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# Weight bias among exercise and nutrition professionals: a systematic review

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## Summary

Obesity affects approximately one-third of American adults. Recent evidence suggests that weight bias may be pervasive among both exercise and nutrition professionals working with adults who have obesity. However, the published literature on this topic is limited. This review aimed to (i) systematically review existing literature examining weight bias among exercise and nutrition professionals; (ii) discuss the implications of this evidence for exercise and nutrition professionals and their clients; (iii) address gaps and limitations of this literature; and (iv) identify future research directions. Of the 31 studies that met the criteria for this review, 20 examined weight bias among exercise professionals, of which 17 (85%) found evidence of weight bias among professionals practicing physical therapy ($n$ = 4), physical education ($n$ = 8) and personal/group fitness training ($n$ = 5). Of 11 studies examining weight bias among nutrition professionals, eight (73%) found evidence of weight bias. These findings demonstrate fairly consistent evidence of weight bias among exercise and nutrition professionals. However, the majority of studies were cross-sectional (90%). Given that weight bias may compromise quality of care and potentially reinforce weight gain and associated negative health consequences in patients with obesity, it is imperative for future work to examine the causes and consequences of weight bias within exercise and nutrition professions using more rigorous study designs.

**Keywords:** Exercise professionals, nutrition professionals, stigma, weight bias.

**Abbreviations:** BMI, body mass index; IAT, Implicit Associations Test; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

## Introduction

More than one-third (36.5%) of adults have obesity in the USA (1). Individuals with higher body weight are vulnerable to experiencing stigma and discrimination because of their weight (2). While weight stigma can occur at diverse body weights, the highest rates (~45%) of weight discrimination are often reported among adults with class II to class III obesity (body mass index [BMI] ≥35 kg $m^{-2}$) (3,4). These stigmatizing experiences incur a range of negative consequences for emotional and physical health, including increased risk of depression (5,6), low self-esteem (7), poor body image (7), psychological distress (8–10), continued obesity and weight gain (11), physiological reactivity (12,13), cardiovascular disease risk factors (14) and exercise avoidance (15).

Of additional concern, substantial evidence has demonstrated that medical professionals including physicians, nurses, psychologists and medical students hold negative stereotypes and biases towards patients with obesity (2,16,17). As a result, patients with obesity may receive compromised care, be less likely to undergo health screenings and more likely to delay or avoid seeking healthcare (18,19). As research continues to document weight stigma in health care, emerging evidence has found weight bias to

be present among both exercise professionals (e.g. personal trainers and physical therapists) (20–22) and nutrition professionals (e.g. dietitians and nutritionists) (23). These are especially relevant professional populations to examine in the context of weight stigma, which if exhibited by exercise and nutrition professionals may affect the way their clients respond to exercise and nutrition programmes, and/or have adverse implications for their client's mental and physical health.

Specifically, there are demonstrated links between weight bias and unhealthy weight control, binge eating (24,25), increased overall food intake (26), weight gain (11,12) and difficulty maintaining weight loss (27), which make it difficult to adhere to or make progress with a nutrition regimen. Previous studies have also indicated that individuals with obesity who experience weight bias are less likely to participate in physical activity and physical education classes (28,29), have less desire to exercise, and decreased levels of moderate to vigorous intensity exercise (30). Thus, exercise and nutrition professionals who exhibit weight bias may create a harmful cycle in which they prescribe an exercise or nutrition programme that inadvertently reduces the likelihood of their clients' participation or adherence and potentially reinforce behavioural patterns that contribute to weight gain and associated negative health consequences. To gain a comprehensive understanding of the emerging literature in this important area of study, the current review aimed to (i) systematically review existing literature examining weight bias among exercise and nutrition professionals; (ii) discuss the implications of this evidence for exercise and nutrition professionals and their clients; (iii) address gaps and limitations of this literature; and (iv) identify future research directions.

