



International comparisons of weight stigma: addressing a void in the field

Rebecca M. Puhl^{1,2} · Leah M. Lessard² · Rebecca L. Pearl^{3,4} · Mary S. Himmelstein⁵ · Gary D. Foster^{3,6}

Received: 13 October 2020 / Revised: 22 April 2021 / Accepted: 6 May 2021

© The Author(s), under exclusive licence to Springer Nature Limited 2021

Abstract

Background/Objectives Despite substantial evidence documenting weight stigma toward people with higher body weight, international comparative studies are lacking in this field. The few studies that have compared weight stigma across different countries focus on explicit weight-biased attitudes rather than people's experiences of weight stigma. The present study conducted a multinational systematic comparison of weight stigma in six countries to assess experiences and interpersonal sources of weight stigma. **Subjects/Methods** Adults ($N = 13,996$) enrolled in WW International (formerly Weight Watchers), residing in Australia, Canada, France, Germany, the UK, and the US completed identical online anonymous surveys in the dominant language for their country. Surveys assessed their history of experiencing weight stigma, the onset of stigmatizing experiences and associated distress from stigma in different time periods, and interpersonal sources of weight stigma.

Results More than half of participants (55.6–61.3%) across countries reported experiencing weight stigma. Participants with higher BMI were significantly more likely to report weight-stigmatizing experiences than individuals with lower BMI. In all countries, weight stigma experiences were most frequent in childhood and adolescence, with associated distress highest during these time periods. Participants in Germany reported a higher frequency of weight stigma across their whole life, but lower distress associated with stigmatizing experiences, compared to participants in the other five countries. High percentages of participants in each country experienced weight stigma from family members (76.0–87.8%), classmates (72.0–80.9%), doctors (62.6–73.5%), co-workers (54.1–61.7%), and friends (48.8–66.2%).

Conclusions Weight stigma is prevalent for adults actively engaged in weight management across different Western countries. There were more similarities than differences in the nature, frequency, and interpersonal sources of people's experiences of weight stigma across the six countries in this study. Findings underscore the need for multinational initiatives to address weight stigma and interventions to support individuals engaged in weight management who experience weight mistreatment.

Introduction

Substantial research evidence has documented weight stigma towards people with higher body weight, who face negative societal stereotypes and prejudice in multiple domains of living [1, 2]. Despite numerous studies examining weight stigma in North America [3, 4], and steadily increasing evidence of the presence of weight stigma in countries around the world [5–7], international comparative research is lacking, with few studies comparing weight stigma across countries. Only a handful of published multinational studies have examined weight stigma, which have primarily focused on expressions of weight-biased attitudes across countries; that is, explicit weight bias that individuals endorse towards people with higher body weight. This small literature includes multinational studies [8–14] using self-report measures of explicit weight bias or implicit weight bias. Findings illustrate the

✉ Rebecca M. Puhl
Rebecca.puhl@uconn.edu

¹ Department of Human Development & Family Sciences, University of Connecticut, Storrs, CT, USA

² Rudd Center for Food Policy and Obesity, University of Connecticut, Hartford, CT, USA

³ Center for Weight and Eating Disorders, Department of Psychiatry, Perelman School of Medicine at the University of Pennsylvania, Philadelphia, PA, USA

⁴ Department of Clinical and Health Psychology, University of Florida, Gainesville, FL, USA

⁵ Department of Psychological Sciences, Kent State University, Kent, OH, USA

⁶ WW International, Inc., New York, NY, USA

presence of weight stigma in societies around the world and underscore that people in many countries (particularly countries with high levels of obesity) have negative attitudes towards individuals with higher weight [8].

Absent from this small body of work is examination of people's *experiences* of weight stigma across countries. To our knowledge only one multinational study has reported on adults' experiences of weight stigma, which compared community and college student samples in the US, Canada, Australia, and Iceland [11]. Findings showed that among the community samples, weight stigma was experienced by 43% of US participants, 59% of Canadian participants, and 33% of Iceland participants. Among student samples (from the US, Australia, Iceland) 51–60% reported experiencing weight stigma [11]. This limited evidence offers initial insight of the commonality of perceived weight stigma experienced by people in different countries. However, much remains to be understood about the nature of these experiences across countries, such as the types of weight stigma experienced (e.g., teasing versus discrimination), the frequency of these experiences, when they occur throughout one's lifetime, and common interpersonal sources of weight stigma. Single-country studies are difficult to compare because of different measures used to assess weight stigma and different types of participant samples. As of yet, there is no published international research comparing multiple, identical measures of experienced weight stigma across different countries with comparable samples. Research has remained siloed within countries with little cross-country communication to address weight stigma, contributing to recent international calls for collective efforts to eliminate weight stigma [15].

To address this considerable research gap, the present study conducted a systematic comparison of weight stigma across six countries, using identical measures to assess experiences of weight stigma, including the types, time periods, and interpersonal sources of these stigmatizing experiences. We examined these experiences among adults enrolled in an internationally available weight management program residing in Australia, Canada, France, Germany, the UK, and the US. This sample provides comparable sociodemographic characteristics across countries, and allows for examination of weight stigma among individuals who are actively trying to manage their weight, for whom weight stigma may be particularly salient [16–18]. In addition, we examined socio-demographic correlates of experienced weight stigma across the six samples.

Methods

Study design and samples

Participants were adults enrolled in WW International (formerly Weight Watchers). WW is a validated behavioral

weight management program centered on healthy habits related to food, activity, and mindset and has demonstrated effectiveness in multiple randomized controlled trials [19–21]. Participants were simultaneously recruited in six countries: Australia, Canada, France, Germany, the United Kingdom (UK), and the United States (US). These countries were selected for their sufficiently large WW memberships to allow for feasible data collection and recruitment of samples of at least 1000 participants. The study was open to WW members in each country who were at least 18 years of age and had participated in WW for at least 3 months. Recruited participants in each country completed an identical, online, anonymous survey in dominant language for the country hosted by Qualtrics.com. In non-English speaking countries (France and Germany) the survey was translated (and back translated) into French and German by a professional translation services company [22]. Prior to data collection, all surveys were piloted with small samples (<160) in each of the six countries during March 2020 to test questionnaire functionality. Study protocol was approved by the institutional review board at the University of Connecticut.

