statistics

Mean values for the individual items on the STRAWS for the current combined sample (n = 301) ranged from 2.38 (Item 15: "I get chest pains whenever I think someone is about to make fun of my weight") to 5.52 (Item 10: "I believe that most people with overweight or obesity will experience some sort of weight stigma in the future similar to the situation I am thinking of"). Most items had a skewness

and kurtosis below |1.0|; all items had a skewness below |1.5| and kurtosis below |2.0|. Table 3 presents the means, standard deviations, skew, and kurtosis values for the combined sample (n = 301) for each STRAWS item.

STRAWS Scores by Gender and Age

Shapiro Wilk Tests for Normality were used to assess normality of the data for total sum STRAWS scores. Total sum scores for the STRAWS were normally distributed for both male participants (n = 95) and female participants (n = 205) in the current sample. A two-sample independent t-test with equal variances was used to compare the total sum scores for the STRAWS between male and female participants in the current sample. There was not a statistically significant difference in mean total sum scores on the STRAWS between male and female participants in the current sample (t = -1.946, df = 298, p-value = 0.053). On average, though only marginally statistically significant, female participants had higher total sum scores on the STRAWS compared to male participants, indicating that the female participants in the current sample experience higher levels of prolonged activation and anticipatory stress related to their experiences of weight stigma than the male participants in the current sample.

To compare total sum STRAWS score by age group, we first used Shapiro Wilk Tests for Normality to assess normality of the data for age. Age was not normally distributed in the current sample ($p < 0.001$). Therefore, a Spearman correlation coefficient was computed to assess the linear relationship between total STRAWS scores and age in the current sample. There was a statistically significantly negative correlation between total STRAWS scores and age ($r(299) = -0.122$, $p = 0.034$). This suggests that older individuals in the current sample tended to have lower total sum scores on the STRAWS compared to younger individuals in the current sample, indicating that the younger participants, on average, experienced higher levels of prolonged activation and anticipatory stress related to their experiences of weight stigma than older participants.

Confirmatory Factor Analysis of the STRAWS

Fit statistics for the one-factor model, the 4-factor orthogonal model, and the 4-factor oblique model in the combined sample from the current study are summarized in Table 4. The fit of the one-factor model was poor ($\chi 2$ (119) = 1442.56, $p < 0.001$, RMSEA = 0.192 (90% CI: 0.184–0.201), CFI = 0.513, TLI = 0.443, SRMR = 0.171). Internal consistency of items using the one-factor solution was $\alpha = 0.82$.

The 4-factor orthogonal model also provided a poor fit ($\chi 2$ (119) = 484.03, $p < 0.001$, RMSEA = 0.101 (90% CI: 0.092–0.110), CFI = 0.865, TLI = 0.845, SRMR = 0.232), though the improved RMSEA value suggested that this model fit the current sample slightly better than the one-factor solution. Internal consistency of the subscales from this model ranged from $\alpha = 0.72–0.92$.

The fit of the hypothesized 4-factor oblique model provided the most adequate fit of all models tested ($\chi 2$ (113) = 265.11, $p < 0.001$, RMSEA = 0.067 (90% CI: 0.057–0.077), CFI = 0.944, TLI = 0.933, SRMR = 0.068). As the subscales for this model remained consistent with those from the 4-factor orthogonal model, internal consistency was the same for the subscales in this model.

The 4-factor oblique solution fit better in individuals with BMI $\geq$ 25 than with the individuals with BMI < 25 (See Table 4). However, based on the SRMR alone, fit was acceptable for both groups.

Measurement Invariance

We examined measurement invariance using the 4-factor oblique model between the BMI groups in our current sample to determine whether participants with different characteristics show the same response patterns for the STRAWS. To achieve this, we tested hierarchical models (Models 1-4, see "Statistical Analyses"). The results of these multigroup analyses are reported in Table 5.

Model 1 (configural invariance) had close to acceptable fit based on RMSEA, CFI, and SRMR indices (Model 1: $\chi 2$ (226) = 383.98, $p < 0.001$, RMSEA = 0.068 (90% CI: 0.057–0.079), CFI = 0.945, TLI = 0.934, SRMR = 0.071). Comparing Model 1 (configural invariance) to Model 2 (metric invariance) revealed marginal changes to indices of model fit (ΔModel 2 - Model 1: ΔRMSEA = -0.001, ΔCFI = -0.001, ΔTLI = 0.002, ΔSRMR = 0.007). Comparing Model 2 (metric invariance) to Model 3 (scalar invariance) revealed a less adequate fit (ΔModel 3 - Model 2: ΔRMSEA = 0.003, ΔCFI = -0.008, ΔTLI = -

0.005, ΔSRMR = 0.005). Finally, from Model 3 (scalar invariance) to Model 4 (residual invariance), model fit continued to worsen (ΔModel 4 - Model 3: ΔRMSEA = -0.001, ΔCFI = -0.005, ΔTLI = -0.001, ΔSRMR = 0.001). As additional constraints were added for each successive model, fit indices generally worsened, with the exceptions of the RMSEA and TLI values for Model 2, which were slightly improved from Model 1. This suggests that Model 1 and Model 2 similarly provided the most adequate fits of the four models.

Chi square difference tests using the "lavTestLRT" function via the lavaan R package (v0.6.9; Rosseel, 2012) iteratively compared Model 1 with Models 2-4. Model 1 differed significantly from Model 3, though there was no statistically significant difference in fit between Model 1 and Model 2 or between Model 1 and Model 4. As Model 2 (e.g., the model with only factor loadings constrained between groups) provided adequate fit and was not statistically significantly different from Model 1, this suggests evidence of metric invariance, meaning the factor loadings for the 17 STRAWS items are similar across BMI groups. As a result, it can be assumed that differences in factor variances and covariances between groups are not attributable to BMI-based differences in the constructs measured by the STRAWS itself.

However, as Model 3 differed significantly in fit from Model 1, this means that the intercepts are not similar across BMI groups. Taken together, there was only metric (weak) invariance between BMI groups in the current sample; the evidence supporting scalar non-invariance suggests that one of the BMI groups tended to systematically give higher or lower responses than the other BMI group (Wichert and Dolan, 2010).

As Model 2 (metric invariance) provided the most adequate fit for the current sample, this indicates that the way items grouped together in the 17-item, 4-factor oblique solution is applicable to groups across the BMI spectrum. However, because intercepts differ between BMI groups, this suggests that use of the STRAWS should be restricted to individuals with the same weight status. We presented internal consistency for each subscale using Cronbach's alpha, standardized factor loadings, and standardized intercepts for each BMI group separately (e.g., Model 2) in Table 6.

Considering the standardized factor loadings and intercepts in Table 6, there is a single item measuring anticipatory weight stigma for others (Item 10) that does not load strongly to the Anticipatory Weight Stigma Stress subscale (AWS) for either BMI group.

Reliability

Based on the 4-factor oblique model, internal consistency for scores on each of the four factors of the STRAWS was analyzed using Cronbach's alpha coefficients. For the combined sample (n = 301), the alpha coefficients were 0.87 for the Perseverative Cognition subscale (PCS), 0.87 for the Secondary Appraisal subscale (SAS), 0.72 for the Anticipatory Weight Stigma Stress subscale (AWS), and 0.92 for the Anticipatory Bodily Alarm Response subscale (ABARS).

All of the scores were above the accepted cutoff alpha level of .70, indicating adequate internal reliability (Nunnally, 1978). Considering that the lower internal consistency for the Anticipatory Weight Stigma Stress subscale (AWS) may be the result of the inadequate factor loading for the single item measuring anticipatory weight stigma for others (Item 10) within that factor, we removed Item 10 and recalculated internal consistency for the Anticipatory Weight Stigma Stress subscale (AWS). After removal of this item, internal consistency for the Anticipatory Weight Stigma Stress subscale (AWS) in the combined sample improved ($\alpha = 0.78$).

Standardized factor correlations were evaluated for the combined sample using the variance-covariance matrix of the latent factors**.** Subscale intercorrelations were highest between the Anticipatory Bodily Alarm Response subscale (ABARS) and the Anticipatory Weight Stigma Stress subscale (AWS; 0.59), the Anticipatory Weight Stigma Stress subscale (AWS) and the Perseverative Cognition subscale (PCS; 0.57), and the Anticipatory Bodily Alarm Response subscale (ABARS) and the Perseverative Cognition subscale (PCS; 0.58). The lowest factor correlation found was between the Anticipatory Bodily Alarm Response subscale (ABARS) and the Secondary Appraisal subscale (SAS; -0.09). All STRAWS subscale intercorrelations are shown in Table 7 and in Figure 1.

Mean Differences in STRAWS Scores by BMI

Total STRAWS scores and scores for each of the four subscales were calculated according to the 4-factor oblique model, as this model provided the best fit for the current sample. Means and standard deviations by BMI group are summarized in Table 8. An ANOVA comparing the means for total STRAWS scores by BMI indicated a significant difference ($F(1,299) = 4.296$, $p = 0.039$). Adults with BMI < 25 (M = 61.46, SD = 16.99) had lower total scores than adults with BMI ≥ 25 (M = 65.84, SD = 16.89). Subsequent ANOVAs comparing the mean scores for each of the four subscales on the STRAWS by BMI indicated that only one of the four subscales (the Anticipatory Weight Stigma Stress subscale, AWS) differed significantly by BMI ($F(1,299) = 19.97$, $p < 0.001$). Adults with BMI < 25 (M=15.35, SD=4.97) had significantly lower scores for the Anticipatory Weight Stigma Stress subscale (AWS) than adults in the current sample with BMI ≥ 25 (M=18.12, SD=4.96). For the remaining three subscales, there were no statistically significant differences in mean scores between adults with BMI < 25 and adults with BMI ≥ 25in the current sample ($p > 0.05$).

Construct Validity

Because there were significant differences in the mean scores for the overall STRAWS scores and the Anticipatory Weight Stigma Stress subscale (AWS) between BMI groups, all scale intercorrelations were calculated separately for individuals with BMI < 25 and individuals with BMI ≥ 25 from the current sample.

