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Obesity Review

Obesity and discrimination – a systematic review and meta-analysis of observational studies

J. Spahlholz,[1,2] N. Baer,[2] H.-H. König,[3] S. G Riedel-Heller[2†] and C. Luck-Sikorski[1,2†]

[1]Leipzig University Medical Center, IFB AdiposityDiseases, Leipzig, Germany, [2]Institute of Social Medicine, Occupational Health and Public Health (ISAP), Leipzig University, Leipzig, Germany, and [3]Department of Health Economics and Health Services Research, University Medical Center Hamburg-Eppendorf, Hamburg, Germany

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[†]Both authors shared last authorship.

Address of correspondence: J Spahlholz, Institute of Social Medicine, Occupational Health and Public Health (ISAP), Leipzig University, Philipp-Rosenthal-Str. 55, Leipzig 04103, Germany.
E-mail: Jenny.Spahlholz@medizin.uni-leipzig.de

Summary

Background: Research on obesity has shown that stigma often accompanies obesity and impacts many life domains. No previous research has systematically reviewed published literature about the prevalence and the nature of perceived weight discrimination in individuals with obesity. This systematic review and meta-analysis aims to fill that gap.

Methods: A systematic literature search was conducted without time limits using the databases Medline, ISI Web of Knowledge and the Cochrane Library. Meta-analyses were performed using random effect models. Observational studies pertaining to (i) prevalence estimates and (ii) forms of perceived weight discrimination among individuals with obesity were included.

Results: Of 4393 citations retrieved, nine citations retrieved, nine studies met inclusion criteria. Pooled prevalence was 19.2% (95% confidence interval (CI) 11.7 to 29.8%) for individuals with class I obesity (Body mass index [BMI] = 30–35 $kg\,m^{-2}$) and 41.8% (95% CI 36.9 to 46.9%) for individuals with more extreme obesity (BMI > 35 $kg\,m^{-2}$). Findings from nationally representative US samples revealed higher prevalence estimates in individuals with higher BMI values (BMI > 35 $kg\,m^{-2}$) and in women.

Conclusions: The results provide evidence that perceptions of weight discrimination by individuals with obesity were common, and its negative consequences are highly relevant issues within society and need to be the focus of potential interventions.

Keywords: discrimination, obesity, stigma, systematic review.

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Background

Research on the causes, consequences and treatment strategies of obesity has grown steadily over the past decade because, in large part, of the increasing prevalence of obesity and its increasing importance worldwide. The US prevalence estimates of obesity, defined as body mass index (BMI) > 30, ranged from 35.5% in men to 36.3% in women (1). Prevalence estimates of obesity in Germany, derived from a national survey (German Health Interview and Examination Survey for Adults), ranged from 23.3% in men to 23.9% in women (2). The apparent increased importance of obesity reflects the negative effects of a higher BMI. Research on obesity and its negative outcomes has shown that individuals with obesity are more vulnerable to psychological and physical symptoms (3–5). Furthermore, individuals with obesity are often stigmatized, as is widely reported (5). Individuals with obesity are frequently stereotyped as 'lazy, unmotivated, lacking in self-discipline, less competent, non-compliant and sloppy' (5, pp. 941). Comprehensive reviews have shown that individuals with obesity are frequently regarded as physically unattractive and undesirable and are regarded as being personally responsible for their weight (6) (for a recent overview see Sikorski *et al.*, 2011 (7) or Puhl & Heuer, 2009 (5)).

The concept of stigma falls within a much broader societal concept (5,6) and refers not only to negative stereotypical beliefs (8). Weight stigma or bias refers to 'negative weight-related attitudes and beliefs that are manifested by stereotypes, rejection and prejudice towards individuals because they are overweight or obese' (9, pp. 347). A widely regarded theoretical framework of the stigma construct provided by Link & Phelan (2001) states, 'stigma exists when elements of labelling, stereotyping, separation, status loss, and discrimination occur together in a power situation that allows them' (8, pp. 377). Link & Phelan (2001) describe five distinct, but interrelated components that serve to define the nature of the stigma construct, focusing equally on the behavioural rather than only on cognitive components. The behavioural component of the stigma construct contains status loss and discrimination (8). Link & Phelan (2001) claim that discrimination is a constitutive feature of the stigma process (8). Discrimination is distinct from prejudices and stereotypes (9,10). 'Discrimination is generally understood as biased behaviour, which includes not only actions that directly harm or disadvantage another group, but those that unfairly favour one's own group (creating a relative disadvantage for other groups)' (11, pp. 9). Therefore, 'it implies more than simply distinguishing among social objects, but refers also to inappropriate and potentially unfair treatment of individuals due to group membership' (11, pp. 8).

A key finding from previous reviews is that weight stigma occurs in multiple domains: employment, healthcare, educational settings, interpersonal relationships and in the media (5,11–15). A major caveat of earlier reviews is that different types of studies (e. g. observational vs. experimental studies) were mixed with different types of study populations (community vs. university student samples). Furthermore, no clear distinction made between the attitudes of the general public towards individuals with overweight or obesity and specific behaviours towards them. In this sense, discrimination due to weight has been inadequately examined. This is of special importance because perceptions of discrimination due to weight seem to be one possible determinant of mental health and wellbeing among individuals who are overweight or obese (16).

While socio-economic inequalities in obesity (e. g. occupational status, income based on census data) are well documented (for a recent overview see meta-analysis by Vanhove & Gordon, 2014 (17)), little is known about the subjective experiences of weight discrimination from the perspective of individuals with obesity (14). This is of great importance as perceived discrimination can serve as a stressor with substantial effects on the affected individual's mental and physical health (16,18). Single study findings on perceived weight discrimination have shown an increase of the prevalence of weight discrimination from 7.3% in 1995 to 12.2% in 2005 (19), however there has been no systematic review of observational studies that provide estimates of the prevalence of perceived weight discrimination among individuals with obesity.

The present review extends the findings of previous reviews by providing prevalence estimates of perceived weight discrimination and incorporates meta-analytical procedures. Therefore, the aim of this paper is to review the existing literature pertaining to perceived weight discrimination in individuals with obesity, specifically (i) to determine prevalence estimates of perceived weight discrimination and (ii) to identify areas or domains of self-reported discrimination among individuals who are classified as obese.