## Methods

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standards (31) were followed for the current review. Boolean searches were performed in PubMed, PsycINFO, CINAHL, Sociological Abstracts, ERIC, socINDEX, Academic Search Premier, Scopus and SportDiscus databases in consultation with a medical librarian for studies examining weight bias as an outcome among students or professionals in exercise or nutrition professions. Databases were searched from inception until 7 February 2018. Eligible exercise professions included any non-physician profession that may prescribe an exercise or physical activity regimen, such as physical therapists, physical education teachers, personal/group fitness trainers, exercise physiologists, exercise specialists and athletic trainers. Eligible nutrition professions included any non-physician profession that may prescribe a nutrition regimen such as dietitians and nutritionists. Databases were searched using keywords related to bias (e.g. stigma, stereotyping, discrimination and prejudice), body weight (e.g. overweight, obesity, fat and body mass index), exercise professionals (e.g. physical therapy, athletic trainers and personal trainers) and nutrition professionals (e.g. dietitian, dietetics and nutritionist). Exclusion of studies was based on the following *a priori* criteria (i) not published; (ii) not published in English; (iii) subjects aged <19 years; (iv) editorials, commentaries and/or other non-research articles; and (v) studies examining exercise or nutrition professionals as victims of weight bias. Only studies including weight bias as an outcome and examining the presence of bias expressed by exercise or nutrition professionals were included. Given that weight bias has been documented in many cultures around the world (32,33), studies outside of the USA were included if the study was published in English. A detailed search strategy is provided in Supplement 1.

## Results

The search and selection process of studies included in this systematic review is presented in Fig. 1. A total of 31 studies that examined weight bias as an outcome among students or professionals in exercise or nutrition professions were included. A total of 29 studies were excluded after a full-text review for (i) not including the study population of interest ($n$ = 13); (ii) not assessing the outcome of interest ($n$ = 10); (iii) being published as a viewpoint review ($n$ = 4); and (iv) being published in a foreign language ($n$ = 2). Detailed characteristics for all included studies are presented in Supplement 2, which are summarized according to the exercise or nutrition professional population studied. Five studies examined weight bias among exercise professionals in a clinical setting, including physical therapists ($n$ = 4) (20,34–36) and physical therapist trainees ($n$ = 1) (37). Eight studies examined weight bias among exercise professionals in an educational setting, including physical education teachers ($n$ = 4) (22,38–40) and physical education teacher trainees ($n$ = 4) (41–44). Seven studies examined weight bias among exercise professionals in an exercise setting including personal/group fitness trainers ($n$ = 4) (21,45–47) and exercise professional trainees ($n$ = 3) (48–50). Eleven studies examined weight bias among nutrition professionals including dietitians/nutritionists ($n$ = 5) (51–55), dietetic/nutrition trainees ($n$ = 5) (15,56–59) and a mixed sample of nutrition professionals/trainees ($n$ = 1) (60).

Of the 31 included studies, one study measured only implicit weight bias (54), 21 studies measured only explicit weight bias (15,20,22,34–37,39,40,46,48,50–53,55–60) and nine studies measured both implicit and explicit weight bias (21,38,41–45,47,49). Implicit weight bias was assessed among the studies using the Implicit Associations Test (IAT) (61) ($n$ = 10) (21,38,41–45,47,49,54). Effect sizes were calculated (62) and pooled for implicit weight bias results

 