As hypothesized, the Perseverative Cognition subscale (PCS), the Anticipatory Weight Stigma Stress subscale (AWS), and the Anticipatory Bodily Alarm Response subscale (ABARS) of the STRAWS all positively and statically significantly correlated with total scores on the Everyday Discrimination Scale (EDS; Williams et al., 1997) and with the Fear of Enacted Stigma subscale (FESS) of the Weight Self-Stigma Questionnaire (WSSQ; Lillis et al., 2009) for both BMI groups. The Secondary Appraisal subscale (SAS) of the STRAWS was inversely correlated with both the total scores on the Everyday Discrimination Scale (EDS; Williams et al., 1997) and with the Fear of Enacted Stigma subscale (FESS)

of the Weight Self-Stigma Questionnaire (WSSQ; Lillis et al., 2009), though this relationship was only statistically significant for the group with BMI ≥ 25.

The Anticipatory Weight Stigma Stress subscale (AWS) of the STRAWS was positively and statistically significantly correlated with the Self-Devaluation subscale (SDS) of the Weight Self-Stigma Questionnaire (WSSQ; Lillis et al., 2009) for both BMI groups. As hypothesized, the Anticipatory Weight Stigma Stress subscale (AWS) of the STRAWS was inversely correlated with the Self-Kindness subscale (SK) of the Self-Compassion Scale (SCS-26; Neff, 2003) for the group with BMI ≥ 25, though this relationship was not statistically significant. The association between the Anticipatory Weight Stigma Stress subscale (AWS) of the STRAWS and the Self-Kindness subscale (SK) of the Self-Compassion Scale (SCS-26; Neff, 2003) occurred in the opposite direction as anticipated for the group with BMI < 25, though this relationship was also not statistically significant. The relationship between the Anticipatory Weight Stigma Stress subscale (AWS) of the STRAWS and the reverse-scored Self-Judgment subscale (SJ) of the Self-Compassion Scale (SCS-26; Neff, 2003) occurred in the anticipated direction for both BMI groups.

As hypothesized, the inverse correlation between the Secondary Appraisal subscale (SAS) of the STRAWS and total scores on the Perceived Stress Scale (PSS; Cohen et al., 1983) were statistically significant for both BMI groups.

Finally, in line with our a priori hypotheses, the Perseverative Cognition subscale (PCS), the Anticipatory Weight Stigma Stress subscale (AWS), and the Anticipatory Bodily Alarm Response subscale (ABARS) of the STRAWS were positively and statistically significant correlated with the Global scores from the EDE-Q Brief for both BMI groups, and the Secondary Appraisal subscale (SAS) of the STRAWS was inversely correlated with the Global scores from the EDE-Q Brief for both BMI groups. However, the inverse association between the Secondary Appraisal subscale (SAS) of the STRAWS and the Global scores from the EDE-Q Brief was only statistically significant for the group with BMI ≥ 25.

Means, standard deviations, and correlation coefficients for scales used in the study are reported for the current sample with BMI ≥ 25 in Table 9.

Intersectionality

As part of the Everyday Discrimination Scale (EDS; Williams et al., 1997), participants were asked to select from a list all of the reasons why they have ever experienced discrimination. As the STRAWS was developed to measure weight stigma specifically, we assessed the proportion of participants who selected "Weight" as one of the reasons why they had experienced discrimination on the Everyday Discrimination Scale (EDS; Williams et al., 1997).

Of the 301 participants retained for the confirmatory factor analysis, 22 participants did not provide responses for the Everyday Discrimination Scale (EDS; Williams et al., 1997). These respondents were removed for the following analyses (n = 279).

The percentages of both BMI groups that selected each individual reason for discrimination are presented in Table 10.

As expected, given the recruitment and eligibility for this study, large proportions of both BMI groups selected "Weight" as a reason why they had experienced discrimination in the past. Among participants with BMI ≥ 25, "Weight" was selected most often compared to the other reasons for discrimination listed. In the group with BMI < 25, "Weight" was the second most commonly selected reason for discrimination, after "Gender". We compared the frequencies that each reason for discrimination was selected by individuals in each BMI group using Chi square tests of independence. These analyses revealed that "Weight" was the only reason for discrimination where the proportion of participants who selected it differed significantly between BMI groups, with a significantly larger proportion of participants with BMI ≥ 25 selecting "Weight" as a reason that they have faced discrimination compared to the proportion of participants with BMI < 25 who selected "Weight" as a reason that they have faced discrimination. The proportions of participants in each BMI group that selected all other reasons for discrimination did not differ significantly.

Among the group with BMI < 25, there were 31 participants who selected multiple responses, with one of their responses being "Weight". Among these 31 respondents, the reason for discrimination that was most commonly selected along with "Weight" was "Gender," with 21 participants (67.7%) selecting both "Weight" and "Gender" for reasons that they have experienced discrimination. Of these 21 individuals who selected both "Weight" and "Gender" as reasons for discrimination, 19 (90.0%) of them were female identifying.

Among the group with BMI ≥ 25, there were 95 participants who selected at least one other reason for experiencing discrimination in addition to weight. Among these 95 respondents, the reason for discrimination that was most commonly selected along with "Weight" was "Gender," with 56 participants (59.0%) selecting both "Weight" and "Gender" for reasons that they have experienced discrimination. Of these 56 individuals who selected both "Weight" and "Gender" as reasons for discrimination, 41 (73.0%) of them were female identifying.

The proportions of participants by BMI group that selected each other reason as a reason in addition to "Weight" that they had faced discrimination are presented in Table 11.

Network Events

From the 301 participants that were retained for previous analyses, 15 responses (4.98%) were removed for providing responses that were too general (e.g., participants who did not reference a specific experience of weight stigma). There were 286 participants that provided specific descriptions of a weight stigma experience that were retained for the following analysis.

There were four participants who described more than one experience in their description. Of these four participants, three of them described both a self- and a network event. These three participants were included in both experience type groups. The remaining response described two network events referring to two different close others and was included twice within the "Network" group. Therefore, among the 286 participants retained for the current analysis, 290 experiences of weight stigma were described, including the four participants who described two different examples of experiences in their

qualitative response. Of these 290 descriptions, there were 252 responses (86.90%) that described a self-event, and 38 responses (13.10%) that described a network event.

Total STRAWS scores and scores for each of the four subscales were calculated according to the 4-factor oblique model. Means and standard deviations by experience type are summarized in Table 12. An ANOVA comparing the means for total STRAWS scores by experience type indicated a significant difference ($F(1,288) = 16.69$, $p < 0.001$). Participants who described direct, self-experiences of weight stigma ($M = 66.29$, $SD = 16.98$) had higher total scores that participants who described network events ($M = 54.58$, $SD = 12.56$). Subsequent ANOVAs comparing the mean scores for each of the four subscales on the STRAWS by experience type indicated that there were significant differences in all but one of the subscales (the Secondary Appraisal subscale, SAS; $p > 0.05$). For the other three subscales, participants who described self-events experienced significantly greater prolonged activation and anticipatory weight stigma stress than participants who described network events (See Table 12).

Of the 38 responses that described network events, two participants (5.26%) described their child's experience of weight stigma, 11 participants (28.95%) described a friend's experience of weight stigma, five participants (13.16%) described a parent's experience of weight stigma, nine participants (23.68%) described a sibling's experience with weight stigma, seven participants (18.42%) described a significant other's experience with weight stigma, and four participants (10.53%) described an experience of weight stigma had by another family member (e.g., cousin, brother-in-law, nephew). The frequencies of relationship types between participants and their close others they described in network events are depicted in Figure 2.

Interestingly, among these 38 responses that described network events, all 38 (100.0%) described weight stigma that a close other experienced due to overweight or obesity, suggesting that network events may be less relevant for individuals whose close others with normal weight and underweight experience weight stigma. An ANOVA comparing the total STRAWS scores of participants who described network events revealed no significant differences in total STRAWS scores by relationship type ($F(5,32) = 0.571$, $p = 0.721$), suggesting that the participants' specific relationship to the close other described in their

network event does not significantly influence the degree to which participants experienced prolonged stress related to the network event. However, because of the small proportion of the overall sample that described network events, these results must be interpreted with caution.

Discussion

The current study examined the underlying factor structure of a newly adapted measure for prolonged activation and anticipatory weight stigma stress in a sample of individuals with overweight and obesity (BMI $\geq$ 25, n = 208) and a sample of non-obese individuals (BMI < 25, n = 93) and tested for measurement invariance between the two BMI groups. Specifically, confirmatory factor analysis of the Stress and Weight Stigma Scale (STRAWS) validated the distinct four-factor structure that was produced by the Prolonged Activation and Anticipatory Race-Related Stress Scale (PARS; Utsey et al., 2012), the measure from which the STRAWS was adapted. The four factors comprising the STRAWS are Perseverative Cognition (PCS), Anticipatory Weight Stigma Stress (AWS), Anticipatory Bodily Alarm Response (ABARS), and Secondary Appraisal (SAS). There was acceptable fit for the combined sample (n=301). When examined separately, model fit was more adequate for the group with BMI $\geq$ 25 than for the group with BMI < 25. Further, the results of the current study endorse adequate internal consistency of the STRAWS. The preliminary evidence presented here supports the validity and reliability of the STRAWS as a measure of prolonged activation and anticipatory weight stigma stress among individuals with overweight and obesity.

Multi-group analysis used to test for measurement invariance demonstrated significant differences in residual variances between the group with BMI $\geq$ 25 and the group with BMI < 25; therefore, factor loadings and intercepts were presented separately by BMI group in the final model (17-items, 4 factors). We also tested a 4-factor, 17-item model with orthogonal rotation, though this model did not demonstrate acceptable fit for the combined sample. This suggests that the constructs assessed by the STRAWS are distinct but related.

In the final model, there was a single item measuring participant's attitudes about anticipatory weight stigma stress in others with overweight and obesity (Item 10) that demonstrated a weak factor

loading for both BMI groups. This item asks participants to indicate the degree to which they agree with the following statement: "*I believe that most people with overweight or obesity will experience some sort of weight stigma in the future similar to the situation I am thinking of."* Though the factor loading for this item is low for both BMI groups, it loaded to the Anticipatory Weight Stigma Stress subscale (AWS) subscale for both groups. Interestingly, the other three items that loaded strongly onto the AWS subscale all ask participants to respond to statements regarding the chances that *they* will experience weight stigma in the future (e.g., Item 13: "*I believe there is a good chance that I will experience weight stigma in the future*"). The three items that loaded strongly to the Anticipatory Weight Stigma Stress subscale (AWS) are relevant to the expectation that *they* will continue to experience stigma because of their weight. In contrast, the item that did not load strongly to the Anticipatory Weight Stigma Stress subscale (AWS; Item 10) refers to the possibility that *others* will experience weight stigma in the future. The mean for this item in the current study was higher than the other three items that loaded onto the Anticipatory Weight Stigma Stress subscale (AWS). Therefore, on average, participants agreed more strongly with the statement that *other* people with overweight and obesity would experience weight stigma in the future compared to their agreement with the statements that they would experience future weight stigma *themselves*.