Methods

Literature search

This review was prepared according to the systematic literature review guidelines of the Centre for Reviews and Dissemination (20) and follows PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) suggestions (21). Three electronic databases (Medline, Web of Science and the Cochrane Library) were searched through March 2015, as well as the reference lists of the selected articles, to identify relevant articles regarding perceived weight discrimination among individuals who are classified as obese. The terms (obes* OR adiposity* OR overweight* OR over-weight* OR fat) AND (stigma* OR discrimination OR victimiz* OR blam* OR unfair OR bully* OR harassment OR "weight-based bias*") served as search terms. A summary of the selection process is illustrated in Figure 1.

Inclusion criteria

Titles and abstracts were screened using the following selection criteria: observational studies (i) reporting on the prevalence and (ii) the manifestations of perceived weight discrimination among individuals who are classified as obese.

Exclusion criteria

Studies were excluded if they were case reports, editorials, experimental studies, conceptual articles, reviews or meta-analyses. Furthermore, studies were excluded if they fell out of the scope of perceived weight discrimination from the perspective of individuals with obesity. In order to avoid redundancies, studies were also excluded if they were primarily concerned with bullying and their association with body weight, because a review (11) was recently published. This review already addressed this specific area of weight related discrimination. Furthermore, studies were excluded if they focused on socio-economic inequalities in obesity (e. g. occupational status and income), because a meta-analysis was recently published (17). To note, the present review addressed specifically perceived weight discrimination from the perspective of individuals with obesity.

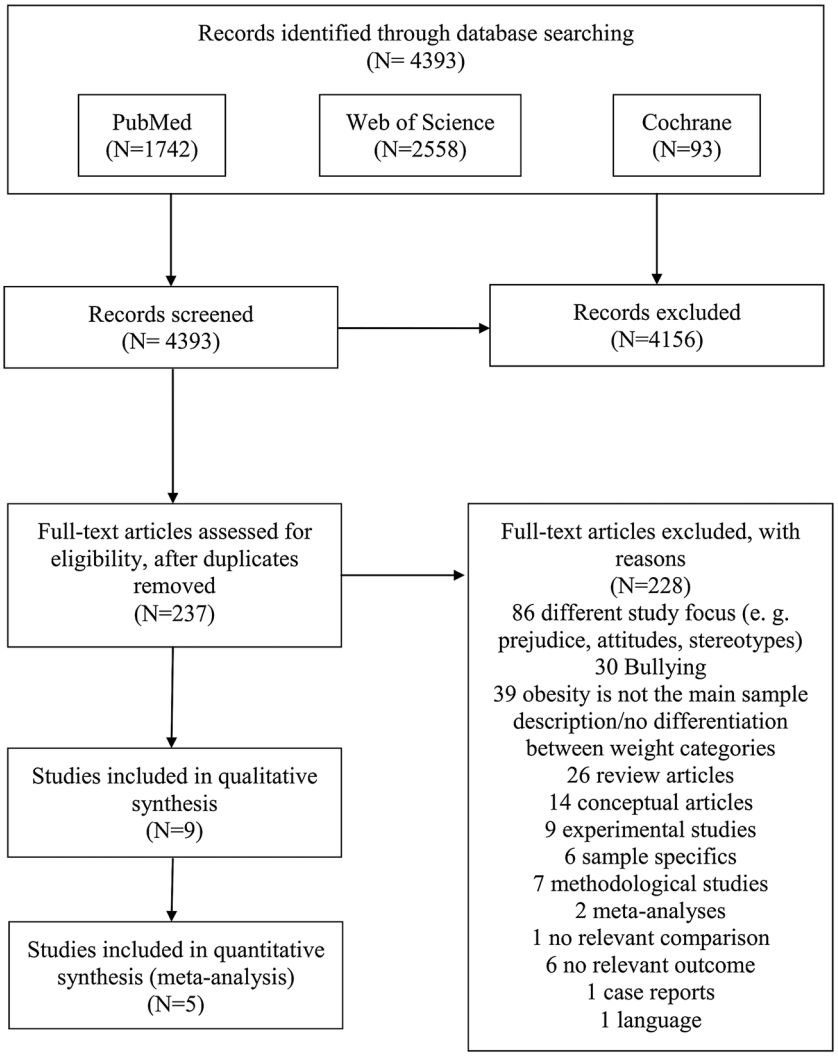

Figure 1 Search strategy search terms are as follows: (obes* OR adiposity* OR overweight* OR over-weight* OR fat) AND (stigma* OR discrimination OR victimiz* OR blam* OR unfair OR bully* OR harassment OR "weight-based bias*")

Furthermore, we limited our search to studies published in English and German.

Data extraction

Titles, abstracts and key words were screened to identify studies of likely relevance. Full-texts were assessed to determine whether the studies met the inclusion criteria. Disagreements were resolved by discussion. Methodical data on sampling, study design, life domains, methods of measurement and prevalence estimates of perceived weight discrimination were extracted from all selected studies. Finally, the selection criteria described in the above section were then reapplied to ensure accurate study inclusion.

Statistical analyses

We conducted three comprehensive meta-analyses using random effect models of the included studies on prevalence of lifetime discrimination among individuals with normal weight (BMI = 18.5–24.9 $kg\,m^{-2}$), individuals with class I obesity (BMI = 30–34.9 $kg\,m^{-2}$) and more extreme obesity (BMI > 35 $kg\,m^{-2}$). No meta-analysis could be performed for work-related discrimination, healthcare related discrimination and interpersonal discrimination because of the small number of studies. The statistical analyses were performed using the Comprehensive Meta-Analysis software package (version 3, Biostat, Englewood, NJ, USA). We tested the heterogeneity of the studies using Cochran's Q tests to test the null hypothesis that homogeneity exists between the sample estimates and the Higgins I^2 statistics to calculate the percentage of total variation between the sample estimates due to heterogeneity. A p value of less than .05 by Cochran's test indicated significant heterogeneity. I^2 values of 25% are considered low heterogeneity, 50% moderate heterogeneity and 75% high heterogeneity (22).

Results

Search results

The initial search resulted in a total of 4393 articles. After scanning titles, abstracts and key words, 237 articles were identified as potentially meeting the inclusion criteria. Nine studies were identified for inclusion in the final review by examination of full-text articles.

Study characteristics

Table 1 gives an overview of study characteristics, used measurements, life domains and prevalence of perceived weight discrimination. Most studies classified obesity in accordance with the World Health Organisation classification: obesity class I (BMI = 30–34.9 kg m^{-2}), obesity class II (BMI = 35–39.9 kg m^{-2}) and obesity class III (BMI > 40). For reason of clarity, BMI values classified as 'moderate obesity' (BMI = 30–34.9 kg m^{-2}) were termed as obesity class I, and BMI values classified as 'severe obesity' (BMI > 35) were termed as obesity class II/III. Deviations from this procedure are noted in Table 1.