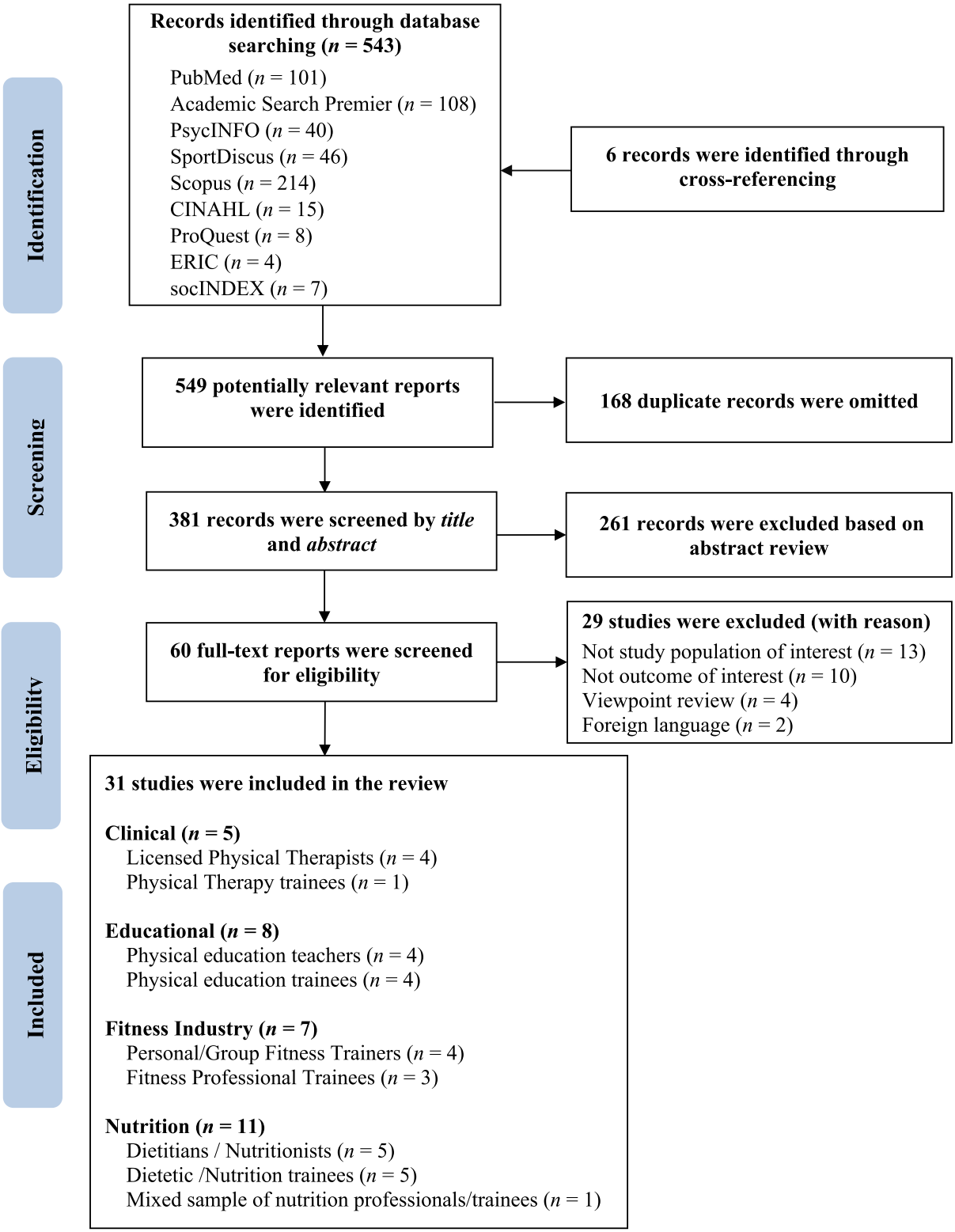


**Figure 1** Flow chart detailing the systematic search of potential reports and selection process of included studies (*n*). [Colour figure can be viewed at wileyonlinelibrary.com]

measured by the IAT, which included results from 10 studies (nine studies of exercise professionals and one study of nutrition professionals). The standardized mean effect size ($d$ = 0.68, 95% CI = 0.46–0.89) was moderate (63) and favoured the presence of implicit weight bias across studies measuring implicit weight bias. Explicit weight bias was assessed among the studies using 14 different measures including the Fat Phobia Scale (64) ($n$ = 7) (15,35,37,52,56–58), Anti-Fat Attitudes Questionnaire (65) ($n$ = 10) (22,34,38,41–45,49,50), Beliefs About Obese People Scale (66) ($n$ = 3) (35,42,57), Attitudes Towards Obese People Scale (66) ($n$ = 2) (42,60), Expectations of Overweight Youth (22) ($n$ = 2) (22,42), Attitude Toward the Client Survey (67) ($n$ = 1) (47), Behaviors Toward Obese and Average-weight Clients (68) ($n$ = 1) (47), Sociocultural Attitudes Towards Appearance Questionnaire (69) ($n$ = 1) (50), Toronto Empathy Questionnaire (70) ($n$ = 1) (35), Youth Obesity and Physical Education Questionnaire (71) ($n$ = 1) (22), case scenarios ($n$ = 3) (39,40), developed questionnaire for the study ($n$ = 7) (36,38,46,48,51,55,59), experimental assessment ($n$ = 2) (15,47) and focus groups ($n$ = 2) (20,53).

In total, 11 studies (35%) examined gender differences in levels of weight bias among exercise (10 studies) (21,22,35,40,43,45,47–50) and nutrition (one study) (57) professionals. Six of these 11 studies found significant differences among men and women. Findings were mixed, with men displaying higher levels of weight bias in two studies of fitness centre employees (45) and exercise science students (50) and women displaying higher levels of weight bias in one study among exercise science students (49). Additionally, compared with men, female physical therapists more commonly displayed empathy towards individuals with obesity in one study (35), and female physical education teachers were more likely to intervene in instances of weight bias towards students in another study (40). Finally, nine (21,35,37,39,49,54,57,59,60) of 31 studies accounted for the exercise or nutrition professional's own body weight when examining their weight biases. Six (35,37,49,54,57,60) of these nine studies showed that the professional's own body weight moderated their level of weight bias, such that exercise and nutrition professionals who were under or normal weight had higher levels of weight bias. Summarized in the following are the study findings for all study populations included in this review.