Recent research has found that a significant degree of anti-fat bias toward other individuals with overweight and obesity is evident among people with all body sizes, even among those with overweight and obesity (Schwartz et al., 2006). Other studies have found that countries like the United States where there is a high prevenance of overweight and obesity have been found to have high levels of implicit weight bias at the national level (Marini et al., 2013). Regardless of one's own body size, weight bias toward others remains pervasive. This explicit expectation that others with overweigh and obesity will experience weight stigma in the future is consistent with previous research that found considerable explicit weight bias among people from different body sizes (Puhl & Heuer, 2009).

Though limited, the existing research comparing self-directed weight bias and other-directed weight bias suggests that individuals who are part of a stigmatized group may engage in self-enhancement

(Taylor & Brown, 1988), referring to the tendency to rate themselves higher than others on a variety of measures, as a means for protecting or improving self-esteem. Specifically, one recent study found that participants with overweight and obesity rated themselves as having significantly more positive personality traits than other individuals with obesity (Carels et al., 2012). Similarly, another study found that participants with overweight and obesity, despite holding significant anti-fat attitudes toward others with higher weights, generally expressed positive implicit self-identities in a variety of areas, including areas consistent with negative weight-related stereotypes (Carels et al., 2011). This finding suggests that individuals with overweight and obesity do have the tendency to engage in self-enhancement, in that they may hold more negative biases toward others than they do about themselves, even concerning traits that are common targets of weight stigmatization.

It is possible that self-enhancement decreases the internalization of weight bias at the individual level, such that individuals with overweight and obesity in the current sample were less likely to agree that *they* as individuals would experience weight stigma in the future. In contrast, if these individuals simultaneously direct strong anti-fat bias toward *others* with overweight and obesity and expressed weaker anti-fat bias toward *themselves*, this would explain why individuals from the current study were more likely to endorse the belief that others would experience weight stigma in the future, but that they would not. This would explain the low factor loading for Item 10 to the Anticipatory Weight Stigma Stress subscale (AWS), as participants were more likely to endorse this single item than they were the remaining three from the Anticipatory Weight Stigma Stress subscale (AWS) such that Item10 shares little variance with the other three items on the Anticipatory Weight Stigma Stress subscale (AWS). As a result, Item 10 did not represent the factor measuring anticipatory weight stigma stress as well as the other items. This low loading item also helps to explain why the internal consistency of the Anticipatory Weight Stigma Stress subscale (AWS) was lower among both BMI groups compared to the internal consistency of the other three subscales.

While the results from the current study indicate that the 17-item, 4-fatcor model does fit the data, model fit may possibly be improved with the removal of the single low-loading item (Item 10) from the

STRAWS. This was not investigated using the current sample, as modified models should be confirmed with new data to avoid artificially forcing a model to fit the current data (Banadlos and Finney, 2018). As such, future research with independent, varied samples should evaluate if model fit is improved with the removal of Item 10 from the STRAWS.

Results from our measurement invariance analyses showed that factor loadings for the 17 items of the STRAWS did not differ significantly between the group with BMI $\geq$ 25 and the group with BMI < 25, suggesting that the 17-item STRAWS captures the constructs of interest (e.g., perseverative cognition, secondary appraisal, and anticipatory stress) similarly across BMI groups. Further, aside from Item 10 discussed previously, loadings for all remaining items were high across both BMI groups (>0.50). However, our analyses also indicated that the intercepts for each item did differ significantly between the two BMI groups in the current sample. The signs of the intercepts are never consistent between BMI groups for any of the 17 items on the STRAWS. While there may not be any single item driving the scalar non-invariance, this suggests that the group with BMI < 25 tended to systematically respond with lower values for each item on the STRAWS compared to the group with BMI $\geq$ 25. While the constructs captured by the STRAWS may have the same structure across BMI groups, as evidenced by metric invariance, the constructs may have different meanings for individuals who have experienced weight stigma for underweight as opposed to those who have experienced weight stigma for overweight and obesity. Further studies with independent populations are needed to determine if the constructs measured by the STRAWS can be meaningfully tested among individuals with BMI < 25. As the majority of weight stigma research focuses on anti-fat bias, additional research is also necessary to better understand how weight stigma is experienced, conceptualized, and coped with among populations with underweight, and to identify differences in the experience of weight stigma by BMI.

As expected, for both BMI groups, higher scores on three of the four STRAWS subscales (the Perseverative Cognition subscale (PCS), the Anticipatory Weight Stigma Stress subscale (AWS), and the Anticipatory Bodily Alarm Response subscale (ABARS)) were significantly correlated with total scores on the Everyday Discrimination Scale (EDS; Williams et al., 1997) and with the Fear of Enacted Stigma

subscale (FESS) of the Weight-Self-Stigma Questionnaire (WSSQ; Lillis et al., 2009). These findings support construct validity of the STRAWS and suggest that these three subscale of the STRAWS are measuring relate constructs to the Everyday Discrimination Scale (EDS; Williams et al., 1997) and the Fear of Enacted Stigma subscale (FESS) of the Weight-Self-Stigma Questionnaire (WSSQ; Lillis et al., 2009). Additionally, as higher scores on the STRAWS subscales measuring perseverative cognition and anticipatory weight stigma stress were positively correlated with scores on the Everyday Discrimination Scale (EDS; Williams et al., 1997) for both BMI groups, this demonstrates that, regardless of BMI, perseverative cognition about weight stigmatization and anticipatory stress about future weight stigmatization increase as the frequency of discriminatory experiences increases. The Secondary Appraisal subscale (SAS) of the STRAWS was inversely correlated with total scores on the Everyday Discrimination Scale (EDS; Williams et al., 1997), and this relationship was only statistically significant for the group with BMI $\geq$ 25. When considered together, these findings suggest that chronic exposure to weight stigmatization through rumination and perseverative cognition and prolonged vigilance about future experiences of weight stigma are closely tied to prolonged activation of weight stigma stress in the current sample. Additional studies with independent samples are needed to determine if this relationship between the STRAWS and the Everyday Discrimination Scale (EDS; Williams et al., 1997) and other measures of discrimination can be replicated.

We also hypothesized that scores on the Anticipatory Weight Stigma Stress subscale (AWS) of the STRAWS would be inversely correlated with scores on the Self-Kindness (SK) and the Self-Judgement (SJ) subscales of the Self-Compassion Scale (SCS-26; Neff, 2003) for both BMI groups. The results of our analyses found that scores on the Anticipatory Weight Stigma Stress subscale (AWS) of the STRAWS only correlated with Self-Kindness scores in the anticipated direction for the group with BMI $\geq$ 25 and that Anticipatory Weight Stigma Stress subscale (AWS) and Self-Kindness scores were positively correlated for the group with BMI < 25, though associations for both BMI groups were not statistically significant. For the group with overweight and obesity, this finding suggests that individuals who experienced greater anticipatory weight stigma stress treat themselves with less kindness when they

experience negative events. Further, the relationship between scores on the Anticipatory Weight Stigma Stress subscale (AWS) of the STRAWS and the Self-Judgement subscale of the Self-Compassion Scale (SCS-26; Neff, 2003) occurred in the anticipated direction for both BMI groups. For both BMI groups, there was an inverse association between Anticipatory Weight Stigma Stress subscale (AWS) scores and Self-Judgement scores. Because the Self-Judgement subscale is reverse scored (Neff, 2015), this indicates that individuals who experienced greater anticipatory weight stigma stress tend to be more self-critical during negative events.

While there is very limited work examining the relationship between anticipatory stress and self-compassion specifically, studies on self-compassion and fear of evaluation in social anxiety have suggested that greater fear and anticipation of social evaluation is associated with higher levels of self-criticism, indicated lower levels of self-kindness (Harwood & Kocovski, 2017). Further, studies on self-esteem, a related construct to self-kindness, have demonstrated that after experiencing a psychologically stressful event, a decrease in self-esteem can initiate a heightened anticipation of similar events in the future, a relationship that may be drive by self-reflective negative thoughts and decreased self-kindness (Pulopulos et al., 2022). In the current study, this relationship is supported by our findings for the group with BMI $\geq$ 25, but not entirely for the group with BMI < 25. It is possible that respondents with BMI < 25 had difficulty answering the items on the AWS subscale accurately, as the language used in some of those items is oriented toward individuals with overweight and obesity (e.g., "*If I go to a place where most other people have smaller bodies, there is a good chance I will experience weight stigma*"). Additional studies are needed with independent samples of individuals with overweight and obesity, and samples with underweight to determine if the relationship between anticipatory weight stigma stress and self-kindness is valid across BMI classifications. However, these initial findings have implications for the use of self-compassion as a target for reducing anticipatory stress in individuals who have experienced weight stigma.

Our results also demonstrated that the Perseverative Cognition subscale (PCS), the Anticipatory Weight Stigma Stress subscale (AWS), and the Anticipatory Bodily Alarm Response subscale (ABARS)

of the STRAWS were all positively and statistically significantly correlated with Global scores from the EDE-Q Brief for both BMI groups, and the Secondary Appraisal subscale (SAS) of the STRAWS was inversely correlated with the Global scores from the EDE-Q Brief for both BMI groups. These findings demonstrate that higher levels of perseverative cognition and anticipatory weight stigma stress are associated with more disordered eating behaviors and cognitions in the current sample. Similarly, because the Secondary Appraisal subscale (SAS) is reverse scored, this finding demonstrates that individuals in our sample with more negative secondary appraisal (e.g., more negative judgment of available coping resources in the event of future stigmatization) experience greater disordered eating in response to stress. These findings are in line with previous research that has supported the link between weight stigma and disordered eating in adults across the BMI spectrum (Muscat & Long, 2008; Vartanian, 2015; Vartanian & Novak, 2010). A recent cross-sectional study demonstrated that anticipatory weight stigma stress might help to explain the weight-stigma-disordered eating association (Hunger et al., 2020). Another study found that weight bias internalization and psychological distress can also help to explain this association between weight stigma and eating behavior (O'Brien et al., 2016). Though further research is needed to examine the relationships between perseverative cognition, anticipatory weight stigma stress, secondary appraisal, weight bias internalization, and disordered eating, the current study offers evidence of the importance of these constructs in explaining the previously established connection between weight stigma and maladaptive eating behaviors.