Data collection occurred from May 2020 to July 2020. Each week, a random set of 4000–33,000 ($M = 23,474$) members in each country were emailed by WW and invited to complete the survey, which was advertised as a “survey to learn more about people's experiences related to body weight and health, including social experiences and challenges”. Response rates within each country were as follows: Australia: 3.8%, Canada: 5.3%, France: 5.9%, Germany: 4.4%, UK: 4.2%, US: 4.9%.

A total of 23,415 individuals entered the survey website (Australia = 2119, Canada = 3968, France = 4656, Germany = 4149, UK = 4631, US = 3892). Of those, 8.0% participants were ineligible for the study because they declined to consent (Australia = 40, Canada = 98, France = 286, Germany = 155, UK = 61, US = 71), were members of WW for less than 3 months (Australia = 10, Canada = 14, France = 74, Germany = 11, UK = 37, US = 10), were under the age of 18 (Australia = 2, Canada = 1, France = 123, Germany = 1, UK = 3, US = 0), did not indicate WW program involvement (Australia = 47, Canada = 47, France = 78, Germany = 60, UK = 108, US = 10), or they closed the survey before completing the eligibility questions (Australia = 56, Canada = 82, France = 104, Germany = 62, UK = 139, US = 92). An additional 2.8% who did not report a country of residence, or a country different from the six included countries, were excluded.

A total of 20,871 individuals (Australia = 1740, Canada = 3659, France = 3906, Germany = 3803, UK = 4150, US = 3613) who entered the survey were eligible to complete it; 6875 individuals (Australia = 495, Canada = 951, France = 1396, Germany = 1190, UK = 1845, US = 998) were excluded because they did not complete at least 50% of the survey

and/or did not provide key study variables (i.e., sex, level of education, body mass index [BMI]) or weight stigma questions. After exclusions, the final sample consisted of 13,996 adults from six countries: Australia ($N = 1245$), Canada ($N = 2708$), France ($N = 2510$), Germany ($N = 2613$), UK ($N = 2305$), and US ($N = 2615$).

Measures

Participant characteristics

Participants reported their age, sex, highest level of education (coded as college degree or equivalent versus no college degree), marital status, race/ethnicity and sexual orientation¹. Participants' BMI was calculated from self-reported height and weight. Participants were classified into BMI categories using clinical guidelines from the World Health Organization [23]. Participants also indicated the duration of their WW membership and WW membership type: Digital (access to the WW app and online tools), Digital + Workshop (access to WW Coach-led sessions as well as app and online tools), or Personal Coaching (individual support from a WW Coach) + Digital.

History of experienced weight stigma

Participants responded to three yes/no questions asking if they had ever been teased, treated unfairly, or discriminated against because of their weight. These questions have been used in previous research with both community and weight management samples [18, 24, 25]. A dichotomous variable was computed, in which participants who responded "yes" to any question were coded as "1", and those who responded "no" to all three questions were coded as "0", indicating no previous experiences of weight stigma.

Weight Stigma Time of Life Questionnaire (WSTOLQ)

The WSTOLQ was developed and tested in previous research to assess weight stigma in samples of adults engaged in weight management [24]. Participants reported the time period in which they first experienced weight stigma, with the following response options: childhood (≤ 10 years), adolescence (11–19 years), young adulthood (20–39 years), middle adulthood (40–59 years) or older adulthood (≥ 60 years). Participants also rated (1–7) the frequency ('never' to 'extremely often') and distress ('not at all upset' to 'extremely upset') of weight-stigmatizing experiences in the last year, across their whole life, and during each of the aforementioned time of life periods.

¹ It was not permissible by law to collect race/ethnicity or sexual orientation data in France and Germany.

Interpersonal sources of weight stigma

Developed and tested in previous work [24, 26, 27], the Interpersonal Sources of Stigma scale assesses the frequency of experiencing weight stigma from people in their lives, including family members, spouse/romantic partner, friend, co-worker, employer/supervisor, classmate, teacher or professor, authority figure (e.g., police), doctor, nurse, dietitian or nutritionist, mental health professional, general community members, sales clerk at a store, servers at a restaurant, or other. Participants who indicated history of experienced weight stigma reported how frequently they had experienced weight stigma from each of these individual sources, which was dichotomized to distinguish between those had (i.e., not 'never'; coded as "1"), versus had not (i.e., 'never'; coded as "0"), experienced weight stigma from each source. Participants who did not encounter a given interpersonal source (e.g., did not have a spouse/romantic partner) could respond 'never' or leave the item blank.

Analytic strategy

Analyses were performed in SPSS. Given the size of the full sample, statistical significance was defined at $p \leq 0.001$ to reduce the likelihood of Type I error [28, 29]. Descriptive statistics were computed for sample characteristics and weight stigma experiences across countries, including prevalence of teasing, unfair treatment, discrimination, and prevalence of any form of weight stigma. Binary logistic regression was conducted to examine differences in experienced weight stigma (1 = at least one experience of weight stigma, 0 = no weight stigma) across each of the six countries as a function of age, BMI, sex, education, and marital status, WW membership duration, and WW membership type. Although race/ethnicity and sexual orientation data are reported for the purposes of sample characteristics, given that such data were unavailable in France and Germany, they are not included as covariates in analyses. BMI and WW membership duration were log-transformed to correct for non-normality; however, to facilitate interpretation of the logistic regression results, we present and describe the odds ratios for raw (as opposed to log-transformed) BMI values. Continuous covariates (i.e., age, BMI, and WW membership duration) were grand-mean centered within each country. Due to low prevalence (0–6 individuals in each country), those who identified as "other" sex were excluded from sex difference comparisons.

Descriptive statistics were also computed for onset of weight stigma and frequency of weight-stigmatizing experiences at different times of life across countries among individuals who reported at least one experience of weight stigma. Unadjusted and adjusted (accounting

Table 1 Sample demographic and anthropometric information, stratified by country.