Overall, eight studies were conducted in the United States, and one study was conducted in Europe. All studies that met the above criteria for inclusion were community-based. Five studies surveyed nationally representative samples of individuals aged 18 years and older. Sample sizes ranged from N = 93 to N = 22,231. With eight out of nine studies, most of the research work in this field relied on cross-sectional studies (3,4,6,9,14,16,23,24). Only one longitudinal study has been conducted in this area (19).

All studies were based on self-reports and used psychometrically validated questionnaires. The predominant instruments applied in the investigations were the Lifetime and Daily Discrimination scales, administered in the National Survey of Midlife Development in the United States (MIDUS) (25,26), and the modified Experiences of Discrimination Scale (27). Five out of nine studies assessed perceptions of discrimination with the help of the Lifetime and Daily Discrimination scales (6,9,14,19,24). Three research groups used a modified version of the Experiences of Discrimination Scale (3,16,24) and two research groups (4,23) used the Stigmatization Situations Inventory (28). The proportion of participants with obesity (BMI > 30) ranged from 27.4 to 100%.

Defining discrimination, perceived discrimination and perceived weight discrimination

A definition of perceived weight discrimination was provided in one study (3), describing perceived weight discrimination as 'person's experience of being treated poorly by others because of his/her weight' (3, pp. 530).

A general definition of discrimination was provided in 67% of the reviewed studies (3,6,9,14,16,19), describing discrimination as 'negative, unequal treatment of people because of their membership in a particular group' (10, pp. 992). Causal reasons for the discrimination included physical appearance (6,9,19,24), weight or height (14) or solely weight (3,16).

A definition of general perceived discrimination (e.g. not only weight or height based) was provided by one study (14). This definition involves 'the perception that one is treated differently based on membership in a group' (15, pp. 302), but also includes 'the belief that the differential treatment was unfair or unjust' (15, pp. 302). This definition therefore emphasizes the subjective nature of discrimination.

Prevalence estimates

General discrimination experiences

As shown in Table 1, lifetime discrimination among US adults was reported up to 53.9% in individuals with obesity (9). Analyses of data from wave 1 of the National Survey of Midlife Development in the United States (MIDUS I) (N = 3437) revealed prevalence estimates of 33% in individuals with class II/III obesity and 16% in individuals with class I obesity. There was a significantly lower prevalence in individuals with normal weight (7%) in comparison to individuals with class II/III obesity (6). Prevalence of perceived weight discrimination in a MIDUS subsample (N = 2290) revealed significant gender differences. Prevalence was much higher in women than in men. Among women, prevalence estimates ranged between 20.6% (class I obesity) and 45.4% (class II/III obesity) and between 6.1% (class I obesity) and 28.1% (class II/III obesity) among men. The prevalence among individuals with normal weight was 2.2% (women and men) (9). Longitudinal analyses of data from the MIDUS survey showed a non-significant increase of perceived weight discrimination in all weight categories over a period of a total of two wave data (1995–1996 (N = 1826) and 2004–2006 (N = 1136)). A higher prevalence was detected in individuals with class II/III obesity (from 38.7 to 42.5%) than in individuals with class I obesity (from 12.5 to 14.2%) and normal weight (from 1.1 to 3.9%) (19).

Dutton *et al.* (2014) showed race and sex differences in the prevalence of perceived weight discrimination, as well as differences in perceived weight discrimination across BMI categories in the biracial US cohort of the Coronary Artery Risk Development in Young Adults study (N = 3466). Prevalence was highest in Caucasian-American women with class II/III obesity (53.9%) in comparison with Caucasian-American men (32.7%) and African-American individuals with class II/III obesity (women = 34.4%, men = 35.5%) (3). Data from the Swedish Survey of Living Conditions (ULF) (N = 2688) revealed prevalence of lifetime discrimination of 60.7% among individuals with class II/III obesity,

Table 1 Study characteristics of observational studies

Study	N (Obese (%))	Study Design	Age M (±SD)	Main Measurements	Prevalence of Weight Related Discrimination (Non-significant differences if no *p*-value presented)
Andreyeva T, Puhl R. M. and Brownell K. D. (2008); USA (19)	2962 (NR)	Nationally representative longitudinal sampling (t_0 = 1995–1996, t_1 = 2004–2006); MacArthur Foundation National Survey of MIDUS	>18 yrs	Conceptualized in 20 items from the Perceived Discrimination Scales administered in the MIDUS survey. Rating on a 4-point Likert scale (subscale 'Daily Discrimination') and on dichotomous variables (subscale 'Lifetime Discrimination')	Changes in weight/height discrimination* Class II/III obesity (t_0 = 38.7%, t_1 = 42.5%) > Class I obesity (t_0 = 12.5%, t_1 = 14.2%) > Overweight (t_0 = 4.7%, t_1 = 6.9%) > Normal weight (t_0 = 1.1%, t_1 = 3.9%; $p \leq 0.05$)
Carr D. and Friedman M. A. (2005); USA (6)	3437 (28.9)	Nationally representative sampling; MacArthur Foundation National Survey of MIDUS	>18 yrs	Conceptualized in 20 items from the Perceived Discrimination Scales, administered in the MIDUS survey. Rating on a 4-point Likert scale (subscale 'Daily Discrimination') and on dichotomous variables (subscale 'Lifetime Discrimination')	Ever experienced any discrimination because of weight/physical appearance (Comparison with normal weight category) Class II/III obesity (33%; $p \leq 0.001$) > Class I obesity (16%) > Overweight (9%) > Normal weight (7%) Underweight (5%)
Dutton G. R., Lewis T. T., Durant N., Halanych J., Kiefe C. I., Sidney S., Kim Y., Lewis C. E. (2014); USA (3)	3466 (43.9)	Convenience sampling; population-based cohort study, Coronary Artery Risk Development in Young Adults Study	M = 50.2 (±3.6)	Conceptualized in 7 items from the modified version of the Experiences of Discrimination EOD scale Rating on dichotomous variables	Experiences of weight discrimination (Multiple comparisons with all weight categories) Caucasian American individuals: Class II/III obesity (w = 53.9%, $p < 0.001$; m = 32.7%, $p < 0.001$) > Class I obesity (w = 31.1%, $p < 0.001$; m = 13.9%, $p < 0.001$) > Overweight (w = 15.8%, $p < 0.001$; m = 5.5%) > Normal weight (w = 7.6%; m = 3.6%) African American individuals (Multiple comparisons with all weight categories) Class II/III obesity (w = 34.4%, $p < 0.001$; m = 35.5%, $p < 0.001$) > Class I obesity (w = 21.5%; m = 13.3%) > Overweight (w = 12.6%; m = 5.1%) > Normal weight (w = 11.3%; m = 10.7%)
Friedman K. E, Ashmore J. A and Applegate K. L (2008); USA (4)	94 (100)	Convenience sampling	M = 52.1 (±8.0)	Conceptualized in 48 items from a modified version of the Stigmatizing Situations Inventory (28). Rating on a 6-point Likert scale	Job discrimination (no further comparison): Class I/III obesity (13%)
Friedman K. E,. Reichmann S. K., Costanzo P. R., Zelli A., Ashmore J. A	93 (100)	Convenience sampling	M = 53.6 (±12.5)	Conceptualized in 48 items from a modified version of the Stigmatizing Situations Inventory (28). Rating on a 10-point Likert scale	Job discrimination (no further comparison) Class I/III obesity (33.3%)