## Clinical exercise professionals

### *Licensed physical therapists*

Two cross-sectional studies (35,36) examined weight bias among physical therapists. Wise and colleagues (35) enrolled 13 types of rehabilitation professionals ($N$ = 221), with physical therapists being the most common clinical exercise-related profession (19%), and examined their attitudes and beliefs towards obesity using the Fat Phobia Scale and the Modified Beliefs About Obese People Scale. Rehabilitation professionals, including physical therapists, demonstrated average levels (3.5 out of 5) of fat phobia, with higher levels of fat phobia found among younger (i.e. aged <40 years; $p < 0.001$) and normal weight professionals (i.e. BMI <25 kg m$^{-2}$; $p$ = 0.017). Beliefs about the cause of obesity was also a predictor of fat phobia ($p < 0.001$). In contrast, Sack and colleagues (36) found that 341 physical therapists who completed a paper mail survey designed to assess weight-related attitudes, knowledge and practice approaches demonstrated neutral attitudes towards individuals with obesity. The respondents' knowledge scores (mean = 6.7 out of 10) and attitudes regarding statements about obesity were positively correlated ($r$ = 0.133, $p$ = 0.043), with higher scores indicating more positive attitudes.

Setchell and colleagues (20) used an interpretive qualitative study design with Australian physical therapists ($N$ = 27) to examine ways of talking about patients with overweight and obesity. The data were collected from six focus groups consisting of four to six physical therapists, who typically described patients with overweight/obesity as being minimally affected by stigma and difficult to treat. These physical therapists also described body weight as having simple causes and being important in physical therapy. The authors suggest that physical therapists should be further educated regarding the complex understandings of working with individuals with obesity as well as weight stigma. A cross-sectional study by Setchell and colleagues (34) reported similar findings among 265 Australian physical therapists. Participants in this study completed the Anti-Fat Attitudes Questionnaire and physical therapy case studies with patients of varying BMI. Weight stigma was assessed by comparing quantitative responses with the case studies among people with different BMI categories and by thematic and count analysis for free-text responses. Findings showed that physical therapists demonstrated a mean weight bias score of 3.2 (out of 8) on the Anti-Fat Attitudes Questionnaire. Participant responses to the case studies were not indicative of weight bias for clinical parameters such as length of treatment time or amount of hands-on treatment with patients, but they did display explicit weight bias in free-text responses about patient management.

### *Physical therapy trainees*

Awotidebe and colleagues (37) implemented a cross-sectional, quantitative study design to examine knowledge and attitudes of 170 physical therapy students towards obesity. Although the students demonstrated average levels of knowledge regarding obesity on the Obesity Risk Knowledge Scale (mean score = 6 out of 10), more than 80% reported that obesity is a behavioural problem and 97.6% characterized individuals with obesity as lazy, unattractive, insecure and with lower self-esteem on the Fat Phobia Scale.

Furthermore, the underweight or normal weight students were more likely to view individuals with obesity as having no endurance and self-indulgent. These findings highlight the importance of including weight bias as a topic of education within the physical therapy curriculum.

## Exercise professionals in education

### *Physical education teachers*

Fontana and colleagues (38) conducted a cross-sectional stratified random sampling study design to examine implicit anti-fat bias (using the IAT) among physical education professors ($N$ = 94) from randomly selected universities. The participants exhibited implicit 'good-bad' ($p < 0.001$) and 'lazy-motivated' ($p < 0.001$) anti-fat biases. Implicit anti-fat bias was also associated with disapproval of 'obese' physical education teachers as role models to students ($p = 0.047$). In addition, a majority (73%) of physical education teachers agreed that physical education teachers should not be obese ($p < 0.001$), because they are role models to their students, but 82% believed that physical education programmes should accept students with obesity ($p < 0.001$). The authors indicated that the anti-fat bias demonstrated by physical education professors may have a negative effect on the training of preservice physical education teachers working with students of diverse body types.