	Total sample (<i>N</i> = 13,996)		Country												<i>F</i>
			Australia (<i>N</i> = 1245)		Canada (<i>N</i> = 2708)		France (<i>N</i> = 2510)		Germany (<i>N</i> = 2613)		United Kingdom (<i>N</i> = 2305)		United States (<i>N</i> = 2615)		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Age	52.24	12.77	54.39	11.42	56.27	12.47	48.95	12.70	47.29	10.74	50.29	12.42	56.87	12.86	<i>p</i> < 0.001
BMI	30.51	6.68	31.07	6.71	30.70	7.00	29.32	5.55	30.58	6.24	30.86	7.26	30.82	7.10	<i>p</i> < 0.001
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	χ^2
Sex															<i>p</i> < 0.001
Male	693	5.0	32	2.6	168	6.2	89	3.5	129	4.9	138	6.0	137	5.3	
Female	13,288	94.9	1213	97.4	2538	93.7	2419	96.4	2483	95.0	2163	93.8	2472	94.5	
Other	15	0.1	0	0.0	2	0.1	2	0.1	1	0.1	4	0.2	6	0.2	
Race ^a															<i>p</i> < 0.001
White	8375	94.5	1209	97.2	2580	95.3	–	–	–	–	2216	96.2	2370	90.8	
Non-White	487	5.5	35	2.8	126	4.7	–	–	–	–	87	3.8	239	9.2	
Sexual orientation ^a															<i>p</i> = 0.175
Heterosexual	8545	96.6	1211	97.6	2603	96.4	–	–	–	–	2216	96.5	2515	96.5	
Homosexual	142	1.6	13	1.0	52	1.9	–	–	–	–	31	1.3	46	1.8	
Bisexual	119	1.3	12	1.0	35	1.3	–	–	–	–	41	1.8	31	1.2	
Other	38	0.4	5	0.4	9	0.3	–	–	–	–	9	0.4	15	0.6	
Marital status ^b															<i>p</i> < 0.001
Married	9112	65.2	851	68.5	1920	71.1	1358	54.1	1637	62.8	1510	65.6	1836	70.2	
Not married	4863	34.8	391	31.5	782	28.9	1151	45.9	968	37.2	792	34.4	779	29.8	
Education															<i>p</i> < 0.001
College degree (eqv)	6862	49.0	591	47.5	1121	41.4	1654	65.9	548	21.0	1125	48.8	1823	69.7	
No college degree (eqv)	7134	51.0	654	52.5	1587	58.6	856	34.1	2065	79.0	1180	51.2	792	30.3	
BMI category															<i>p</i> < 0.001
<18.5 kg/m ²	23	0.2	0	0.0	10	0.4	3	0.1	1	0.0	3	0.1	6	0.2	
18.5–24.9 kg/m ²	2731	19.5	194	15.6	556	20.5	516	20.6	461	17.6	457	19.8	547	20.9	
25–29.9 kg/m ²	4976	35.6	457	36.7	902	33.3	1031	41.1	942	36.1	794	34.4	850	32.5	
≥30 kg/m ²	6266	44.8	594	47.7	1240	45.8	960	38.2	1209	46.3	1051	45.6	1212	46.4	

^aCollection of race and sexual orientation data was prohibited in France and Germany.

^bNot married comparison group includes individuals who reported a marital status other than “married” (e.g., divorced, widowed, separated, single).

for the sociodemographic, anthropometric, and WW covariates) one-way analyses of variance (ANOVA) were used to examine the frequency of weight-stigmatizing experiences as a function of life stage and country. Differences in distress associated with weight stigma across different times of life in each country were tested using ANOVA, both with and without covariate controls. Finally, chi-square tests were conducted to examine the prevalence of weight stigma by various interpersonal sources (e.g., doctors, classmates, family members) across countries.

Results

Sample characteristics

Table 1 displays demographic information for the final sample, stratified by country. On average, participants were

in middle adulthood. The majority of participants in each country identified as female (range = 93.7–97.4%) and White (range = 90.8–97.2%). Rates of college education varied across countries (range = 21.0–69.7%), in ways that map on to population level educational attainment [30]. Participants had a mean BMI of 30.51 ± 6.68 (mean range = 29.32–31.07 across countries). Less than 1% of the sample in each country had a BMI < 18.5, 15.6–20.9% had a BMI ranging from 18.5–24.9, 32.5–41.1% had a BMI ranging from 25–29.9, and 38.2–47.7% of participants had a BMI ≥ 30 in each country². Participants reported an average WW membership duration that ranged from 1.3 years (France) to 3.8 years (US) across countries. The majority of participants in each country indicated current involvement in WW Digital programs (range: 32.0–61.4%) or Workshop + Digital

² For reference, approximate prevalence rates of adult obesity in the participating countries are as follows: Australia: 30%, Canada: 31%, France: 23%, Germany: 26%, UK: 30%, US: 37% [31].

Table 2 Multinational comparisons of weight stigma experiences.

Variable	Total sample (<i>N</i> = 13,996)		Australia (<i>N</i> = 1245)		Canada (<i>N</i> = 2708)		France (<i>N</i> = 2510)		Germany (<i>N</i> = 2613)		United Kingdom (<i>N</i> = 2305)		United States (<i>N</i> = 2615)		χ^2	<i>p</i>
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%		
Experienced weight stigma															28.78	<0.001
Any	8100	57.9	698 ^{ab}	56.1	1660 ^a	61.3	1396 ^b	55.6	1452 ^{bc}	55.6	1336 ^{ab}	58.0	1558 ^{ab}	59.6		
None	5896	42.1	547	43.9	1048	38.7	1114	44.4	1161	44.4	969	42.0	1057	40.4		
Teased about weight															50.38	<0.001
Yes	7552	54.0	629 ^{ac}	50.5	1565 ^b	57.8	1271 ^a	50.6	1333 ^a	51.0	1284 ^{bc}	55.7	1470 ^b	56.2		
No	6444	46.0	616	49.5	1143	42.2	1239	49.4	1280	49.0	1021	44.3	1145	43.8		
Treated unfairly because of weight															56.31	<0.001
Yes	5485	39.2	470 ^{adc}	37.8	1173 ^b	43.3	963 ^{ac}	38.4	1025 ^{ab}	39.2	774 ^d	33.6	1079 ^{bce}	41.3		
No	8512	60.8	775	62.2	1535	56.7	1547	61.6	1588	60.8	1531	66.4	1536	58.7		
Discrimination because of weight															67.46	<0.001
Yes	4332	31.0	386 ^{acd}	31.0	952 ^{ab}	35.2	726 ^{cef}	28.9	864 ^{bd}	33.1	583 ^e	25.3	821 ^{adf}	31.4		
No	9664	69.0	859	69.9	1756	64.8	1784	71.1	1749	66.9	1722	74.7	1794	68.6		

Values within the same row not sharing the same letter are significantly different from each other at $p \leq 0.001$.

(range: 37.7–67.3%), followed by Personal Coaching + Digital (range: 0.0–4.4%).