(*Continues*)

Table 1. (Continued)

Study	N (Obese (%))	Study Design	Age M (±SD)	Main Measurements	Prevalence of Weight Related Discrimination (Non-significant differences if no *p*-value presented)
and Musante G. J. (2005); USA (23)					
Hansson L. M., Näslund E., Rasmussen F. (2010); Sweden (24)	2788 (56)	Nationally representative sampling; Swedish Survey of Living Conditions	>18 yrs	Conceptualized in 23 items from items administered in the EOD scale and in the MIDUS questionnaire. Rating on a 7-point Likert scale	Lifetime discrimination due to physical appearance (no further comparison) Class II/III obesity (60.7%) > Class I obesity (48.9%) > Normal weight (43.1%) Interpersonal Discrimination due to physical appearance (no further comparison) Class II/III obesity (47.2%) > Normal weight (46.6%) > Class I obesity (40.3%) Work-related discrimination due to physical appearance (no further comparison) Class II/III obesity (32.9%) > Class I obesity (28.8%) > Normal weight (21.9%) Healthcare related discrimination due to physical appearance (no further comparison) Class II/III obesity (40.6%) > Class I obesity (25.8%) > Normal weight (21.5%)
Hatzenbuehler M. L., Keyes K. M., Hasin D. S. (2009); USA (16)	2223 (27.4)	Nationally representative sampling; National Epidemiologic Survey on Alcohol and Related Conditions	>18 yrs	Conceptualized in 5 items from the modified version of the EOD scale. Rating on 5-point Likert scale	Discrimination experiences due to weight in obtaining insurance (Comparison between gender) Super obese (BMI > 45 kg m^{-2}; w = 12.4%; m = 7.3%, $p < 0.001$) > Morbid obesity (BMI = 40–44.9 kg m^{-2}; w = 6.3%, m = 2.5%; $p < 0.001$) > Severe obesity (BMI = 35–39.9 kg m^{-2}; w = 3.8%, m = 1.2%; $p < 0.001$) > Class I obesity (w = 0.8%, m = 0.6%; $p < 0.001$) > Overweight (w = 0.2%, m = 0.1%, $p < 0.001$) Discrimination experiences due to weight in health care (Comparison between gender): Super obese (BMI > 45 kg m^{-2}; w = 12.5%, m = 5.2%; $p < 0.001$) > Morbid obesity (BMI = 40–44.9 kg m^{-2}; w = 9.9%, m = 3.7%; $p < 0.001$) > Severe obesity (w = 2.5%, m = 1.2%; $p < 0.001$) > Obesity class I

(*Continues*)

Table 1. (Continued)

Study	N (Obese (%))	Study Design	Age M (±SD)	Main Measurements	Prevalence of Weight Related Discrimination (Non-significant differences if no *p*-value presented)
					(w = 0.8%, m = 0.6%; $p < 0.001$) > Overweight (w = 0.4%, men: 0.1%, $p < 0.001$) Discrimination experiences due to weight in public settings (Comparison between gender) Super obese (BMI > 45 kg m^{-2}; w = 25.8%, m = 13.6%; $p < 0.001$) > Morbid obesity (BMI = 40–44.9 kg m^{-2}; w = 12.2%, m = 9.3%; $p < 0.001$) > Severe obesity (w = 6.0%, m = 2.5%; $p < 0.001$) > Class I obesity (w = 2.4%, m = 0.6%; $p < 0.001$) > Overweight (w = 0.9%, m = 0.1%, $p < 0.001$) Discrimination experiences due to weight in job or school (Comparison between gender) Super obese (BMI > 45 kg m^{-2}; w = 9.4%, m = 7.1%) > Morbid obesity (BMI = 40–44.9 kg m^{-2}; w = 6.1%, m = 4.2%) > Severe obesity (w = 2.6%, m = 1.4%) > Class I obesity (w = 0.5%, m = 0.5%) > Overweight (w = 0.3%, m = 0.1%) Discrimination experiences due to weight in other setting such as with the police or courts (Comparison between gender) Super obese (BMI > 45 kg m^{-2}; w = 2.5%, m = 1.3%) > Morbid obesity (BMI = 40–44.9 kg m^{-2}; w = 1.2%, m = 1.0%) > Severe obesity (w = 0.7%, m = 0.6%) > Class I obesity (w = 0.1%, m = 0.1%) > Overweight (w = 0.1%, m = 0.0%)
Puhl R. M., Andreyeva T. and Brownell K. D. (2008); USA (9)	2290 (22)	Nationally representative sampling; MacArthur Foundation National Survey of MIDUS	>18 yrs	Conceptualized in 20 items from the Perceived Discrimination Scales administered in the MIDUS survey. Rating on a 4-point Likert scale (subscale 'Daily Discrimination') and on dichotomous variables (subscale 'Lifetime Discrimination')	Discrimination due to physical appearance (Comparison between gender) Class II/III obesity (w = 45.4%, m = 28.1%; $p \leq 0.05$) > Class I obesity (w = 20.6%, m = 6.1%; $p \leq 0.01$) > Overweight (w = 8.6%, m = 3.5%; $p \leq 0.05$) > Normal weight (w = 2.2%, m = 2.2%) Discrimination due to physical appearance (Overall): Class II/III obesity (39.8%) > Class I obesity

(*Continues*)

Table 1. (Continued)