Greenleaf and Weiller (22) examined anti-fat attitudes among physical education teachers ($N$ = 105) and their performance and ability expectations for youth with and without high body weight. The physical education teachers reported moderate anti-fat attitudes (three out of five) on the Anti-Fat Attitudes Test and higher expectations for youth with healthy weight versus youth with overweight in skill areas of coordination ($p < 0.05$), strength ($p < 0.05$), sport competence ($p < 0.001$), physical ability ($p < 0.001$) and reasoning ability ($p < 0.001$). Peterson and colleagues (39) conducted a cross-sectional experimental study of physical education teachers and coaches ($N$ = 162). The participants were randomly assigned to read a scenario about a male and female student of average weight or overweight who were the targets of weight-based victimization. The physical education teachers and coaches reported a higher likelihood of intervening when the female student victim was overweight rather than average weight, specifically in situations of relational victimization (i.e. behaviours detrimental to relationships or one's social reputation; $p = 0.019$). Male teachers were less likely to respond to incidents of weight-based victimization compared with female teachers. The results of this study provide further evidence for the importance of increasing awareness of weight-based bias among physical educators and intervening to address weight bias regardless of a student's gender. With this sample, Peterson and colleagues (40) additionally found that physical educators' expectations and attitudes regarding students may be negatively influenced by youths' body weight and gender, with participants expressing poorer performance expectations in overweight women only.

### *Physical education trainees*

Readdy and Wallhead (44) conducted an interpretive qualitative and quantitative study to examine implicit and explicit weight bias among 18 preservice physical education teachers and determine if the presence of weight bias manifested in the quality and frequency of teacher feedback in K-12 physical education settings. Preservice physical education teachers reported small explicit fat bias on the Anti-Fat Attitudes Scale (16.5 ± 4.03 out of 25). Furthermore, educators with strong implicit and explicit bias provided more feedback regardless of the student's weight status, and those with moderate bias interacted less frequently with students perceived to be overweight, while educators with no bias communicated equally regardless of the student's weight status. These results suggest that some educators may change their feedback behaviours to be more encouraging for students with overweight.

O'Brien and colleagues (41) conducted a cross-sectional study to examine the prevalence of implicit and explicit weight bias among physical education ($n$ = 180) and psychology ($n$ = 164) students. The physical education students reported higher levels of implicit anti-fat bias than psychology students ($p < 0.01$) on the IAT. Third year physical education students reported greater implicit anti-fat bias than first year physical activity students on the IAT ($ps < 0.05$), a finding moderated by social dominance orientation (i.e. one's amount of preference for inequality among social groups) and lower body esteem (i.e. self-evaluation of one's body). Physical education students also demonstrated significantly higher explicit weight bias on the willpower subscale of the Crandall's 13-item Anti-Fat Attitudes Questionnaire than the psychology students ($p < 0.0005$). Similarly, Lynagh and colleagues (42) conducted a cross-sectional study to examine implicit and explicit weight bias among undergraduate non-specialist ($n$ = 177) and specialist ($n$ = 62) men ($n$ = 68) and women ($n$ = 134) health and physical education majors. Findings showed that non-specialist and specialist students reported implicit and moderate explicit anti-fat bias, respectively. Compared with non-specialist trainees, specialists had lower expectations for children with obesity regarding their 'reasoning' ($p = 0.01$) and 'cooperation' ($p = 0.04$) skills. A third cross-sectional study by Alameda and Whitehead (43) examined levels of anti-fat bias in American ($n$ = 59) and Mexican ($n$ = 53) undergraduate physical education and exercise science students, as well as Mexican athletes. Students' average total scores on the Anti-Fat Attitude Test did not reflect explicit anti-fat bias; however, the entire sample displayed significant implicit anti-fat bias on 14 of 18 subscales on the IAT.

 

## Exercise professionals in the fitness industry

### *Personal/group fitness trainers*

Fontana and colleagues (47) performed a two-phase, cross-sectional study and compared exercise recommendations, attitudes and behaviours of personal trainers ($N$ = 52) towards clients with obesity versus clients with normal weight. In phase one, personal trainers completed the IAT and watched videos of mock clients with obesity and normal weight with identical health profiles with the exception of their BMI. Following the videos, the trainers provided exercise recommendations for the clients and completed the Attitude Toward the Client Survey. In phase two, the personal trainers met with a client with obesity or a client with normal weight, and interaction behaviours were measured including the duration and the amount of exercise advice provided and the sitting distance between the trainer and client. Although the entire sample expressed significant implicit anti-fat bias on the IAT in phase one, there were no significant differences in exercise recommendations provided (i.e. duration and intensity) or attitudes of personal trainers among clients with obesity and clients with normal weight ($p$s $> 0.05$). In phase two, the amount of exercise advice provided, duration of answers and the sitting distance were also not different among clients with obesity and clients with normal weight ($p$s $> 0.05$).