As it has been suggested that weight stigma be studied using an intersectionality framework (Himmelstein et al., 2017), we also examined the most common reasons for discrimination that participants selected on the Everyday Discrimination Scale (EDS; Williams et al., 1997). As the STRAWS was developed to assess experiences of weight stigma specifically, it is not surprising that a large proportion of respondents from both BMI groups selected "Weight" as a reason why they had experienced discrimination in the past. However, "Weight" was the only reason for discrimination where the proportion of each BMI group that selected it was significantly different, with a larger proportion of the group with BMI $\geq$ 25 selecting "Weight" as a reason for discrimination compared to the group with

BMI < 25. While our findings suggest that individuals with normal weight and underweight certainly experience weight stigma, experiences of weight-based discrimination may be more common and explicit against individuals with overweight and obesity.

For both BMI groups, more than half of the samples selected multiple reasons why they had experienced discrimination. However, for both BMI groups, the most common reason for past discrimination that participants selected in addition to "Weight" was "Gender." Interestingly, for both BMI groups, the majority of individuals who selected both "Weight" and "Gender" as reasons for past discrimination were female-identifying. While the proportion of the total sample that identified as female was larger than the proportion of the total sample that identified as male, this gender difference is still important to note, given its implications for public health professionals and healthcare providers caring for individuals who have experienced weight stigma.

The evidence supporting gender differences in the prevalence of weight stigmatization is mixed (Spahlholz et al., 2015). However, nearly 40% of men have reported experiencing weight stigma (Himmelstein et al., 2019), suggesting that weight stigma is potentially understudied in men. While men and women with overweight and obesity may experience weight stigma at comparable rates, men and women have been shown to differ in their coping with experiences of weight stigma. Specifically, weight-based criticism is typically harsher against women than it is for men (Fikkan & Rothblum, 2011; Roehling, 2011). Women are also more likely to internalize weight stigma than men (Hayward et al., 2018; Himmelstein et al., 2017). In this way, though men and women may experience weight stigma at similar frequencies, the impact of stigmatization on psychological functioning appears to be, on average, more severe for women. While findings from the current study do not necessarily indicate that men are less affected by weight stigma than women, they may demonstrate an important interaction between social ideals for weight and body size and gender-based expectations. Another possibility is that, because body ideals for men and women differ in the United States (Murnen & Don, 2012), weight bias targets men and women differently. As a result, while men may experience weight stigma at moderate rates, they may be less apt to recognize it as stigma than women are. Not only is additional research warranted to

assess between-gender and within-gender differences in the effects of weight stigmatization on health, but further studies on perceived weight stigma between genders could be helpful for understanding how sociocultural gendered body ideals influence one's ability to recognize when they have experienced stigma. Also, additional research may want to extend the study of weight stigma using an intersectionality lens to determine how the compounding effects of other stigmatized identities and conditions (e.g., race, age) with weight exacerbate health disparities in other contexts. Nevertheless, it is important that healthcare providers realize the differential rates of weight stigma internalization between men and women such that they can better anticipate the psychological and physiological health risks affecting their patients.

Finally, we utilized participants qualitative responses on the STRAWS where they described an experience of weight stigma to explore differences in prolonged activation and anticipatory stress between responses that described a direct, personal experience of weight stigma versus responses that described a network event (e.g., a stressful situation experienced by someone intimately tied to the respondent via their social network; Kessler & McLeod, 1984). We found that the majority of participants described self- events as opposed to network events. This is not surprising, given that our recruitment language targeted individuals with overweight and obesity who had experienced weight stigma themselves. Analysis of total STRAWS scores between individuals who described self- versus network event types revealed significant differences in total STRAWS scores and on three of the four subscales (the Perseverative Cognition subscale (PCS), the Anticipatory Weight Stigma Stress subscale (AWS), and the Anticipatory Bodily Alarm Response subscale (ABARS)) between experience type groups. For these measures, individuals who described self-events experienced significantly higher levels of prolonged activation and anticipatory weight stigma stress compared to individuals who described network events.

While this exploratory finding suggests that network events were less harmful than self-events for participants in the current sample, it does not suggest that network events are irrelevant in the context of weight stigma all together. The Prolonged Activation and Anticipatory Race-Related Stress Scale (PARS; Utsey et al., 2012) upon which the Stress and Weight Stigma Scale (STRAWS) is based included network

events because of previous research suggesting that vicarious racism, or indirect exposure to discrimination experienced by close others, can be distressing and harmful to the health of people of color (Harrell, 2000). The PARS (Utsey et al., 2012) was developed to measure race-related stress among African American adults, and the instrument was validated in a sample of this population. While the STRAWS included network events to explore the extent to which weight stigma stress can be transferred to close others, it is important to note that, unlike the PARS, the current study measured weight stigma stress in a population that did not solely include individual with overweight and obesity. For the PARS, Utsey and colleagues (2012) surveyed a sample of African American adults; of these participants described a network event, they would have described the experience of a close other who is also a racial minority who had experienced racism. Therefore, for the PARS, there was racial concordance between participants and the close others they described in network events. However, in the current study, while all of the participants who described network events on the STRAWS described a close other with overweight or obesity (e.g., no participants described a network event of a close other who experienced wight stigma for underweight), it is important to consider the possible body size discordance between participants and the subjects of their described network events. In fact, among the participants in the current study who described network events, nearly a third of them do not have overweight or obesity themselves. Despite weight being a modifiable characteristic (unlike race), it is possible that if someone with underweight or normal weight witnesses a close other with overweight or obesity experience weight stigma, they may experience a less intense stress reaction themselves.

Because the cultural ideal of beauty is synonymous with thinness in the United States (Marini, 2017; Wiseman et al., 1992), individuals who do not have overweight or obesity may hold the assumption that they would not be at risk for experiencing weight stigma, and therefore would feel less personally threatened by a network event experienced by a close other with a larger body size. This is different from the PARS, where the stress of racism among racial minorities is more transferable from close others as all of the surveyed participants were also part of the stigmatized group. Larger studies are needed where

individuals with overweight and obesity describe network events among close others with body size concordance to more clearly understand the impact of network events in the context of weight stigma.

The findings of the current study must be considered in light of certain limitations. The Stress and Weight Stigma Scale (STRAWS) was initially adapted from the Prolonged Activation and Anticipatory Race-Related Stress Scale (PARS; Utsey et al., 2012) for use in populations with overweight and obesity, such that some of the language used in the STRAWS items is specific to individuals with larger bodies. Because our use of MTurk for data collection allowed us to collect data on individuals across the BMI spectrum, we had a larger proportion of respondents with BMI < 25 than originally anticipated. However, research has shown that individuals from across the BMI spectrum report experiencing weight stigma (Andreyeva et al., 2008). Despite the focus of weight stigma research on individuals with overweight and obesity, recent evidence suggests that individuals with underweight experience more frequent weight-specific criticism than peers with average or normal weight (Tantleff-Dunn et al., 2009). To address this gap in the literature, we did not exclude individuals with BMI < 25 from the current study. As this group was smaller in size than the group with BMI ≥ 25, we included both individuals with BMIs that classified them as underweight and individuals with BMIs that classified them as normal weight. Further studies need to be carried out to validate the STRAWS in these BMI subgroups. Especially because the available evidence suggests that weight stigma experiences may be more frequent and stressful in individuals with underweight then those with average weight (Tantleff-Dunn et al., 2009), the findings from the current study for the group with BMI < 25 that combined those with underweight and normal weight may be skewed. Most importantly, the current study supports the evidence that BMI is not a unidirectional risk factor for weight stigmatization; rather, it appears individuals with body sizes that differ from the norm in either direction are likely to experience weight stigma. Future research must not neglect the experiences of weight stigma among persons with smaller bodies.

Another factor of the current findings to consider is that the STRAWS did not specify any time bounds within which the particular event or experience respondents referred to had to have occurred. In contrast with racial identity, weight is a more modifiable status. When African American participants

respond to items on the PARS (Utsey et al., 2012), it is certain, regardless of when the specific event they have in mind occurred, that they remain the same racial identity at the time of completion as they were when the described event occurred. For the STRAWS, it is certainly possible that individuals who had BMI < 25 at the time they completed the survey described an event on the STRAWS that occurred during childhood or adolescence, or at another time in adulthood when they did indeed have overweight and obesity. For individuals in the current sample with BMI ≥ 25, it is a possibility that they will no longer have overweight or obesity in the future. If someone in the current study who does not currently have overweight or obesity described a situation from adolescence when they had a larger body size, the amount of time passed and the difference in body size between the described experience and present could influence scores on the Anticipatory Weight Stigma Stress subscale (AWS) of the STRAWS, especially if individuals no longer expect that they would experience weight stigma due to a change in body weight since the described experience. Future studies using the STRAWS may wish to include items that ask participants to indicate their age and body size at the time that the described experience occurred.

It is also difficult to truly assess intersectionality of multiple stigmatized identities using a measure like the STRAWS that requires individuals to describe a single experience. While a respondent in the current study may have described an experience of weight stigma and their responses to items on the STRAWs are relevant to that experience, it is impossible to know if their scores for perseverative cognition and anticipated stress carry over to experiences of stigma that are attached to a different identity, or even if those scores are maintained for other experiences of weight stigma aside from the one they described. In other words, it's difficult to know if the STRAWS (and the PARS, for that matter) are tracking these constructs among people experiencing stigma for a particular identity (e.g., "state" responses - specific to weight stigma and not other identities), or if the constructs are related to the individual themselves (e.g., "trait" responses – similar responses across multiple stigmatized identities). To more accurately study perseverative cognition and anticipatory stress using an intersectionality framework, an interesting direction for future research may recruit participants who are, for example, African American *and* who have overweight or obesity, have them complete the STRAWS and the PARS

separately, and compare scores for the instruments for each person to determine if they capture prolonged activation and anticipatory stress in the same ways across different types and experiences of stigma.