Nature of weight stigma experiences

Prior experiences of weight stigma were reported by 57.9% of participants (see Table 2). Prevalence of weight stigma was significantly higher in Canada (61.3%) compared to France and Germany (both 55.6%). Among the forms of weight stigma experienced (i.e., teasing, unfair treatment, discrimination), weight teasing was most common across all countries; more than half of participants in each country reported having been teased about their weight. Prevalence of unfair treatment and discrimination because of weight, respectively ranged from 33.6% and 25.3% (UK) to 43.3% and 35.2% (Canada). Rates were highest across each of these experienced weight stigma variables in Canada.

Table 3 displays sociodemographic and anthropometric correlates of experienced weight stigma, stratified by country. Across all countries, consistent differences emerged as a function of participant age and BMI³. Specifically, the odds of experienced weight stigma increased by 1.11–1.13 times across countries for each one unit increase in BMI; in addition, older age was associated with lower odds of reporting weight stigma ($OR_{age} = 0.96–0.99$). No other sociodemographic factors were significantly linked to experienced weight stigma, with the exception of marital status in the US; individuals currently married had lower odds of reporting experiences of weight stigma than those not currently married ($OR = 0.73$, $p = 0.001$).

³ These findings replicated when modeling weight stigma as a count variable (i.e., sum of the prevalence of ever having been teased, treated unfairly, or discriminated against because of one's weight).

Onset and frequency of weight stigma across the lifespan

Among participants who reported history of experienced weight stigma, across countries, at least 1-in-5 indicated having experienced weight stigma as early as age 10 years or younger (Australia = 28.1%, Canada = 30.6%, France = 22.0%, Germany = 23.9%, UK = 30.7%, US = 29.3%). Adolescence was most commonly reported as the developmental period of weight stigma onset across all countries (Australia = 42.6%, Canada = 42.6%, France = 47.1%, Germany = 47.3%, UK = 39.8%, US = 45.4%). Lower prevalence of onset was found in young adulthood, (Australia = 17.3%, Canada = 15.3%, France = 19.1%, Germany = 20.2%, UK = 20.1%, US = 16.4%), followed by middle adulthood (Australia = 10.9%, Canada = 10.6%, France = 10.8%, Germany = 7.9%, UK = 8.8%, US = 8.3%), with the lowest prevalence in older adulthood (Australia = 1.0%, Canada = 1.0%, France = 1.0%, Germany = 0.6%, UK = 0.5%, US = 0.6%).

Figure 1 displays the unadjusted frequency of weight-stigmatizing experiences across life stages in each of the six countries, and relevant post-hoc between-country comparisons. As evidenced by the consistent inverse association, individuals across countries reported weight stigma to be most frequent in childhood, followed by adolescence, and decreasing steadily in frequency across the lifespan. With the exception of the past year, unadjusted ANOVAs revealed few between-country differences in the frequency of weight stigma within each of the developmental stages, a pattern that was retained when controlling for the sociodemographic, anthropometric and WW membership variables. Between-country differences documented in young adulthood (depicted in Fig. 1) became non-significant when the covariates were accounted for. In contrast, between-country differences in

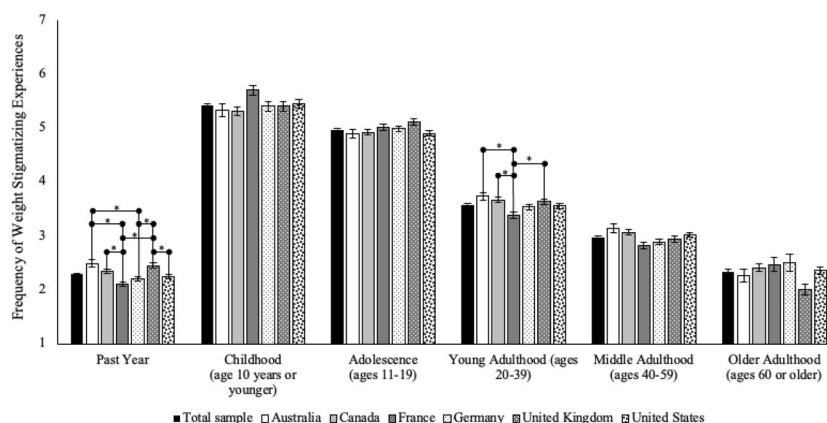
Table 3 Summary of regressions predicting experienced weight stigma.

	Australia		Canada		France		Germany		United Kingdom		United States	
	OR	<i>p</i>	OR	<i>p</i>	OR	<i>p</i>	OR	<i>p</i>	OR	<i>p</i>	OR	<i>p</i>
Age	0.97	<0.001	0.98	<0.001	0.96	<0.001	0.97	<0.001	0.97	<0.001	0.99	<0.001
Current BMI	1.13	<0.001	1.12	<0.001	1.13	<0.001	1.13	<0.001	1.11	<0.001	1.12	<0.001
Sex (male)												
Female	0.64	0.284	0.70	0.049	0.83	0.436	1.63	0.013	0.91	0.600	0.85	0.390
Education (no college degree)												
College degree	1.43	0.005	1.26	0.008	1.07	0.444	1.02	0.824	1.20	0.048	1.18	0.084
Married (not married)												
Married	0.67	0.004	0.80	0.019	0.88	0.147	0.80	0.012	0.82	0.051	0.73	0.001
WW membership duration	1.14	0.020	1.14	0.001	1.25	<0.001	1.14	0.001	1.16	<0.001	1.17	<0.001
WW membership type (digital)												
Digital + Workshop	1.44	0.006	1.36	0.001	1.46	<0.001	1.25	0.014	1.22	0.042	1.15	0.153
Personal coaching + Digital	0.79	0.440	1.16	0.779	–	–	1.40	0.467	1.09	0.815	0.69	0.477

Logistic regression models (1 = at least one experience of weight stigma, 0 = no weight stigma) run separately for each country. Logarithmic transformation used for WW membership duration. Sex reference group = male. Educational attainment reference group = no college degree. Marital status reference group = not married. WW membership type reference group = digital. ‘Personal Coaching + Digital’ estimate excluded for France due to low prevalence (i.e., $n = 1$).

Fig. 1 Unadjusted frequency of weight-stigmatizing experiences as a function of life stage and country.

Response options ranged from 1 (*never*) to 7 (*extremely often*). Error bars reflect standard errors. * $p \leq 0.001$.



middle adulthood emerged over and above the covariates [$F(5, 5850) = 6.84, p < 0.001$], such that weight stigma experiences in middle adulthood were significantly more frequent among participants in Australia, Canada and the US compared to France, and more frequent in Australia relative to Germany (p values ≤ 0.001).