Dimmock and colleagues (45) conducted a cross-sectional study to examine explicit and implicit weight bias among 70 fitness centre staff members including management and administrative staff, personal trainers, fitness instructors and exercise/sport psychologists. All participants exhibited moderately strong implicit weight bias on the IAT ($p < 0.01$); however, levels of weight bias were the same in both exercise (IAT = 0.39) and neutral (IAT = 0.39) contexts, indicating that weight bias among exercise professionals extends outside of the fitness setting. Robertson and Vohora (21) examined weight bias among 57 fitness and aerobics instructors and found strong anti-fat bias on the IAT ($p < 0.001$). In contrast, Hare and colleagues (46) found that 74% of 254 fitness instructors certified by the American College of Sports Medicine reported neutral levels of weight bias on a questionnaire developed to assess school and medical professional's attitudes towards obesity. While it is not clear why these results contrast with other work demonstrating higher levels of weight bias (21,45), these findings suggest that it may be important to assess whether the type of certification held by fitness professionals plays a role in their biases.

### *Exercise professional trainees in the fitness industry*

Chambliss and colleagues (49) conducted a cross-sectional study to examine the attitudes of 246 undergraduate and graduate exercise science students towards individuals with obesity. A strong anti-fat implicit bias was found (using the IAT) against individuals with obesity, including 'good versus bad' attitude ($p < 0.001$) and 'motivated versus lazy' ($p < 0.001$). The 'good versus bad' implicit weight bias was more evident among individuals with a lower BMI ($p = 0.006$). Greater beliefs in personal responsibility for obesity were also associated with stronger lazy bias ($p < 0.001$). Sartore and Cunningham (48) conducted three cross-sectional studies and examined the impact of weight discrimination on perceived attributions, person-job fit and hiring recommendations in the fitness industry among university students enrolled in health and kinesiology classes. Participants in all three studies evaluated applications of varying qualifications and weight statuses. In all three studies, qualified applicants who were overweight, relative to their qualified and sometimes unqualified thin counterparts, were judged by students to have less desirable attributes, considered less suitable for the position, and less likely to receive a hiring recommendation ($p$s $< 0.05$). These results suggest that individuals seeking employment in the fitness industry may be susceptible to weight bias. More recently, Langdon and colleagues (50) examined psychosocial predictors of obesity bias among 168 undergraduate exercise science students from two universities. Using the Fat Phobia Scale and the Anti-fat Attitudes Test, exercise science students exhibited moderate fat phobia and endorsed specific anti-fat stereotypes towards individuals with overweight and obesity, which were found to be significant predictors of obesity bias ($p < 0.001$).

## Nutrition professionals

### *Dietitians*

Four studies (51,52,54,55) have examined weight bias among dietitians using cross-sectional designs, with three (51,52,54) documenting a presence of weight bias. De Costa Cori and colleagues (51) found a high prevalence of weight bias reported by dietitians, who described individuals with obesity by greed (67.4%), unattractiveness (52%), ungainliness (55.1%), lack of willpower (43.6%) and laziness (42.3%). Similarly, Edelstein and colleagues (54) found that 76% of registered dietitians ($N$ = 128) reported moderate to strong preference ($p = 0.05$) for thin people compared with people with overweight on the IAT, exceeding the test's general population norm of 52%. In addition, registered dietitians with overweight had no preference for thinness, while those who were normal weight displayed bias against people with obesity.

Hellbardt and colleagues (52) found that dietitians ($N$ = 49) had an unfavourable evaluation of a person who is overweight (mean fat phobia score = 3.35) compared with a person who is normal weight (2.61; $p < 0.001$). However, McArthur and colleagues (55) conducted the only cross-sectional study that found dietitians ($N$ = 23) reported ambivalent attitudes towards clients who were overweight.

Stone and Werner (53) conducted an interpretive, qualitative study design with four focus groups of 23 female Israeli dietitians who exhibited emotional rejection of patients with obesity through instrumental, professional, and interpersonal avoidance.