A strength of the Stress and Weight Stigma Scale (STRAWS) is its inclusion of a qualitative item, such that participants' quantitative responses reference their specific, unique experience and they are not limited to a list of pre-determined choices. Participants' open-ended responses were analyzed to determine if they described a "self" or a "network" event. However, several respondents were not included in our examination of network events because they were too general (e.g., did not describe a time when they faced a specific experience of weight stigma). Some participants also described multiple experiences within their responses. It is possible that some participants in the current study did not have a clear understanding of what weight stigma is, which limited the quality of the qualitative data in the current study. For qualitative responses to be more useable for meaningful qualitative analyses in future studies, the instructions included at the start of the STRAWS could include a definition of what weight stigma is, in addition to some examples of what it is *not*. Future researchers pursuing qualitative analyses using the STRAWS may also wish to strongly emphasize the need for a description of a specific, personally relevant event (e.g., some of the respondents that were removed from our analyses described instances of weight stigma "in society", such as in media, but that did not target them or a close other directly).

Finally, it is important to note the limitations of using BMI as a marker of weight. BMI is relatively simple to calculate, and the current study was limited by its use of MTurk for data collection and inability to collect measurements of body size that were not self-report. Self-report data is notoriously biased; especially in studies that use BMI as a variable, participants tend to underestimate their true weights (Taylor et al., 2006). As such, it is possible that some individuals in the current sample that were included in the group with BMI < 25 based on their self-reported weights should have instead been included in the group with BMI ≥ 25. Further, BMI is not a reliable measurement of body size, as it does not adequately account for body composition and regional distribution of adiposity (Nuttall, 2015). Rather, waist circumference has been suggested as a more valid indicator of health risks associated with

obesity (Janssen et al., 2004). Future research may benefit from the use of more valid measures for body size, when possible.

Future studies should also assess the validity of the Stress and Weight Stigmas Scale (STRAWS) in more demographically diverse samples, and in larger samples across the weight spectrum. Further, because a large proportion of the current sample described experiences of weight stigma that occurred in childhood and adolescence, researchers may wish to validate the STRAWS in this age group so that interventions can target weight stigma stress before it persists into adulthood.

Conclusion

Overall, confirmatory factor analysis of the STRAWS, a measure for prolonged activation and anticipatory weight stigma stress in individuals across the BMI spectrum demonstrated acceptable fit of the four-factor model produced by the Prolonged Activation and Anticipatory Race-Related Stress Scale (Utsey et al., 2012), from which the STRAWS was adapted. Based on measurement invariance analysis, significant difference in intercepts between the group with BMI < 25 and the group with BMI ≥ 25 indicate that there may be systematic differences in subscale interpretation in the STRAWS between BMI groups, though the absence of statistically significant differences in factor loadings between BMI groups for each of the 17 items on the STRAWS suggests that the conceptualization of each item in relation to the other items is stable across the BMI spectrum. While the current study provides initial psychometric data for the STRAWS, additional studies are needed to examine other indices of validity in larger, more diverse sample.

Table 1

The 17-item PARS and corresponding items from the adapted 17-item STRAWS

PARS Item	**Prolonged Activation and Anticipatory Race-Related Stress Scale** (PARS) (Utsey et al., 2012)	**STRAWS Item**	**Stress and Weight Stigma Scale** (STRAWS)
Item 1	On a scale from 1 to 7 (1 = *not at all stressful* and 7 = *extremely stressful*), I would describe my experience with racism as:	**Item 1**	On a scale from 1 to 7 (1 = *not at all stressful* and 7 = *extremely stressful*), the situation when I experienced weight stigma that I am thinking of was:
Item 2	In the days/weeks after my experience with racism, I thought about it:	**Item 2**	In the days/weeks after my experience with weight stigma, I thought about it or had memories of it:
Item 3	Whenever I thought about my experience with racism, I would think about it for:	**Item 3**	Whenever I think about my experience with weight stigma, I think about it for:
Item 4	In the days/weeks after my experience with racism, I continued to think about it for:	**Item 4**	In the days/weeks after my experience with weight stigma, I continued to think about it for:
Item 5	I would think about my experience with racism even when I didn't mean to.	**Item 5**	I think about this experience with weight stigma even when I don't mean to.
Item 6	Black people have always had to deal with these kinds of events/ situations, so my experience with racism was something I could manage.	**Item 6**	People with overweight and obesity have always had to deal with these kinds of events/situations, so my experience with weight stigma was something I could handle.
Item 7	At the time the event/situation occurred, I felt prepared to deal with it.	**Item 7**	At the time the event/situation occurred, I felt prepared to deal with it.
Item 8	At the time the event/situation occurred, I was able to think of ways to deal with it.	**Item 8**	At the time the event/situation occurred, I was able to think of ways to deal with it.
Item 9	I felt I had what I needed to deal with the event/situation.	**Item 9**	I felt I had what I needed to deal with the event/situation.
Item 10	When I am around White people, I expect them to say or do something racist.	**Item 10**	I believe that most people with overweight or obesity will experience some sort of weight stigma similar to the situation I am thinking of in the future.
Item 11	I believe that most Black people will experience some form of racism in the future.	**Item 11**	When I am around people who have different body sizes than I do, I expect them to say something hurtful about my weight or do something to harm or humiliate me because of my weight.
Item 12	I know that if I go where there are mostly White people, there is a good chance I will experience racism.	**Item 12**	If I go to a place where most people have smaller bodies, there is a good chance I will experience weight stigma.
Item 13	I believe there is a good chance that I will experience racism in the future.	**Item 13**	I believe there is a good chance that I will experience weight stigma in the future.
Item 14	I can feel my hands start to shake whenever I think I am about to experience racism.	**Item 14**	I can feel my hands start to shake whenever I think someone is about to make fun of my weight.
Item 15	I get chest pains whenever I think I am about to experience racism.	**Item 15**	I get chest pains whenever I think someone is about to make fun of my weight.

Table 1 (continued): The 17-item PARS and corresponding items from the adapted 17-item STRAWS

Item 16	My hands (or other body parts) sweat whenever I think I am about to experience racism.	**Item 16**	My hands (or other body parts) sweat whenever I think someone is about to make fun of my weight.
Item 17	I get a lump (or dryness) in my throat whenever I think I am about to experience racism.	**Item 17**	I get a lump (or dryness) in my throat whenever I think someone is about to make fun of my weight.

Note: Item 10 from the PARS corresponds to Item 11 from the STRAWS, and item 11 from the PARS corresponds to Item 10 from the STRAWS. Both instruments share the same response scales. The response scale for Item 2 is as follows: not at all, once weekly, 2 to 3 times a week, 3 or more times a week, once a day, 2 to 3 times a day, and more than 3 times a day. The response scale for Item 3 is as follows: did not think about it, less than 1 minute, 1 to 5 minutes, 5 to 20 minutes, 20 minutes or more, but less than 1 hour, and could not stop thinking about it. The response scale for Item 4 is as follows: did not think about it at all, less than 7 days, 7 to 30 days, 1 to 2 months, 2 to 5 months, 6 to 9 months, and I still think about it. Item 5 is scaled as follows: never, rarely, sometimes, often, very often, and all the time. Items 6 to 17 are on a 7-point Likert-type scale ranging from strongly disagree to strongly agree.

Table 2

Participant Characteristics by BMI Category

	Combined Sample (n = 301)	**BMI < 25 (n = 93)**	**BMI ≥ 25(n = 208)**
Participant Characteristic	*Mean (SD) or n (%)*	*Mean (SD) or n (%)*	*Mean (SD) or n (%)*
Age	37.45 (10.7)	34.71 (9.3)	38.67 (11.1)
Height (m)	1.69 (0.1)	1.67 (0.1)	1.69 (0.1)
Weight (kg)	84.81 (26.3)	61.36 (10.3)	95.29 (24.5)
BMI	29.69 (8.2)	21.78 (2.1)	33.22 (7.5)
Sex[a]			
Male	95 (31.6)	24 (25.8)	71 (34.1)
Female	205 (68.1)	69 (74.2)	136 (65.4)
Gender[b]			
Man	94 (31.2)	24 (25.8)	70 (33.7)
Woman	196 (65.1)	68 (73.1)	128 (61.5)
Transgender Man	5 (1.7)	-	5 (2.4)
Transgender Woman	1 (0.3)	-	1 (0.5)
Non-binary, gender fluid, or gender queer	4 (1.3)	1 (1.1)	3 (1.4)
Sexual Orientation[c]			
Asexual	7 (2.3)	1 (1.1)	6 (2.9)
Bisexual	29 (9.6)	7 (7.5)	22 (10.6)
Homosexual (Gay or Lesbian)	10 (3.3)	2 (2.2)	8 (3.9)
Heterosexual (Straight)	246 (81.7)	81 (87.1)	165 (79.3)
Pansexual	5 (1.7)	2 (2.2)	3 (1.4)
Other[d]	2 (0.7)	-	2 (1.0)
Race[e]			
White or Caucasian	227 (75.4)	71 (76.3)	156 (75.0)
Asian or Asian American	19 (6.3)	10 (10.8)	9 (4.3)
Black or African American	29 (9.6)	7 (7.5)	22 (10.6)
Native Hawaiian or Pacific Islander	1 (0.3)	-	1 (0.5)
American Indian, Native American or Alaskan Native	4 (1.3)	-	4 (1.9)
Multiracial	14 (4.7)	3 (3.2)	11 (5.3)

Table 2 (continued): Participant Characteristics by BMI Category

Ethnicity			
Hispanic or Latinx	29 (9.6)	9 (9.7)	20 (9.6)
Not Hispanic or Latinx	272 (90.4)	84 (90.3)	188 (90.4)
Educational Status[e]			
High School or Less	38 (12.6)	8 (8.6)	30 (14.4)
Some College	74 (24.6)	21 (22.6)	53 (25.5)
College Degree or More	189 (62.8)	64 (68.8)	125 (60.1)
Marital Status			
Single	83 (27.6)	32 (34.4)	51 (24.5)
In a relationship[f]	198 (65.8)	58 (62.4)	140 (67.3)
Divorced	17 (5.7)	3 (3.2)	14 (6.7)
Widowed	3 (1.0)	-	3 (1.4)

Note: Continuous variables are reported as Mean (SD) and categorical variables are reported as n (%). For categorical variables, percentages reported may not sum to 100% due to rounding. sample Dashed lines indicate that there were 0 respondents who selected a particular response.