Between-country differences also emerged for the frequency of weight-stigmatizing experiences across individuals' whole life, $F(5, 7875) = 9.37, p < 0.001$. Post-hoc comparisons indicated that weight stigma was experienced more frequently in Germany, compared to all other countries. After controlling for the sociodemographic, anthropometric, and WW membership covariates, the frequency of experienced weight stigma across individuals' whole life remained significantly higher in Germany than in Australia, Canada and the US.

Distress associated with weight stigma

Distress associated with weight stigma across multiple time of life periods is displayed in Table 4, stratified by country. Consistent with the pattern of results for frequency, across all countries individuals reported distress associated with weight stigma to peak during childhood, followed by adolescence. There were no differences by country in weight stigma-related distress during childhood. In contrast, between-country differences were most pronounced when considering young adulthood and whole life experiences of weight stigma. Specifically, distress associated with weight stigma during young adulthood and across individuals' whole life was significantly lower in Germany as compared to all other countries. When controlling for the sociodemographic, anthropometric, and WW membership covariates, the country-specific comparisons

Table 4 Distress associated with weight stigma during multiple time of life periods, stratified by country.

Time of life	Total sample	Australia	Canada	France	Germany	United Kingdom	United States	F	p
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)		
Past year	4.43 (2.00)	4.57 ^{ab} (2.03)	4.31 ^{ac} (1.99)	4.64 ^b (2.07)	4.15 ^c (1.96)	4.58 ^{ab} (2.01)	4.47 ^{abc} (1.92)	6.35	<0.001
Whole life	5.31 (1.66)	5.38 ^{ac} (1.58)	5.37 ^{ac} (1.62)	5.21 ^a (1.81)	4.98 ^b (1.69)	5.47 ^c (1.60)	5.45 ^{cd} (1.57)	17.30	<0.001
Childhood	6.12 (1.37)	6.05 ^a (1.33)	6.02 ^a (1.50)	6.18 ^a (1.29)	6.04 ^a (1.38)	6.19 ^a (1.36)	6.24 ^a (1.26)	1.85	0.099
Adolescence	5.89 (1.48)	5.89 ^{acde} (1.51)	5.93 ^{ab} (1.44)	5.91 ^{acde} (1.55)	5.70 ^c (1.54)	6.00 ^{bd} (1.42)	5.93 ^{bc} (1.42)	4.92	<0.001
Young adulthood	4.89 (1.79)	4.97 ^{ac} (1.76)	5.02 ^{ac} (1.74)	4.81 ^a (1.85)	4.54 ^b (1.78)	5.10 ^c (1.78)	4.95 ^{ac} (1.77)	13.58	<0.001
Middle adulthood	4.41 (1.91)	4.49 ^{acd} (1.90)	4.43 ^{ab} (1.85)	4.43 ^{acd} (2.06)	4.13 ^c (1.89)	4.60 ^{bd} (1.94)	4.41 ^{acd} (1.88)	4.58	<0.001
Older adulthood	4.19 (1.98)	3.93 ^a (1.98)	4.19 ^a (1.99)	4.39 ^a (2.07)	4.13 ^a (2.06)	4.16 ^a (1.96)	4.22 ^a (1.94)	0.65	0.660

Weight Stigma Time of Life Questionnaire items were only administered to participants who reported weight stigma onset during or prior to that developmental period. Response options ranged from 1 (*not at all upset*) to 7 (*extremely upset*). Values within the same row not sharing the same letter are significantly different from each other at $p \leq 0.001$.

Table 5 Prevalence of weight stigma from each interpersonal source (0 = never, 1 = at least once), stratified by country.

Source of weight stigma	Total sample		Australia		Canada		France		Germany		United Kingdom		United States		χ^2	p
	N	%	N	%	N	%	N	%	N	%	N	%	N	%		
Family members	6559	81.8	586 ^{ac}	84.7	1398 ^{ac}	84.8	1046 ^b	76.0	1092 ^b	76.0	1077 ^a	81.6	1360 ^c	87.8	114.39	<0.001
Spouse/romantic partner	3969	50.6	396 ^a	58.1	831 ^{ab}	51.1	616 ^{bc}	46.6	587 ^c	41.9	730 ^a	56.3	809 ^a	53.1	87.26	<0.001
Friend(s)	4730	60.3	439 ^{ac}	64.7	1071 ^a	66.2	649 ^b	48.8	859 ^{ac}	61.4	752 ^c	58.3	960 ^{ac}	62.9	109.04	<0.001
Co-worker(s)	4564	58.2	405 ^{ab}	59.7	997 ^a	61.7	720 ^b	54.1	802 ^{ab}	57.2	781 ^{ab}	60.3	859 ^{ab}	56.6	22.49	<0.001
Employer, supervisor	2734	35.0	263 ^a	38.8	590 ^a	36.8	370 ^b	28.1	544 ^a	38.9	426 ^{ab}	33.2	541 ^a	35.6	45.94	<0.001
Classmate(s)	5934	75.5	497 ^a	73.6	1195 ^a	73.9	962 ^a	72.0	1138 ^b	80.9	985 ^{ab}	76.0	1157 ^a	75.7	34.82	<0.001
Teacher or professor	2175	27.7	178 ^a	26.4	448 ^a	27.9	331 ^a	24.9	495 ^b	35.3	349 ^a	26.9	374 ^a	24.4	54.22	<0.001
Authority figure (e.g., police)	1015	13.0	80 ^a	11.9	259 ^{ac}	16.1	64 ^b	4.8	169 ^a	12.1	174 ^{ac}	13.4	269 ^c	17.7	123.28	<0.001
Doctor	5268	66.6	426 ^a	62.6	1052 ^{ac}	64.8	856 ^a	63.5	1043 ^b	73.5	820 ^a	62.8	1071 ^{bc}	69.7	58.04	<0.001
Nurse	2514	32.1	215 ^{ad}	31.8	482 ^a	29.9	255 ^b	19.3	394 ^a	28.1	586 ^c	45.2	582 ^d	38.1	241.90	<0.001
Dietician or nutritionist	2195	28.0	213 ^{ad}	31.5	462 ^{acd}	28.7	452 ^a	34.0	319 ^b	22.8	320 ^{bcc}	24.7	429 ^{de}	28.1	54.27	<0.001
Mental health professional (psychologist, social worker, therapist)	921	11.8	88 ^a	13.0	182 ^a	11.3	159 ^a	12.0	168 ^a	12.0	143 ^a	11.0	181 ^a	11.9	2.18	0.823
General community members	4681	59.5	485 ^a	71.5	1083 ^{ad}	67.0	675 ^b	50.7	690 ^b	49.2	770 ^c	59.0	978 ^{cd}	64.0	195.24	<0.001
Sales clerk at a store	4318	54.9	428 ^a	63.1	963 ^a	59.3	758 ^{ac}	56.8	806 ^a	57.4	582 ^b	44.8	781 ^c	51.2	98.11	<0.001
Servers at restaurants	2187	27.9	199 ^{adf}	29.4	540 ^{ab}	33.5	227 ^c	17.1	391 ^{df}	27.9	330 ^{de}	25.5	500 ^{bf}	32.8	125.26	<0.001
Other	438	12.0	39 ^{ab}	13.4	71 ^{ab}	10.7	90 ^a	15.8	107 ^{ab}	13.7	61 ^b	8.6	70 ^{ab}	11.2	19.43	0.002