### *Nutrition/dietitian trainees*

Five cross-sectional studies (15,56–59) have examined weight bias among nutrition or dietetic trainees, three of which included control groups (15,58,59). Bacardi-Gascon and colleagues (56) found moderate fat phobia (F-scale mean score = 3.45) on the Fat Phobia Scale reported by 88% of Mexican nutrition students ($N$ = 630). Swift and colleagues (57) also found moderate levels of fat phobia (F-scale score mean = 3.8) on the Fat Phobia Scale among 1,130 trainee dietitians, doctors and nutritionists, with lower fat phobia predicted by higher self-reported BMI among the participants. Only 1.4% of participants expressed 'positive or neutral' attitudes towards individuals with overweight/obesity. Of the three controlled studies, only one (15) found a moderate level (F-scale score mean = 3.7) of fat phobia reported among 182 undergraduate dietetic students, who also rated patients with obesity as being less likely to comply with treatment recommendations, and having poorer diet quality and health status compared with non-obese patients ($p$s $< 0.05$). In contrast, Berryman and colleagues (58) measured explicit weight bias using the Fat Phobia Scale, and McArthur (59) measured implicit weight bias using a questionnaire developed for their study, and neither of these cross-sectional, controlled studies found weight bias among their samples of dietetic ($n$ = 38) versus non-dietetic ($n$ = 38) and nutrition ($n$ = 98) versus non-nutrition ($n$ = 418) students, respectively ($p$s $> 0.05$).

Oberrieder and colleagues (60) assessed implicit weight bias using the Attitudes Towards Obese People Scale among a mixed sample of dietetic undergraduate students ($n$ = 64) and registered dietitians ($n$ = 234). Both students and registered dietitians had scores indicative of negative obesity attitudes (score $> 93$), with no differences between the two groups ($p > 0.05$). However, students who perceived themselves as having a healthy weight had a higher negative obesity attitude score compared with participants who self-reported as being overweight ($p = 0.043$). The mixed results from studies examining weight bias among nutrition/dietitian trainees indicate the need for further research to examine if the amount of experience (e.g. working years) in the field moderates nutrition professional's attitudes towards individuals with overweight/obesity.

## Discussion

The primary aim of this review was to systematically review the current literature examining weight bias among exercise and nutrition professionals. Thirty-one articles were included in this review; of the 20 studies examining exercise professionals, 17 (85%) demonstrated evidence of weight bias among these professionals, and of the 11 studies assessing nutrition professionals, eight (73%) reported the presence of weight bias. The studies included in our review were conducted in the USA (87%), Australia (3.2%), Brazil (3.2%), Mexico (3.2%) and the UK (3.2%), all of which have similar rates of overweight and obesity (72). Collectively, this research indicates that weight bias is common in both professions. In addition, weight bias was present in both women and men in these professions, and on both implicit and explicit measures of bias. Despite the emerging literature on this topic, the strength of evidence demonstrating weight bias among exercise and nutrition professionals is variable, in part because of methodological limitations. All studies in the current review used cross-sectional designs (seven with control groups) to examine weight bias among exercise and nutrition professionals, with the exception of three studies (20,44,53) that used interpretative qualitative designs (i.e. in the context of an experience). Longitudinal, randomized, experimental research designs should be implemented to better establish sequences of events or experiences that contribute to the onset and persistence of weight bias among exercise and nutrition professionals over time. Examining weight bias among exercise and nutrition professionals both acutely and over time will provide a better understanding of the influence that education, training and personal experiences have on whether or not these professionals harbour and/or express weight bias in their professional practice.

Additionally, there were 14 different measures used to assess explicit weight bias across studies in this review, all of which were self-report questionnaires or content generated from focus groups, which makes it difficult to compare results because these measures may assess different constructs of weight bias. As a result, a pooled analysis could not be conducted for the results of measurements assessing explicit weight bias. Of the 20 studies examining weight bias among exercise professionals, 16 studies reported the magnitude of weight bias, which included neutral or no ($n$ = 1 implicit; $n$ = 5 explicit), low ($n$ = 2 implicit; $n$ = 2 explicit), moderate ($n$ = 3 implicit; $n$ = 6 explicit) and high ($n$ = 3 implicit; $n$ = 3 explicit) weight bias. Therefore, the most common levels of weight bias found among exercise professionals were moderate and high for implicit (each 19% of studies) and moderate for explicit (38% of studies) weight bias. Of the 11 studies examining weight bias among nutrition professionals, nine studies reported the magnitude of weight bias, which included neutral or no ($n$ = 0 implicit, $n$ = 3 explicit), low (implicit $n$ = 1, explicit = 0), moderate ($n$ = 0 implicit, $n$ = 4 explicit) and high ($n$ = 1 implicit, $n$ = 1 explicit) weight bias. Therefore, the most common levels of weight bias found for nutrition professionals was low and high for

 