[a] 1 respondent declined to report sex

[b] 1 respondent declined to report gender

[c] 2 respondents declined to report sexual orientation

[d] 2 respondents who reported "Other" for sexual orientation specified their sexual orientations as queer

[e] 7 respondents declined to report race

[f] Includes those who are engaged to be married and those who are already married

Table 3

Means, standard deviations, skew, and kurtosis for the 4-factor, 17-item STRAWS (n = 301)

Items and Mean Scores	**Mean**	**SD**	**Skew**	**Kurtosis**
Item 1: *On a scale from 1 to 7, I would describe my experience with weight stigma as:*	5.19	1.52	-0.79	-0.09
Item 2: *In the days/weeks after the situation, I thought about it or had memories of it:*	4.02	1.92	-0.03	-1.29
Item 3: *Whenever I think about this situation, I think about it for:*	3.09	1.19	0.52	-0.05
Item 4: *In the days/weeks after this situation occurred, I continued to think about it for:*	4.35	2.18	-0.01	-1.54
Item 5: *I think about this situation when I don't mean to:*	2.92	1.21	0.42	-0.27
Item 6: *People with overweight and obesity have always had to deal with these kinds of experiences, so this situation was something I could handle:*	4.22	1.81	-0.09	-0.97
Item 7: *At the time the situation occurred, I felt prepared to deal with it:*	3.33	1.83	0.40	-0.97
Item 8: *At the time the situation occurred, I was able to think of ways to deal with it:*	3.65	1.83	0.16	-1.14
Item 9: *I felt I had what I needed to deal with the situation:*	3.58	1.92	0.24	-1.16
Item 10: *I believe that most people with overweight or obesity will experience some sort of weight stigma in the future similar to the situation I am thinking of:*	5.52	1.62	-1.07	0.37
Item 11: *When I am around people who have different body sizes than I do, I expect them to say something hurtful about my weight or do something to harm or humiliate me because of my weight.*	3.05	1.71	0.54	-0.68
Item 12: *If I go to a place where most other people have smaller bodies, there is a good chance I will experience weight stigma.*	4.01	1.82	-0.17	-1.04
Item 13: *I believe there is a good chance that I will experience weight stigma in the future.*	4.68	1.77	-0.46	-0.67
Item 14: *I can feel my hands start to shake whenever I think someone is about to make fun of my weight.*	2.69	1.86	0.87	-0.47
Item 15: *I get chest pains whenever I think someone is about to make fun of my weight.*	2.38	1.71	1.12	0.11
Item 16: *My hands (or other body parts) sweat whenever I think someone is about to make fun of my weight.*	2.67	1.81	0.80	-0.64
Item 17: *I feel a lump (or dryness) in my throat whenever I think someone is about to make fun of my weight.*	2.69	1.77	0.78	-0.56

Table 4

Confirmatory factor analysis model fit summary

Model	df	χ^2	χ^2 *p*-value	RMSEA	CFI	TLI	SRMR	Bollen-Stine Bootstrap (*p*-value)
One-factor (n = 301)	119	1442.56	< 0.001	0.192	0.513	0.443	0.171	< 0.001
4-factor (orthogonal) (n = 301)	119	484.03	< 0.001	0.101	0.865	0.845	0.232	< 0.001
4-factor (oblique)[a] (n = 301)	113	265.11	< 0.001	0.067	0.944	0.933	0.068	< 0.001
4-factor (oblique)[a] BMI < 25 (n = 93)	113	177.48	< 0.001	0.078	0.940	0.927	0.078	< 0.001
4-factor (oblique)[a] BMI ≥ 25 (n = 208)	113	204.75	< 0.001	0.062	0.948	0.938	0.074	< 0.001

[a] Utsey et al., 2012

Table 5

Fit indices for measurement invariance analyses (n = 301)

Multi-group Analyses	**df**	**χ^2**	**χ^2 *p*-value**	**RMSEA**	**CFI**	**TLI**	**SRMR**
Model 1 *(configural invariance)*	226	383.98	< 0.001	0.068	0.945	0.934	0.071
Model 2 *(weak/metric invariance)*	239	401.15	< 0.001	0.067	0.944	0.936	0.078
Model 3 *(strong/scalar invariance)*	252	438.58	< 0.001	0.070	0.936	0.931	0.083
Model 4 *(strict/residual invariance)*	269	462.21	< 0.001	0.069	0.931	0.930	0.084
Model Comparison	**Δdf**	**$\Delta \chi^2$**	***p*-value**	**Interpretation**			
Model 1 vs. Model 2	13	16.69	0.214	Factor loadings differ by BMI group (*least restrictive*)			
Model 1 vs. Model 3	13	38.43	< 0.001***	Factor loadings and thresholds differ by BMI group			
Model 1 vs. Model 4	17	25.79	0.078	Factor loadings, thresholds, and variances differ by BMI group (*most restrictive*)			

*** $p < 0.001$

Table 6

Internal consistency, standardized factor loadings, and standardized intercepts for the 4-factor, 17-item STRAWS

Factor	**Internal Consistency** (α)		**STRAWS Item**	**Factor loading**		**Intercept**	
	BMI < 25	BMI ≥ 25		BMI < 25	BMI ≥ 25	BMI < 25	BMI ≥ 25
Perseverative Cognition (PCS)	0.88	0.87	Item 1	0.722	0.731	-0.124	0.057
			Item 2	0.804	0.788	0.016	-0.007
			Item 3	0.777	0.778	-0.015	0.007
			Item 4	0.745	0.709	-0.059	0.026
			Item 5	0.808	0.787	0.004	-0.002
Secondary Appraisal (SAS)	0.87	0.88	Item 6	0.532	0.558	0.002	-0.001
			Item 7	0.877	0.869	0.138	-0.064
			Item 8	0.958	0.898	0.054	-0.024
			Item 9	0.886	0.860	0.079	-0.036
Anticipatory Weight Stigma Stress (AWS)	0.67	0.71	Item 10	0.196	0.243	-0.321	0.161
			Item 11	0.674	0.724	-0.068	0.030
			Item 12	0.756	0.860	-0.371	0.171
			Item 13	0.608	0.713	-0.325	0.154
Anticipatory Bodily Alarm Response (ABARS)	0.95	0.91	Item 14	0.933	0.852	-0.061	0.026
			Item 15	0.905	0.828	0.052	-0.022
			Item 16	0.909	0.904	-0.023	0.011
			Item 17	0.892	0.820	-0.132	0.058

Table 7

Subscale intercorrelations for the 4-factor, 17-item STRAWS (combined sample, n = 301)

	PCS	SAS	AWS	ABARS
PCS	1.00			
SAS	-0.36	1.00		
AWS	0.57	-0.10	1.00	
ABARS	0.58	-0.09	0.59	1.00

Note: PCS = Perseverative Cognition subscale; SAS = Secondary Appraisal subscale; AWS = Anticipatory Weight Stigma Stress subscale; ABARS = Anticipatory Bodily Alarm Response subscale.

Table 8

Subscale mean scores by BMI for the 4-factor, 17-item STRAWS

	BMI < 25 (n = 93)		**BMI ≥ 25** (n = 208)				
Subscale	Mean	SD	Mean	SD	df	F	*p*-value
STRAWS (total score)	61.46	16.99	65.84	16.89	1	4.296	0.039*
PCS	19.28	6.72	19.72	6.50	1	0.284	0.594
SAS	15.30	6.34	14.56	6.28	1	0.895	0.345
AWS	15.35	4.97	18.12	4.96	1	19.97	< 0.001***
ABARS	10.13	6.67	10.56	6.36	1	0.283	0.595

$p < 0.05$*; $p < 0.01$**; $p < 0.001$***

Note: PCS = Perseverative Cognition subscale; SAS = Secondary Appraisal subscale; AWS = Anticipatory Weight Stigma Stress subscale; ABARS = Anticipatory Bodily Alarm Response subscale.

Table 9

Means, standard deviations, and correlation coefficients for study instruments (BMI ≥ 25, n = 208)

Scale	Mean	SD	STRAWS (AWS)	STRAWS (ABARS)	STRAWS (SAS)	EDS	WSSQ (FESS)	WSSQ (SDS)	SCS (SK)	SCS (SJ)	PSS	EDEQ (Global)
STRAWS (PCS)	19.72	6.50	0.44***	0.48***	-0.36***	0.35***	0.44***	0.08	-0.18*	-0.40***	0.34***	0.37***
STRAWS (AWS)	18.12	4.96		0.41***	-0.08	0.45***	0.55***	0.15*	-0.14*	-0.35***	0.27***	0.24***
STRAWS (ABARS)	10.56	6.36			-0.13	0.42***	0.36***	0.20**	-0.10	-0.25***	0.26***	0.16*
STRAWS (SAS)	14.56	6.28				-0.16*	-0.25**	-0.09	0.26***	0.37***	-0.28***	-0.29***
EDS	23.72	10.43					0.39***	0.21**	-0.27***	-0.32***	0.36***	0.22**
WSSQ (FESS)	20.10	5.73						0.47***	-0.30***	-0.49***	0.47***	0.39***
WSSQ (SDS)	18.25	5.50							-0.25***	-0.36***	0.34***	0.20**
SCS (SK)	2.83	0.97								0.63***	-0.54***	-0.29***
SCS (SJ)	2.48	0.98									-0.64***	-0.52***
PSS	20.53	8.18										0.34***
EDEQ (Global)	3.48	1.39										

$p < 0.05$*; $p < 0.01$**; $p < 0.001$***

Note: See Appendix A for scale abbreviations. All correlations depicted are Spearman's rank correlation coefficients; 0.00-0.19 = "Very weak", 0.20-0.39 = "Weak", 0.40-0.59 = "Moderate", 0.60=0.79 = "Strong", 0.80-1.0 = "Very strong".