Study	N (Obese (%))	Study Design	Age M (±SD)	Main Measurements	Prevalence of Weight Related Discrimination (Non-significant differences if no *p*-value presented)
					(13.5%) > Overweight (BMI = 25–29 kg m^{-2}; 5.7) > Normal weight (BMI = 18.5–24.9 kg m^{-2}; 2.2%)
Roehling M. V., Roehling P. V., Pichler S. 2007); USA (14)	2838 (21.2)	Nationally representative sampling; MacArthur Foundation National Survey of MIDUS	M = 44.8 (±11.2)	Conceptualized in 3 single items from the Lifetime Discrimination subscale of the MIDUS questionnaire. Rating on a 4-point Likert scale	Work-related discrimination (No further comparison) Class II/III obesity (w = 27.7%, m = 12.1%) > Class I obesity (w = 9.6%, m = 4.1%) > Overweight (w = 4.1%, m = 2.0%) > Normal weight (BMI = 19–24.9 kg m^{-2}; w = 0.8%, m = 0.7%)

EOD, experiences of discrimination; M, mean; m, men; MIDUS, midlife development in the United States; N, number of participants; NR, not reported; SD, standard deviation; w, women; yrs = years; Underweight represents BMI category 15–18.5 kg m^{-2}, if no other BMI/weight is reported in brackets; Normal weight represents BMI category 18.5–24.9 kg m^{-2}, if no other BMI/weight is reported in brackets; Overweight represents BMI category 25–29.9 kg m^{-2}, if no other BMI/weight is reported in brackets; Class I obesity represents BMI category 30–34.9 kg m^{-2}, if no other BMI/weight is reported in brackets; Class II obesity represents BMI category 35–39.9 kg m^{-2}, if no other BMI/weight is reported in brackets; Class III obesity represents BMI category >40 kg m^{-2}, if no other BMI/weight is reported in brackets. *Comparison between t_0 and t_1.

48.9% among individuals with class I obesity and 43.1% among individuals with normal weight (24).

Discrimination at the workplace

Five studies reported prevalence rates of perceived work-related discrimination (4,14,16,23,24). Analyses of data from the MIDUS survey (N = 2838) revealed prevalence estimates between 9.6% (class I obesity) and 27.7% (class II/III obesity) among women. Among men, the prevalence ranged between 4.1% (class I obesity) and 12.1% (class II/III obesity). Prevalence among individuals with normal weight ranged between 0.7% (women) and 0.8% (men) (14). The prevalence of perceived weight discrimination in individuals with class II/III obesity seeking weight loss surgery ranged between 13 (4) and 33.3% (23). Self-report data from the Swedish Survey of Living Conditions (ULF) indicated prevalence estimates between 28.8% (class I obesity) and 32.9% (class II/III obesity) (24). Hatzenbuehler *et al.* (2009) reported joint prevalence rates for school and workplace. The reported prevalence estimates ranged from 0.5% (class I obesity) to 9.4% (super obese; BMI > 45 kg m^{-2}).

Discrimination in healthcare

Two studies reported prevalence estimates of perceived healthcare-related discrimination (16,24). Previous analyses of data from the National Epidemiologic Survey on Alcohol and Related Conditions (N = 22,231) revealed prevalence estimates from 0.8% (class I obesity) to 12.5% (super obese) among women and from 0.6% (class I obesity) to 5.2% (super obese) among men in the United States (16). Findings based on data from the Swedish community-based ULF-survey (N = 2,788) showed prevalence estimates between 25.8% among individuals with class I obesity and 40.6% among individuals with class II/III obesity. The prevalence of perceived healthcare related discrimination among individuals with normal weight was estimated at 21.5% (24).

Discrimination on day-to-day interpersonal settings

Prevalence rates for day-to-day minor discrimination – based on data from a random sample of the Swedish population (ULF-survey) – ranged between 40.3% (class I obesity) and 47.2% (class II/III obesity). The prevalence of interpersonal discrimination among individuals with normal weight was estimated at 46.6% (24). Day-to-day minor discrimination involves unkind treatment and character assaults, such as '*treated with less courtesy than other people*', '*treated with less respect than other people*' or '*receive poorer service than other people at restaurants or stores*' (24).

Discrimination in other settings

Hatzenbuehler *et al.* (2009) examined perceived weight discrimination in settings such as with the police or courts. The reported prevalence estimates ranged from 0.1% (class

I obesity) to 2.5% (super obese) among women and from 0.1% (class I obesity) to 1.3% (super obese) among men (16).

Meta-analyses

Pooled prevalence of perceived weight discrimination among individuals with normal weight was 5.7% (95% CI 2 to 15.5%). There was a significant and also a high degree of heterogeneity among estimates ($I^2 = 99.6\%$; Cochran $Q = 1130.14$, $df = 5$, $p < 0.01$ (figure not shown)).

As shown in Figure 2, the meta-analysis of the studies indicated a pooled prevalence of perceived weight discrimination of 19.2% (95% CI 11.7 to 29.8%) among individuals with class I obesity (BMI = 30–-35 kg m^{-2}). There was a significant and also a high degree of heterogeneity among estimates ($I^2 = 99.3\%$; Cochran $Q = 691.61$, $df = 5$, $p < 0.01$).

As shown in Figure 3, the meta-analysis of the studies indicated a pooled prevalence of perceived weight discrimination of 41.8% (95% CI 36.9 to 46.9%) among individuals with more extreme obesity (BMI > 35 kg m^{-2}). There was a significant and also a high degree of heterogeneity among estimates ($I^2 = 95.5\%$; Cochran $Q = 110.06$, $df = 5$, $p < 0.01$).

Discussion

This study aimed at reviewing observational studies on (i) prevalence estimates and (ii) forms of perceived weight discrimination from the perspective of individuals with obesity. The impact of obesity on income inequalities and bullying were well described in other sources and were not reviewed in detail for this review (see review by Puhl & King, 2013 (11) and meta-analysis by Vanhove & Gordon, 2014 (17). In general, weight stigmatization has become an increasingly important field of research, and previous reviews have covered specific areas where weight stigma occurs by integrating quantitative, qualitative and/or experimental approaches. Growing evidence suggests that weight stigma was common and occurred in multiple domains: employment, healthcare, educational settings, interpersonal relationships and in the media (5,11–15). Although a great deal of research on weight stigmatization has been done, much of it described attitudes that could potentially lead to discriminatory behaviour. Perceptions of unfair or unequal treatment due to weight were described only within a small number of studies (N = 9). Given the enormous amount of potential references, a lack of consensus was revealed regarding the conceptualization of 'perceived weight discrimination'. In several studies, there was no consistent definition and understanding of the term 'perceived weight discrimination'. The term 'weight stigmatization' was often used as an umbrella term. Despite the absence of an explicit definition of the perceived weight discrimination construct, however, it should be emphasized that the studies included in this review used measurements that were in accordance with recommendations on the assessment of weight discrimination in individuals with obesity (for an overview see review by DePierre & Puhl, 2012 (29)).