Values within the same row not sharing the same letter are significantly different from each other at $p \leq 0.001$.

documented in Table 4 were retained, with the following exceptions: after accounting for the covariates, ‘past year’ weight stigma-related distress in the US was significantly higher as compared to Germany, which in turn did not differ from Australia; additionally, weight stigma-related distress was significantly lower in Germany during middle adulthood compared to Australia and the US.

Interpersonal sources of weight stigma

Multiple interpersonal sources of weight stigma were reported across countries, as displayed in Table 5. Family members were the most common source of weight stigma in each country, with 76.0% (France and Germany) to 87.8% (US) of participants reporting at least one experience of weight stigma from family members. Weight stigma from classmates (range:

72.0–80.9%) and doctors (range: 62.6–73.5%) was also highly prevalent across countries. Similarly, high rates of weight stigma perpetration by friends (range: 48.8–66.2%), general community members (range: 49.2–71.5%), and co-workers (range: 54.1–61.7%) were reported across countries. Overall, weight stigma from mental health professionals (e.g., psychologists; range: 11.0–13.0%) and ‘other’ interpersonal sources (range: 8.6–15.8%) were least common, with no significant differences between countries.

Discussion

The present study advances the limited cross-country literature on weight stigma, offering novel insights about experiences of weight stigma among adults engaged in weight

management. Overall, there were more similarities than differences in the nature of people's experiences of weight stigma across the six countries in this study. More than half of participants (55.6–61.3%) across countries reported experiencing some form of weight stigma. Weight-based teasing was most common (reported by over half of participants), and approximately one-third of participants reported mistreatment and/or discrimination across countries. The prevalence of weight discrimination reported in these samples (25.3–35.2%) is higher than prevalence rates documented in previous single-country studies using general population samples, including research from the US [3, 32], Canada [33], Germany [34], and the UK [35], but similar to other US studies including women in the population-based CARDIA study [36] and among adults seeking weight loss treatment [37], and lower than the prevalence of weight discrimination reported in US [38] and German [16] samples of adults with obesity. Additionally, rates of weight stigma (e.g., being teased by others) reported across the six countries are somewhat similar to stigmatizing experiences documented in previous US studies using community samples [11, 39], and lower than weight stigma reported in samples of adults with higher levels of obesity [38, 40]. Rates of all forms of weight stigma were highest in Canada (significantly higher than France), which contrasts with limited evidence from Canada suggesting particularly low prevalence rates of weight discrimination in this country [33]. The lack of research in general documenting prevalence rates of weight stigma and discrimination in other countries precludes additional comparisons to contextualize the current study findings, and highlights the need for more work to better understand the prevalence of these experiences across different samples and countries.

Across all six countries, participants with higher BMI were significantly more likely to report weight-stigmatizing experiences than individuals with lower BMI. This finding is consistent with prior US, Canadian, and German studies documenting experiences of weight stigma and discrimination to be most pronounced among adults in higher weight categories and younger age [3, 33, 34, 38]. Across countries, the initial onset of stigmatizing experiences most commonly occurred in adolescence followed by childhood, and stigmatizing experiences were more frequent during these time periods of youth than later in adulthood. Additionally, participants across all countries reported that distress associated with weight stigma experiences was most prominent in childhood and adolescence. Collectively, these findings suggest that childhood and adolescence are time periods of heightened vulnerability for both experiences and distress related to weight stigma. Given longitudinal evidence that experiences of weight teasing in early adolescence can have long-term consequences for maladaptive eating behaviors and weight gain in adulthood [41], the present findings suggest that more cross-

country research is warranted to examine the impact of early experiences of weight stigma on health behaviors and outcomes among adults engaged in weight management.

In general, few cross-country differences emerged in the frequency of weight stigma experiences in various life stages. This consistency is interesting given differences in obesity prevalence rates across the six countries, ranging from 23% (France) to 37% (US). However, there were some exceptions to this finding. First, in the unadjusted models, participants from Australia, Canada and the US reported more frequent weight stigma in young adulthood compared to participants from France, although these differences were no longer significant after covariates were accounted for. Nevertheless, it would be informative for future work to examine factors that might increase the frequency of experiencing weight stigma in early adulthood in these different cultures, such as societal/media messages about body weight targeting young adults. Second, unadjusted associations indicated that participants in Germany reported a higher frequency of weight stigma across their whole life compared to the other five countries, but they also reported the lowest distress associated with stigma compared to participants in those countries. These findings are puzzling, particularly in light of a recent comparative study of weight-biased attitudes in the US and Germany, which found that public weight stigma was significantly more pronounced in the US compared to Germany [14]. Lower ratings of stigma-related distress in Germany could also reflect a cultural tendency to rate negative emotions with less intensity and downplay distress. For example, one recent cross-cultural study found that adults in Germany were more likely to believe that mental illnesses should be kept secret, compared to those in the US and Iceland [42]. It is also possible that there is an effect of participating in the WW program, which offers content and techniques on weight independent self-esteem, dealing with weight stigma, and other mindset topics. Examining possible reasons for our results will require additional cross-country comparisons, including exploration of possible mechanisms that might increase resiliency against distress in the face of weight stigma among individuals with high body weight, such as having a higher core self-evaluation and/or lower internalization of weight stigma [43].