Table 10

Intersectionality in the Everyday Discrimination Scale by BMI

Reason for Discrimination	**Combined sample** (n = 279) **n (%)**	**BMI < 25** (n = 83) **n (%)**	**BMI ≥ 25** (n = 196) **n (%)**	χ^2 *p*-value
Ancestry or National Origins	30 (10.8)	14 (16.9)	16 (8.2)	0.053
Gender	120 (43.0)	43 (51.8)	77 (39.3)	0.072
Race	72 (25.8)	25 (30.1)	47 (24.0)	0.357
Age	87 (31.2)	33 (39.8)	54 (27.6)	0.061
Religion	14 (5.0)	6 (7.2)	8 (4.0)	0.423
Height	40 (14.3)	17 (20.5)	23 (11.7)	0.086
Weight	170 (60.9)	37 (44.6)	133 (67.9)	< 0.001***
Some other aspect of physical appearance	53 (19.0)	18 (21.7)	35 (17.9)	0.563
Sexual orientation	23 (8.2)	6 (7.2)	17 (8.7)	0.871
Education or income level	35 (12.5)	13 (15.7)	22 (11.2)	0.409
Physical disability	19 (6.8)	6 (7.2)	13 (6.6)	1.00
More than one reason selected	167 (59.9)	53 (63.9)	114 (58.2)	0.451

Note: Percentages reported may sum to greater than 100% as a result of participants who selected multiple responses and rounding.

Table 11

Most commonly selected reasons for discrimination, secondary to "Weight", among participants who selected multiple reasons by BMI

Reason for Discrimination	**BMI < 25** (n = **31**)	**BMI ≥ 25** (n = **95**)
	n (%)	**n (%)**
Ancestry or National Origins	8 (25.8)	13 (13.7)
Gender	21 (67.7)	56 (59.0)
Race	10 (32.3)	34 (35.8)
Age	16 (51.6)	42 (44.2)
Religion	3 (9.7)	6 (6.3)
Height	14 (45.2)	18 (19.0)
Some other aspect of physical appearance	8 (25.8)	23 (24.2)
Sexual orientation	6 (19.4)	14 (14.7)
Education or income level	9 (29.0)	15 (15.8)
Physical disability	4 (12.9)	8 (8.4)

Note: Percentages reported may sum to greater than 100% as a result of participants who selected multiple responses and rounding.

Table 12

Subscale mean scores by experience type (self – versus network) for the 4-factor, 17-item STRAWS

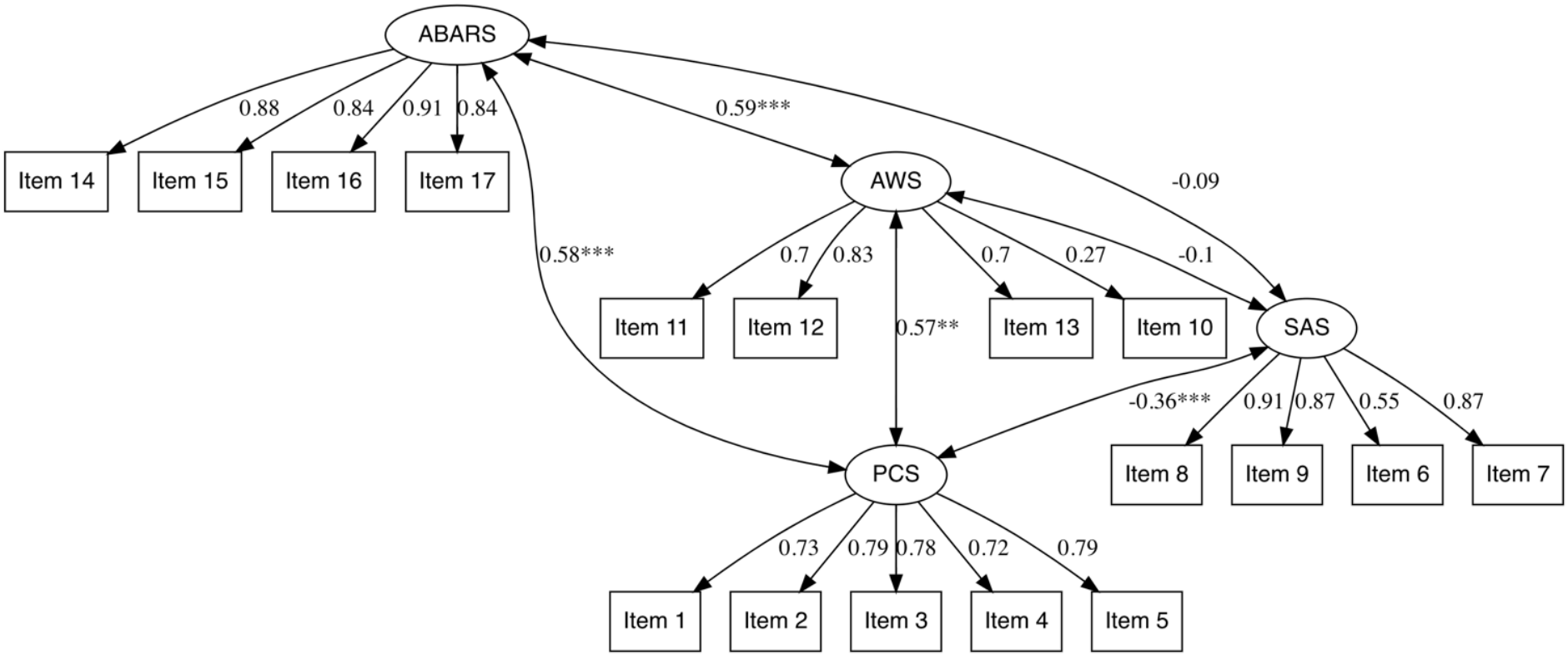
	Self (n = 252)		**Network** (n = 38)				
Subscale	Mean	SD	Mean	SD	df	F	*p*-value
STRAWS (total score)	66.29	16.98	54.58	12.56	1	16.69	< 0.001***
PCS	20.28	6.40	16.16	5.73	1	14.07	< 0.001***
SAS	14.57	6.34	15.82	5.94	1	1.294	0.256
AWS	17.75	5.07	15.11	4.81	1	9.091	0.003**
ABARS	10.84	6.52	7.13	4.70	1	11.38	< 0.001***

$p < 0.05$*; $p < 0.01$**; $p < 0.001$***

Note: PCS = Perseverative Cognition subscale; SAS = Secondary Appraisal subscale; AWS = Anticipatory Weight Stigma Stress subscale; ABARS = Anticipatory Bodily Alarm Response subscale. "Self" refers to qualitative descriptions of weight stigma when a participant experienced weight stigma themselves; "Network" refers to network events (e.g., qualitative weight stigma descriptions that were experienced by a close other).

Figure 1

Plot diagram with standardized factor loadings and subscale intercorrelations for the 4-factor, 17-item STRAWS (combined sample, n = 301)

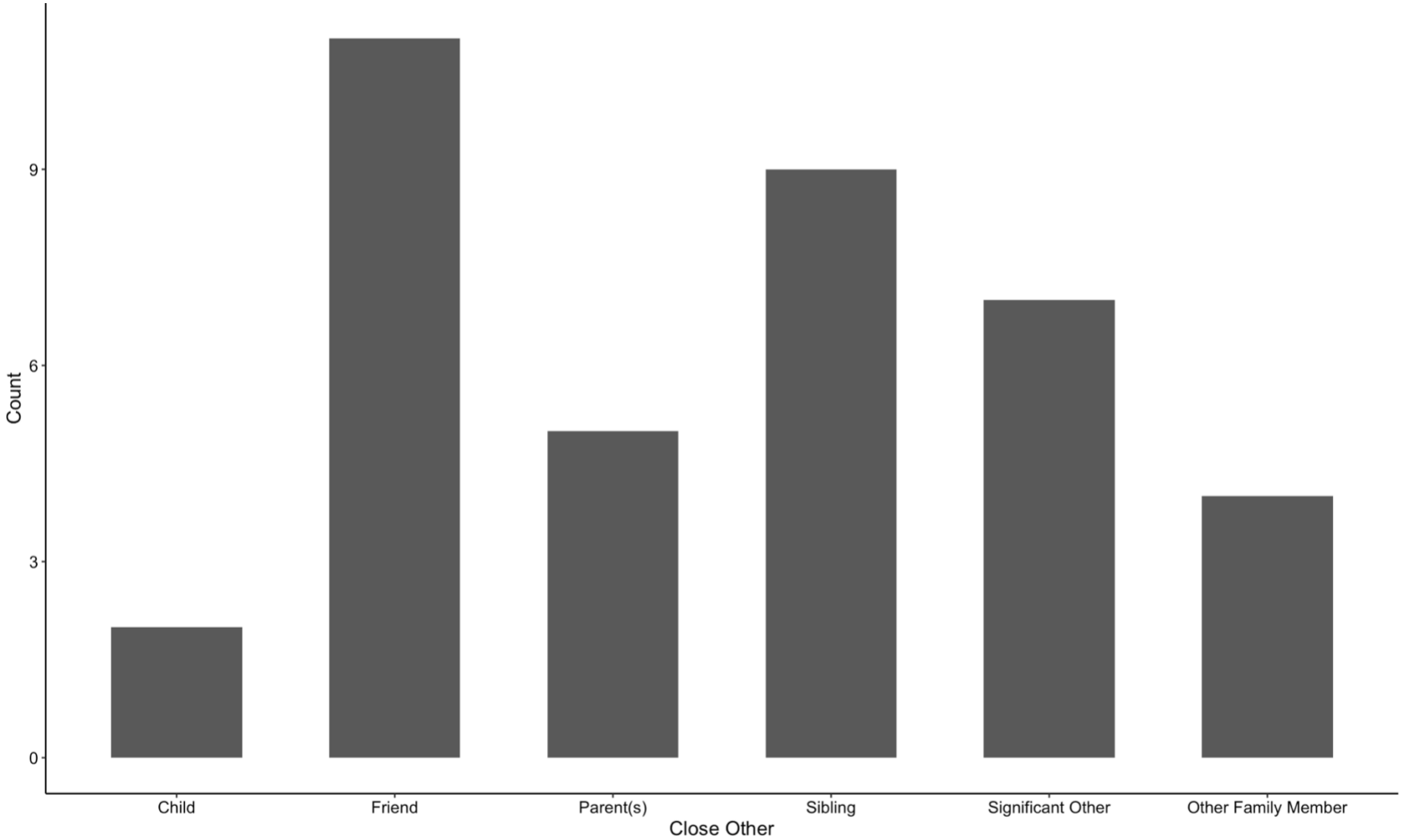


$p < 0.05$*; $p < 0.01$**; $p < 0.001$***

Note: PCS = Perseverative Cognition subscale; SAS = Secondary Appraisal subscale; AWS = Anticipatory Weight Stigma Stress subscale; ABARS = Anticipatory Bodily Alarm Response subscale. Plot diagram was generated using the "lavaanPlot" R package (v0.6.2; Lishinski, 2021).