In the present review, only one study (3) provided an explicit definition of perceived weight discrimination, although 67% of the reviewed studies (3,6,9,14,16,19) provided a traditional definition of discrimination. However, this traditional definition of discrimination as 'negative, unequal treatment of people because of their membership in a particular group' (10, pp. 992) does not cover the subjective component of the perceived weight discrimination construct. Therefore, the extension of the traditional definition to 'the belief that the differential treatment was unfair or unjust' (15, pp. 302) offers a better understanding of the construct 'perceived weight discrimination'. This definition includes both 'objective' and 'subjective' components (14). While some still argue over the accuracy of self-reported discrimination, its relevance in general and its linkage to

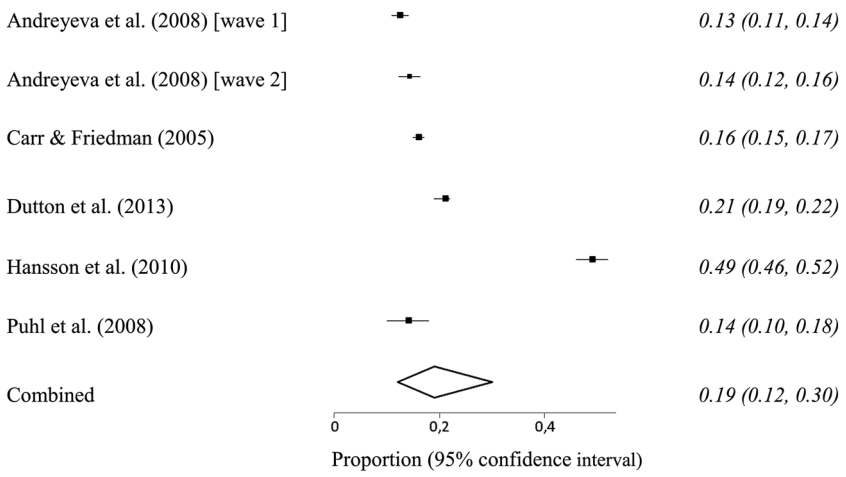

Figure 2 Forest plot of prevalence of perceived weight discrimination among individuals with Class I obesity

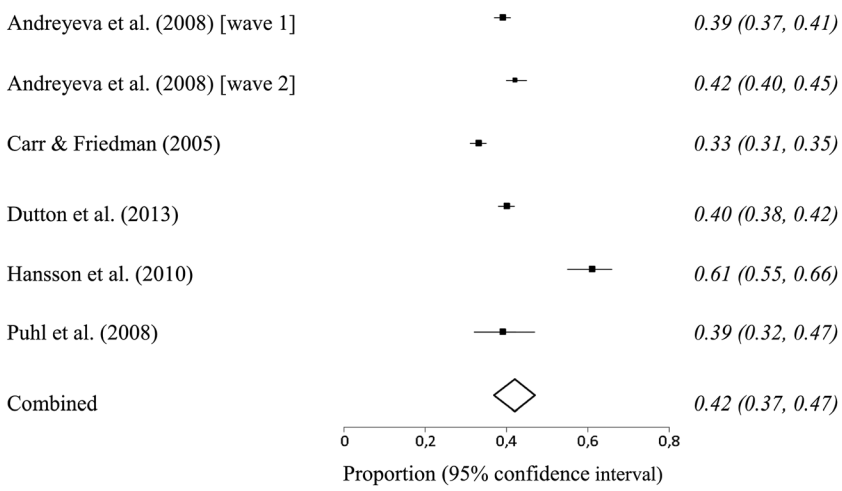

Figure 3 Forest plot of prevalence of perceived weight discrimination among individuals with Class II/III obesity

negative outcomes on mental and physical health have been demonstrated by many studies (see review by Pascoe & Richman (2009) (18)).

Methodological and measurement challenges in the assessment of weight related discrimination

In general, prevalence estimates of perceived weight discrimination varied across studies. Regardless of differences in the understanding of perceived weight discrimination, the variation in the estimated prevalence rates may result from differences in classification criteria of obesity (e. g. class I, II and III obesity vs. severe and moderate obesity) and methodological differences. These are also found in the assessment of weight discrimination. The data generated in this work do not only solely summarize prevalence estimates specifically referring to weight related discrimination (e. g. discrimination because of weight or height (14), but also discrimination because of physical appearance (6,9,19,24) or weight in general (3,16)). Research suggested, however, that these categories all reflect discrimination because of (over-)weight (19). Furthermore, according to research on racism, different measurements with different time frames (e. g. lifetime vs. past-month time frame) and different evaluation algorithms (single items vs. global scales) may also explain the wide variation found in these prevalence estimates (30,31).

Given the difficulties inherent to assessing perceived weight discrimination, the prevalence of perceived exposure to major lifetime discrimination among US adults was reported to be up to 53.9% (3). Results from longitudinal analyses emphasized that perceived weight discrimination seems to be stable over time and not a temporary phenomenon (19). However, this finding must be interpreted with some caution as it based on a single study. Differences in the populations surveyed (Sweden vs. United States) support evidence of considerable cultural differences in the acceptance of obesity (24). The degree to which variations in prevalence estimates reflect variation in true prevalence warrants further research.

Possible reasons for perceived weight discrimination in individuals with normal weight could be related to methodological issues. With respect to temporality, body weight could fluctuate over time, and retrospective reports on weight discrimination in individuals with current normal weight might be self-reports of individuals with former overweight or obesity (32).

In addition to methodological limitations, retrospective reports of discrimination experiences may be affected by individuals' current physical and emotional states (16,33). Regardless of causality, this aspect might be highly relevant with regards to the frequency of specific symptoms and comorbidities in obesity, such as depressive symptoms (16,24). Therefore, emotional and physical states at the time of the measurement should be examined in future research. Furthermore, there was evidence that variables, such as social support, served as potential intermediary variables for the discrimination-psychopathology relationship (16), suggesting directions for future research.