Finally, it is noteworthy that such high percentages of participants in each country reported experiencing weight stigma from family members (76.0–87.8%), classmates (72.0–80.9%), doctors (62.6–73.5%), co-workers (54.1–61.7%), and friends (48.8–66.2%). This suggests that, across countries, adults engaged in weight management face weight stigma in multiple interpersonal relationships in their lives. These findings underscore the importance of studying the impact of weight stigma experienced in different relationships and in different societal settings, and for targeted efforts to reduce weight

stigma in these interpersonal domains. Furthermore, given recent US evidence of associations between specific interpersonal sources of weight stigma (e.g., family members, co-workers) and increased self-blame (e.g., internalized weight bias, which is itself related to maladaptive eating behaviors and weight gain [44, 45]) among adults managing their weight and/or with obesity [23, 46], it will be important to increase research attention to weight-related health consequences resulting from stigma in interpersonal relationships among individuals engaged in weight management.

Limitations

Data in this study relied on self-reported recall of experiences of stigma and body weight. The cross-sectional data preclude any causal conclusions about experiences of weight stigma in this sample. Participants across countries in our study primarily identified as white women; future international research should prioritize comparisons of weight stigma in samples with greater racial/ethnic diversity, and consider the multiple and intersecting layers of stigma that people may face in addition to weight, including their racial/ethnic identity, religion, gender, or sexual orientation. As our study focused on Western countries, future investigation of weight stigma is warranted in Africa, Asia, and South America where body ideals and other relevant aspects of culture may differ. The low response rate prevents generalization to all WW members and/or those seeking treatment. Furthermore, while our study compared weight stigma experiences among adults engaged in weight management, our sample may not be representative of adults with higher weight in general. Nevertheless, commercial programs such as WW are widely used, reaching more people than weight loss treatment programs offered in clinical settings, thus, our findings may have higher generalizability than tightly controlled clinical studies with strict inclusion/exclusion criteria. Given the high percentages of participants across countries who reported experiencing weight stigma from family members, educators, health professionals, and employers, it will be important for future cross-country work to include more comprehensive measures of weight stigma to assess the nature of these experiences in different settings. Finally, data collection occurred during the summer of 2020, several months after the initial COVID outbreak. While survey questions focused on participants' life history of experiences of weight stigma, it is unclear whether completing a survey during this time period colored perceptions of past experiences.

Conclusions

Our study provides the first comprehensive comparison of experiences of weight stigma across multiple countries. In

Australia, Canada, France, Germany, the UK and the US, weight stigma is a prevalent experience for adults who are enrolled in weight management. These stigmatizing experiences most commonly involve teasing (but also mistreatment and discrimination), begin early in life during childhood and adolescence, and induce distress during those time periods. Moreover, most participants across these countries experience weight stigma in multiple and diverse interpersonal relationships, ranging from family members to doctors. Collectively, these findings indicate more cross-country similarities than differences in weight stigma experienced by adults engaged in weight management, and underscore the need for collaborative, multinational initiatives to address weight stigma and implement supportive interventions to help individuals who experience weight stigma and its harmful consequences.

Acknowledgements The authors would like to thank WW members who participated in this study and shared their experiences of weight stigma.

Funding This study was funded by a grant from WW (formerly Weight Watchers) to the University of Connecticut on behalf of RMP. RLP is supported in part by a Mentored Patient-Oriented Research Career Development Award from the National Heart, Lung and Blood Institute/NIH (#K23HL140176).

Compliance with ethical standards

Conflict of interest GDF is an employee and shareholder of WW.

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

References

- Pearl RL. Weight bias and stigma: Public health implications and structural solutions. *Soc Issues Policy Rev.* 2018;12:146–82.
- Puhl RM, Heuer CA. The stigma of obesity: a review and update. *Obesity.* 2009;17:941–64.
- Spahlholz J, Baer N, König HH, Riedel-Heller SG, Luck-Sikorski C. Obesity and discrimination—a systematic review and meta-analysis of observational studies. *Obes Rev.* 2016;17:43–55.
- Wu Y, Berry DC. Impact of weight stigma on physiological and psychological health outcomes for overweight and obese adults: a systematic review. *J Adv Nurs.* 2017;74:1030–42.
- Alimoradi Z, Golboni F, Griffiths MD, Brostrom A, Lin C-Y, Pakpour AH. Weight-related stigma and psychological distress: a systematic review and meta-analysis. *Clin Nutr.* 2020;39:2001–13.
- Brewis A, SturtzSreetharan C, Wutich A. Obesity stigma is a globalizing health challenge. *Glob Health.* 2018;14:20. <https://doi.org/10.1186/s12992-018-0337-x>.
- Hackman J, Maupin J, Brewis A. Weight-related stigma is a significant psychosocial stressor in developing countries: evidence from Guatemala. *Soc Sci Med.* 2016;161:55–60.
- Marini M, Sriram N, Schnabel K, Maliszewski N, Devos T, Ekehammar B, Alia I, Schnall S. Overweight people have low levels of implicit weight bias, but overweight nations have high levels of implicit weight bias. *PLoS ONE.* 2013;8:e83543.
- Brewis AA, Wutich A, Falletta-Cowden A, Rodriguez-Soto I. Body norms and fat stigma in a global perspective. *Curr Anthropol.* 2011;52:269–76.