Figure 2

Participant relationships to close others described in network events



Note: The two participants who described network events when a child experienced weight stigma both described experiences of sons; no participants described a daughter's experience with weight stigma. "Parent(s)" includes both mothers and fathers. Eight of the nine participants who described network events when a sibling experienced weight stigma both described experiences of sisters; only one participant described a brother's experience with weight stigma. "Significant Other" includes spouses and boyfriends/girlfriends. "Other Family Member" includes cousins and other extended family members (e.g., brother-in-law, nephew).

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Appendix A: List of abbreviations used throughout the current study

ABARS Anticipatory Bodily Alarm Response subscale (STRAWS)

ANOVA analysis of variance test

AWS Anticipatory Weight Stigma Stress subscale (STRAWS)

BMI Body Mass Index (kg/m^2)

CFA confirmatory factor analysis

CFI comparative fit index

COBWEBS cyclic obesity/weight-based stigma model (Tomiyama, 2014)

DF degrees of freedom

EDE-Q Eating Disorder Examination – Questionnaire (Fairburn & Bèglin, 1994)

EDS Everyday Discrimination Scale (Williams et al., 1997)

FESS Fear of Enacted Stigma subscale (WSSQ; Lillis et al., 2009)

MLR maximum-likelihood estimation with robust standard errors

PARS Prolonged Activation and Anticipatory Race-Related Stress Scale (Utsey et al., 2012)

PCS Perseverative Cognition Subscale (STRAWS)

PSS Perceived Stress Scale (Cohen et al., 1983)

RMSEA root-mean-square error of approximation

SAS Secondary Appraisal subscale (STRAWS)

SCS-26 Self-Compassion Scale (Neff, 2003)

SD standard deviation

SDS Self-Devaluation subscale (WSSQ; Lillis et al., 2009)

SJ Self-Judgement subscale (SCS-26; Neff, 2003)

SK Self-Kindness subscale (SCS-26; Neff, 2003)

SRMR standardized root-mean-square residual

STRAWS Stress and Weight Stigma Scale

TLI Tucker Lewis index

WSSQ Weight Self-Stigma Questionnaire (Lillis et al., 2009)

Appendix B: The Stress and Weight Stigma Scale (STRAWS)

Instructions

Using the space below, please describe an event or situation when you experienced stigma because of your weight, or when someone close to you (like a family member or close friend) experienced it in the past. Some people experience stigma because of a variety of identities, such as race, ethnicity, gender, age, sexual orientation, and/or disability. If you or someone close to you experienced stigma because of both weight and something else, you may describe that experience here.

While we do not suggest that any of the following experiences should have happened to you, some possible examples of weight stigma that some people have experienced could include:

- Being treated unfairly by friends, family members, and/or strangers because of your weight
- Being teased, humiliated, or physically hurt by someone else because of your weight
- Having others make assumptions about you because of your weight
- Being bullied, left out, or not being invited to social events by others because of your weight
- Not been allowed to participate in certain activities at school because of your weight
- Being denied a job, housing, or access to other services because of your weight
- Being treated disrespectfully or receiving lower quality care from a healthcare provider because of your weight
- Seeing a situation when a close friend or family member was treated unfairly or made fun of because of their weight

These are just a few examples of how you or someone close to you might experience weight stigma. It would be impossible to list all of the ways in which a person can experience weight stigma, so you must decide if an event/situation happened to you because of your weight or size. When describing your experience with weight stigma, please provide as much detail as possible.

For the following questions, please think about the situation or event when you experienced weight stigma that you described above.

1. On a scale from 1 to 7 (1 = *not at all stressful* and 7 = *extremely stressful*), the situation when I experienced weight stigma that I am thinking of was:

2. In the days/weeks after my experience with weight stigma, I thought about it or had memories of it (1 = *not at all*, 2 = *once weekly*, 3 = *2 to 3 times a week*, 4 = *3 or more times a week*, 5 = *once a day*, 6 = *2 to 3 times a day*, and 7 = *more than 3 times a day*)

1 – Not at all
2 – Once weekly
3 – 2-3 times a week
4 – 3 or more times a week
5 – Once a day
6 – 2-3 times a day
7 – More than 3 times a day

3. Whenever I think about my experience with weight stigma, I think about it for (1 = *I do not think about i*t, 2 = *less than 1 minute*, 3 = *1 to 5 minutes*, 4 = *5 to 20 minutes*, 5 = *20 minutes or more, but less than 1 hour*, and 6 = *could not stop thinking about it*)

1 – I do not think about it
2 – Less than 1 minute
3 – 1-5 minutes
4 – 5-20 minutes
5 – 20 minutes or more, but less than 1 hour
6 – Could not stop thinking about it

4. In the days/weeks after my experience with weight stigma, I continued to think about it for (1 = *I did not think about it at all*, 2 = *less than 7 days*, 3 = *7 to 30 days*, 4 = *1 to 2 months*, 5 = *2 to 5 months*, 6 = *6 to 9 months*, and 7 = *I still think about it*):

1 – I did not think about it at all
2 – Less than 7 days
3 – 7-30 days
4 – 1-2 months
5 – 2-5 months
6 – 6-9 months
7 – I still think about it

5. I think about this experience with weight stigma even when I don't mean to (1 = *never*, 2 = *rarely*, 3 = *sometimes*, 4 = *often*, 5 = *very often*, and 6 = *all the time*):

1 – Never
2 – Rarely
3 – Sometimes
4 – Often
5 – Very often
6 – All the time

6. People with overweight and obesity have always had to deal with these kinds of events/situations, so my experience with weight stigma was something I could handle (1 = *strongly disagree* and 7 = *strongly agree*)

1 – Strongly disagree
2 – Disagree
3 – Somewhat disagree
4 – Neither agree nor disagree
5 – Somewhat agree
6 – Agree
7 – Strongly agree

7. At the time the event/situation occurred, I felt prepared to deal with it (1 = *strongly disagree* and 7 = *strongly agree*)

1 – Strongly disagree
2 – Disagree
3 – Somewhat disagree
4 – Neither agree nor disagree
5 – Somewhat agree
6 – Agree
7 – Strongly agree

8. At the time the event/situation occurred, I was able to think of ways to deal with it (1 = *strongly disagree* and 7 = *strongly agree*)

1 – Strongly disagree
2 – Disagree
3 – Somewhat disagree
4 – Neither agree nor disagree
5 – Somewhat agree
6 – Agree
7 – Strongly agree

9. I felt I had what I needed to deal with the event/situation (1 = *strongly disagree* and 7 = *strongly agree*)

1 – Strongly disagree
2 – Disagree
3 – Somewhat disagree
4 – Neither agree nor disagree
5 – Somewhat agree
6 – Agree
7 – Strongly agree

10. I believe that most people with overweight or obesity will experience some sort of weight stigma similar to the situation I am thinking of in the future (1 = *strongly disagree* and 7 = *strongly agree*)

1 – Strongly disagree
2 – Disagree
3 – Somewhat disagree
4 – Neither agree nor disagree
5 – Somewhat agree
6 – Agree
7 – Strongly agree

For the following questions, please answer according to your general thoughts and experiences; *your answers to the following questions do not have to pertain specifically to the event or situation you described above.*

11. When I am around people who have different body sizes than I do, I expect them to say something hurtful about my weight or do something to harm or humiliate me because of my weight. 1 = *strongly* disagree and 7 = strongly *agree*):

1 – Strongly disagree
2 – Disagree
3 – Somewhat disagree
4 – Neither agree nor disagree
5 – Somewhat agree
6 – Agree
7 – Strongly agree

12. If I go to a place where most people have smaller bodies, there is a good chance I will experience weight stigma (1 = *strongly disagree* and 7 = *strongly agree*):

1 – Strongly disagree
2 – Disagree
3 – Somewhat disagree
4 – Neither agree nor disagree
5 – Somewhat agree
6 – Agree
7 – Strongly agree

13. I believe there is a good chance that I will experience weight stigma in the future (1 = *strongly disagree* and 7 = *strongly agree*):

1 – Strongly disagree
2 – Disagree
3 – Somewhat disagree
4 – Neither agree nor disagree
5 – Somewhat agree
6 – Agree
7 – Strongly agree

14. I can feel my hands start to shake whenever I think someone is about to make fun of my weight (1 = *strongly disagree* and 7 = *strongly agree*):

1 – Strongly disagree
2 – Disagree
3 – Somewhat disagree
4 – Neither agree nor disagree
5 – Somewhat agree
6 – Agree
7 – Strongly agree

15. I get chest pains whenever I think someone is about to make fun of my weight (1 = *strongly disagree* and 7 = *strongly agree*):

1 – Strongly disagree
2 – Disagree
3 – Somewhat disagree
4 – Neither agree nor disagree
5 – Somewhat agree
6 – Agree
7 – Strongly agree

16. My hands (or other body parts) sweat whenever I think someone is about to make fun of my weight (1 = *strongly disagree* and 7 = *strongly agree*):

1 – Strongly disagree
2 – Disagree
3 – Somewhat disagree
4 – Neither agree nor disagree
5 – Somewhat agree
6 – Agree
7 – Strongly agree

17. I get a lump (or dryness) in my throat whenever I think someone is about to make fun of my weight (1 = *strongly disagree* and 7 = *strongly agree*):

1 – Strongly disagree
2 – Disagree
3 – Somewhat disagree
4 – Neither agree nor disagree
5 – Somewhat agree
6 – Agree
7 – Strongly agree