Perceived weight discrimination more frequent in women and in individuals with higher BMI values

Regardless of how perceived weight discrimination was operationalized (globally vs. different life domains), prevalence estimates were different in individuals with class I obesity and more extreme obesity ($BMI > 35\,kg\,m^{-2}$) and in female versus male individuals (9,14,16). Findings from the reviewed studies suggested that the frequency of discrimination due to weight increased with weight gain. The frequency distribution was quantitatively similar in a variety of life domains (major lifetime discrimination, interpersonal discrimination, work-related discrimination and healthcare-related discrimination) and similar for almost all reviewed studies.

Thus, some studies yielded evidence to suggest that women (9,19), younger adults (16,19,24) and Caucasians (3,16) were more vulnerable. Women reported more lifetime discrimination, work-related discrimination and healthcare-related discrimination than men, and women with more extreme obesity (class II/III obesity) reported an even higher degree of perceived weight discrimination than women and men with class I obesity (3,9,14,16), thus underlying the 'gendered nature of weight related discrimination' (15, pp. 313).

The most prominently discussed reason for discrimination towards individuals with obesity relates to Western society's emphasis on thinness as an ideal (16,24). Further, the ideal of thinness equating to attractiveness is even more relevant for women. In sum, the literature was characterized by inconsistent findings regarding gender differences at extreme BMI levels (BMI of 40 and higher) (9), with some studies showing that gender differences disappeared at extreme BMI levels and others showing that gender differences were consistent even at the highest weight categories (16). However, the lower prevalence in perceived weight discrimination among men might reflect a higher acceptance of obesity among men (9), suggesting that being overweight or obese might be more socially acceptable for men. Empirical evidence has shown that even the awareness of being a member of a stigmatized group was associated with higher readiness to interpret socially ambiguous cues as discriminatory, even in the absence of actual discrimination. In fact, earlier experiences of disparate treatment were associated with biased expectation about future discrimination (34), indicating that higher scores on discrimination scales do not automatically reflect a higher frequency of discrimination experiences. Thus, it is possible that research on either perceived or actual discrimination could lead to discrepant results and substantively different conclusions (34). But previous research has demonstrated the importance of focusing on the perspective of the person affected by discrimination with regard to their physical and mental well-being. Most research suggests that increased levels of perceived discrimination are associated with decreased levels of physical and mental health (18).

Limitations

The results from this review were summarized according to the number of studies providing data on prevalence estimates and forms of perceived weight discrimination associated with obesity across several settings. The number of studies that were included was limited. Additionally, grey literature (e. g. studies that are unpublished) was not included, and the exclusion of research focusing on the impact of obesity on bullying and income inequalities may weaken the present review. Given the cross-sectional nature of most data, such designs are not valuable for providing information about the stability of effects over time. Another limitation comes from the use of a lifetime assessment of perceived weight discrimination. Lifetime discrimination events refer to major discriminatory events, such as not being hired for a job, being hassled by the police or being provided with inferior medical care (6,9,19,24) that might have occurred many years ago (35) but do not reflect the current situation for affected individuals. In summary, the results reported here document the frequency of 'self-perceived' discrimination. Whether such perceptions reflect what individuals actually encounter in their lives is unclear (19). However, the debate on subjective and objective discrimination is central to traditional research on discrimination, and the equal importance of subjective information has been acknowledged (18).

Conclusion

This review documents the occurrence of perceived weight discrimination in several life domains (employment/school, health care and interpersonal relationships), however offers no firm conclusion about particularly vulnerable life domains. Perceptions of discrimination due to weight were found to be more frequent in women and in individuals with higher BMI values (BMI $>$ 35). The factors that may contribute to these differences are unclear and deserve further research (16). Furthermore, the degree to which variations in prevalence estimates reflect variation in true prevalence warrants further research. Additionally, it might be indicated to examine the nature of perceived weight discrimination within groups as well as across groups. Based on an extensive literature review, the present review reveals several gaps and limitations in research on perceived weight discrimination. A consensus definition and a consistent use of the term 'perceived weight discrimination' are clearly needed and would help to focus research. The results highlight the salience of perceived mistreatment due to weight among individuals with obesity.

Although this study focused on the prevalence of perceived discrimination, there is evidence that people with obesity are faced with structural discrimination in their everyday lives. This is strengthened by recent findings on the socioeconomic inequalities in obesity (e. g. occupational status and income based on census data) (17). Thus, there is a need for structural level interventions directed at the social-political environment, e. g. legal/policy interventions to protect stigmatized groups as well as to reduce barriers to education or health care. These are interventions designed to communicate tolerance and respect for diversity and a commitment to institutional fairness (36) and may be part of anti-discrimination legislation.

Likewise, other components of the stigma process according to Link and Phelan (2001) must be addressed as well. Stereotypes are distributed through socialisation, the media

and language and disclosure (10); there is a need for mass media interventions to improve reporting on obesity in the mass media in such a way as to influence public opinion (36). Non-structural intervention strategies to reduce stigma should focus on multiple components, including interpersonal (e.g. interventions to improve social interactions between the stigmatized and non-stigmatized) and intrapersonal interventions (e. g. interventions to alter and to cope with stigma) (36).

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Authors' contributions

C. L.S. and J. S. outlined and specified the research questions. The principal author conducted the literature search and screened abstracts and titles. Full-texts were assessed by N. B. and J. S. Article inclusion was evaluated by J. S and N. B. J. S wrote the first draft of the manuscript. C. L.S., S. R. H. and H. H. K. revised it critically for important intellectual content. All authors contributed to and have approved the final manuscript.

Conflict of interest statement

The authors declare that they have no competing interests.