10. Brewis AA, Wutich A. A world of suffering? Biocultural approaches to fat stigma in the global contexts of the obesity epidemic. *Ann Anthropol Pract.* 2015;38:269–83.
11. Puhl RM, Latner JL, O'Brien K, Luedicke JL, Danielstottir S, Forhan M. A multi-national examination of weight bias: predictors of anti-fat attitudes across four countries. *Int J Obes.* 2015;39:1166–73.
12. Crandall CS, D'Anello S, Sakalli N, Lazarus E, Nejtardt GW, Feather NT. An attribution-value model of prejudice: anti-fat attitudes in six nations. *Pers Soc Psychol Bul.* 2001;27:30–37.
13. Crandall CS, Martinez R. Culture, ideology, and anti-fat attitudes. *Pers Soc Psychol Bul.* 1996;22:1165–76.
14. Kim TJ, Makowski AC, von dem Knesebeck O. Obesity stigma in Germany and the United States—Results of population surveys. *PLoS ONE.* 2019;14:e0221214. <https://doi.org/10.1371/journal.pone.0221214>.
15. Rubino F, Puhl RM, Cummings DE, Eckel RH, Ryan DH, Mechanick JI, et al. Joint international consensus statement for ending stigma of obesity. *Nat Med.* 2020;26:485–97.
16. Jung F, Spahlholz J, Hilbert A, Ridele-Heller SG, Luck-Sikorski C. Impact of weight-related discrimination, body dissatisfaction, and self-stigma on the desire to weigh less. *Obes Facts.* 2017;10:139–51.
17. Sharma S, Wharton S, Forhan M, Kuk J. Influence of weight discrimination on weight loss goals and self-selected weight loss interventions. *Clin Obes.* 2011;1:153–60.
18. Puhl R, Quinn D, Weisz B, Suh Y. The role of stigma in weight loss maintenance among U.S. adults. *Ann Behav Med.* 2017;5:754–63.
19. Gudzone KA, Doshi RS, Mehta AK, et al. Efficacy of commercial weight-loss programs: an updated systematic review. *Ann Intern Med.* 2015;162:501–12.
20. Ahern A, Wheeler GM, Aveyard P, Boyland EJ, Halford JCG, Mander AP. Extended and standard duration weight-loss programme referrals for adults in primary care (WRAP): A randomised controlled trial. *The Lancet.* 2017;389:P2214–25.
21. Wojtanowski AC, Foster GD. Scaling science-based approaches beyond the clinic. In: JM Morton, SA Brethauer, EJ DeMaria, S Kahan, MM Hutter, editors. *Quality in obesity treatment.* Switzerland: Springer Nature; 2019. p117–128.
22. Language Scientific. <https://www.languagescientific.com/>. Accessed 6 Sep 2020.
23. World Health Organization. *Obesity: preventing and managing the global epidemic.* World Health Organization, Geneva, Switzerland, 2000. <https://www.euro.who.int/en/health-topics/disease-prevention/nutrition/a-healthy-lifestyle/body-mass-index-bmi>. Accessed 20 June 2020.
24. Pearl RL, Himmelstein MS, Puhl RM, Wadden TA, Wojtanowski AC, Foster GD. Weight bias internalization in a commercial weight management sample: Prevalence and correlates. *Obes Sci Pract.* 2019;5:342–53.
25. Puhl RM, Heuer C, Sarda V. Framing messages about weight discrimination: impact on public support for legislation. *Int J Obes.* 2011;35:863–72.
26. Pearl RL, Wadden TA, Tronieri JS, Chao AM, Alamuddin N, Bakizada AM, et al. Sociocultural and familial factors associated with weight bias internalization. *Obes Facts.* 2018; 11:157–64.
27. Puhl RM, Brownell KD. Confronting and coping with weight stigma: an investigation of overweight and obese adults. *Obesity.* 2006;14:1802–15.
28. Benjamin DJ, Berger JO, Johannesson M, Nosek BA, Wagenmakers E-J, Berk R, et al. Redefine statistical significance. *Nat Hum Behav.* 2018;2:6–10.
29. Newman ML, Groom CJ, Handelman LD, Pennebaker JW. Gender differences in language use: an analysis of 14,000 text samples. *Discourse Process.* 2008;45:211–36.
30. Organisation for Economic Co-operation and Development (OECD). *Education at a Glance 2020: OECD Indicators.* 2020. OECD Publishing, Paris. <https://doi.org/10.1787/69096873-en>.
31. World Health Organization. *Noncommunicable diseases country profiles 2018.* <https://www.who.int/nmh/publications/ncd-profiles-2018/en/>. Accessed Sep 2020.
32. Udo T, Purcell K, Grilo CM. Perceived weight discrimination and chronic medical conditions in adults with overweight and obesity. *Int J Clin Pract.* 2016;70:1003–11.
33. Godley J. Everyday discrimination in Canada: prevalence and patterns. *Can J Sociol.* 2018;43:111–42.
34. Sikorski C, Spahlholz J, Hartlev M, Riedel-Heller SG. Weight-based discrimination: an ubiquitous phenomenon? *Int J Obes.* 2016;40:333–7.
35. Daly M, Sutin AR, Robinson E. Perceived weight discrimination mediates the prospective association between obesity and physiological dysregulation: Evidence from a population-based cohort. *Psychol Sci.* 2019;30:1030–9.
36. Dutton GR, Lewis TT, Durant N, Halanych J, Keife CI, Sidney S, et al. Perceived weight discrimination in the CARDIA study: differences by race, sex, and weight status. *Obesity.* 2014;22:530–6.
37. Pearl RL, Wadden TA, Tronieri JS, Chao AM, Alamuddin N, Berkowitz RO. Everyday discrimination in a racially diverse sample of patients with obesity. *Clin Obes.* 2018;8:140–6.
38. Puhl RM, Himmelstein MS, Gorin AA, Suh YJ. Missing the target: including perspectives of women with overweight and obesity to inform stigma-reduction strategies. *Obes Sci Pract.* 2017;3:25–35.
39. Himmelstein MS, Puhl RM, Quinn DM. Intersectionality: an understudied framework for addressing weight stigma. *Am J Prev Med.* 2017;53:421–31.
40. Puhl RM, Himmelstein MS, Quinn DM. Internalizing weight stigma: prevalence and sociodemographic considerations in US adults. *Obesity.* 2018;26:167–75.
41. Puhl RM, Wall MM, Chen C, Austin BS, Eisenberg ME, Neumark-Sztainer D. Experiences of weight teasing in adolescence and weight-related outcomes in adulthood: a 15-year longitudinal study. *Prev Med.* 2017;100:173–9.
42. Manago B, Pescosolido BA, Olafsdottir S. Icelandic inclusion, German hesitation and American fear: a cross-cultural comparison of mental-health stigma and the media. *Scand J Public Health.* 2019;47:90–98.
43. Hilbert A, Braehler E, Haeuser W, Zenger M. Weight bias internalization, core self-evaluation, and health in overweight and obese persons. *Obesity.* 2014;22:79–85.
44. Pearl RL, Puhl RM. Weight bias internalization and health: a systematic review. *Obes Rev.* 2018;19:1141–63.
45. Olson KL, Lillis J, Thomas JG, Wing RR. Prospective evaluation of internalized weight bias and weight change among successful weight-loss maintainers. *Obesity.* 2018;26:1888–92.
46. Pearl RL, Puhl RM, Himmelstein MS, Pinto AM, Foster GD. Weight stigma and weight-related health: Associations of self-report measures among adults in weight management. *Ann Behav Med.* 2020;54:904–14. <https://doi.org/10.1093/abm/kaaa026>.