References

1. Flegal KM, Carroll MD, Kit BK, Ogden CL. Prevalence of obesity and trends in the distribution of body mass index among US adults, 1999-2010. *JAMA* 2012; **307**: 491–497.
2. Mensink GBM, Schienkiewitz A, Haftenberger M, Lampert T, Ziese T, Scheidt-Nave C. Übergewicht und Adipositas in Deutschland: Ergebnisse der Studie zur Gesundheit Erwachsener in Deutschland (DEGS1). *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 2013; **56**: 786–794.
3. Dutton GR, Lewis TT, Durant N *et al*. Perceived weight discrimination in the CARDIA study: differences by race, sex, and weight status. *Obesity (Silver Spring)* 2014; **22**: 530–536.
4. Friedman KE, Ashmore JA, Applegate KL. Recent experiences of weight-based stigmatization in a weight loss surgery population: psychological and behavioral correlates. *Obesity (Silver Spring)* 2008; **16**: S69–74.
5. Puhl RM, Heuer CA. The stigma of obesity: a review and update. *Obesity (Silver Spring)* 2009; **17**: 941–964.
6. Carr D, Friedman MA. Is Obesity Stigmatizing? Body Weight, Perceived Discrimination, and Psychological Well-Being in the United States. *J Health Soc Behav* 2005; **46**: 244–259.
7. Sikorski C, Luppa M, Kaiser M *et al*. The stigma of obesity in the general public and its implications for public health - a systematic review. *BMC Public Health* 2011; **11**: 661.
8. Link BG, Phelan JC. Conceptualizing stigma. *Annu Rev Sociol* 2001; **27**: 363–385.
9. Puhl RM, Andreyeva T, Brownell KD. Perceptions of weight discrimination: prevalence and comparison to race and gender discrimination in America. *Int J Obes (Lond)* 2008; **32**: 992–1000.
10. Dovidio JF, Hewstone M, Glick P, Esses VM. Prejudice, stereotyping and discrimination: theoretical and empirical overview. In: *The SAGE Handbook of Prejudice, Stereotyping and Discrimination*. SAGE Publications Ltd: 1 Oliver's Yard, 55 City Road, London EC1Y 1SP United Kingdom, 2010, pp. 3–28.
11. Puhl RM, King KM. Weight discrimination and bullying. *Best Pract Res Clin Endocrinol Metab* 2013; **27**: 117–127.
12. Puhl R, Brownell KD. Bias, discrimination, and obesity. *Obes Res* 2001; **9**: 788–805.
13. Giel KE, Thiel A, Teufel M, Mayer J, Zipfel S. Weight bias in work settings - a qualitative review. *Obes Facts* 2010; **3**: 33–40.
14. Roehling MV, Roehling PV, Pichler S. The relationship between body weight and perceived weight-related employment discrimination: the role of sex and race. *Journal of Vocational Behavior* 2007; **71**: 300–318.
15. Wötzel H, Sikorski C, Schomerus G, Luppa M, Riedel-Heller SG. Werden übergewichtige Patienten in der Psychiatrie seltener stigmatisiert als in der Somatik? *Psychiatr Prax* 2015; **42**: 328–332.
16. Hatzenbuehler ML, Keyes KM, Hasin DS. Associations between perceived weight discrimination and the prevalence of psychiatric disorders in the general population. *Obesity (Silver Spring)* 2009; **17**: 2033–2039.
17. Vanhove A, Gordon RA. Weight discrimination in the workplace: a meta-analytic examination of the relationship between weight and work-related outcomes. *J Appl Soc Psychol* 2014; **44**: 12–22.
18. Pascoe EA, Smart RL. Perceived discrimination and health: a meta-analytic review. *Psychol Bull* 2009; **135**: 531–554.
19. Andreyeva T, Puhl RM, Brownell KD. Changes in perceived weight discrimination among Americans, 1995-1996 through 2004-2006. *Obesity (Silver Spring)* 2008; **16**: 1129–1134.
20. Centre for Reviews and Dissemination (2008). Systematic reviews: CRD's guidance for undertaking reviews in health care. [WWW document]. URL http://www.york.ac.uk/inst/crd/pdf/Systematic_Reviews.pdf
21. Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *J Clin Epidemiol* 2009; **62**: 1006–1012.
22. Sedgwick P. Meta-analyses: what is heterogeneity? *BMJ* 2015; **350**: h1435.
23. Friedman KE, Reichmann SK, Costanzo PR, Zelli A, Ashmore JA, Musante GJ. Weight stigmatization and ideological beliefs: relation to psychological functioning in obese adults. *Obes Res* 2005; **13**: 907–916.
24. Hansson LM, Näslund E, Rasmussen F. Perceived discrimination among men and women with normal weight and obesity. A population-based study from Sweden. *Scand J Public Health* 2010; **38**: 587–596.
25. Brim, OG, Baltes, PB, Bumpass, LL, Cleary, PD, Featherman, DL, Hazzard, WR *et al.* (2011). National Survey of Midlife Development in the United States (MIDUS), 1995-1996. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor]. [WWW document]. URL http://doi.org/10.3886/ICPSR02760.v8
26. Carol, R, Almeida, DM, Ayanian, JS, Carr, DS, Cleary, PD, Coe, C *et al.* (2012). National Survey of Midlife Development in the United States (MIDUS II), 2004-2006. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor]. [WWW document]. URL http://doi.org/10.3886/ICPSR04652.v6
27. Krieger N, Smith K, Naishadham D, Hartman C, Barbeau EM. Experiences of discrimination: validity and reliability of a self-

report measure for population health research on racism and health. *Soc Sci Med* 2005; **61**: 1576–1596.
28. Myers A, Rosen JC. Obesity stigmatization and coping: relation to mental health symptoms, body image, and self-esteem. *Int J Obes Relat Metab Disord* 1999; **23**: 221–230.
29. DePierre JA, Puhl RM. Experiences of weight stigmatization: a review of self-report assessment measures. *Obes Facts* 2012; **5**: 897–918.
30. Kressin NR, Raymond KL, Manze M. Perceptions of race/ethnicity-based discrimination: a review of measures and evaluation of their usefulness for the health care setting. *J Health Care Poor Underserved* 2008; **19**: 697–730.
31. Shavers VL, Fagan P, Jones D *et al*. The state of research on racial/ethnic discrimination in the receipt of health care. *Am J Public Health* 2012; **102**: 953–966.
32. Sikorski C, Spahlholz J, Hartlev M, Riedel-Heller SG. Weight-based discrimination: an ubiquitary phenomenon? *Int J Obes* 2015; Aug 27. doi: 10.1038/ijo.2015.165 (e-pub ahead of print).
33. Brondolo E, Brady N, Thompson S *et al*. Perceived racism and negative affect: analyses of trait and state measures of affect in a community sample. *J Soc Clin Psychol* 2008; **27**: 150–173.
34. Hartung F, Renner B. Perceived and actual social discrimination: the case of overweight and social inclusion. *Front Psychol* 2013; **4**: 147.
35. Kessler RC, Mickelson KD, Williams DR. The prevalence, distribution, and mental health correlates of perceived discrimination in the United States. *J Health Soc Behav* 1999; **40**: 208–230.
36. Cook JE, Purdie-Vaughns V, Meyer IH, Busch JTA. Intervening within and across levels: a multilevel approach to stigma and public health. *Soc Sci Med* 2014; **103**: 101–109.