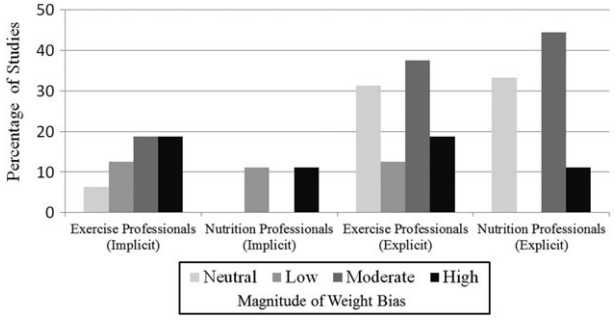


**Figure 2** The magnitude of implicit and explicit weight bias among exercise and nutrition professionals reported by the included studies. Note: The magnitude of weight bias could not be extrapolated from six studies (four studies of exercise professionals and two studies of nutrition professionals) based on the study's results presented.

implicit (each 11% of studies) and moderate for explicit (44% of studies) weight bias. Overall, weight bias was more commonly found among measures of implicit weight bias (91%) compared with measures of explicit weight bias (65%). Figure 2 provides a visual comparison of the magnitude of implicit and explicit weight bias documented in nutrition and exercise professionals across studies.

Given that 6 of the 31 (19%) studies in this review did not find weight bias among exercise ($n$ = 3) and nutrition ($n$ = 3) professionals in their primary outcome, it may be important to carefully examine the content and format of measurement of weight bias to better understand these findings. For example, the only two studies (36,55) that mailed questionnaires assessing explicit weight bias did not find evidence of weight bias among exercise (36) or nutrition (55) professionals. It has been hypothesized that individuals completing in-person or phone call questionnaires may inaccurately report information due to limited time to complete the questionnaire (73), and telephone/in-person questionnaires may also lead to more extreme responses (e.g. responses that favour a positive finding) compared with mailed questionnaires (74). Thus, format of measurement (in person vs. mailed) may be an important consideration in assessment of weight bias. In addition, four of the six studies that did not find weight bias among exercise and nutrition professionals used questionnaires developed specifically for their respective studies (36,46,55,59). Therefore, it is not clear if these self-report questionnaires were validated or reliable. Finally, given that studies to date have relied on self-report measures, future research should also seek to utilize observational, behavioural and other objective assessments of weight bias. For example, observing and coding professional interactions with clients of diverse body sizes such as the two-phase study by Fontana and colleagues (47) could provide important insights regarding the ways in which weight biases may be communicated in clinical settings.

Another limitation of existing research pertains to sample diversity. The studies that reported gender of participants in the current review consisted primarily of women for both exercise (sample mean = 60% women) and nutrition professionals (sample mean = 98% women; Supplement 2). Some work suggests that women may experience weight stigmatization at higher rates than men, and at lower levels of excess weight than their male peers (3). Men are also more likely to express weight bias than women, particularly implicit weight bias (17,19). Only 11 studies (35%) examined gender differences, of which 10 were among exercise professionals, and these generated mixed results. Thus, the results from these studies cannot be generalized to men, especially research pertaining to nutrition professionals. Future studies should continue to examine gender differences in weight bias among exercise and nutrition professionals to help clarify the nature, extent and impact of weight biases among women versus men in these professional groups. The included studies' samples also comprised primarily Caucasian/White participants. Previous studies (75) report that weight stigma is experienced across racial groups; however, racial groups may internalize and cope with stigma differently (75), and therefore, future studies should explore race/ethnicity as a potential moderator. In addition, less than one-third of the included studies (9 of 31) accounted for the exercise or a nutrition professional's own body weight when examining their weight biases. Therefore, future studies should also continue to examine the exercise or nutrition professional's own body weight as a potential moderator of weight bias. It was also not clear if the studies including samples of non-trainee nutrition professionals were credentialed or non-credentialed nutrition professionals. Only one study (54) specified that their sample included registered dietitians, whereas all other studies used the terms 'dieticians' or 'nutritionists'. Future studies examining weight bias among nutrition professionals should clarify the credentials of their sample to assess whether levels of weight bias differ among credentialed versus trainee or non-credentialed groups. Furthermore, theoretically driven studies aiming to understand the reasons for, and origins of, weight bias in these professional populations could be informative for advancing this field of study. Theoretical underpinnings of weight bias have been extensively studied in the psychology literature, and it seems warranted to determine how these existing (or other) conceptual frameworks for weight bias can further our understanding of this issue among exercise and nutrition professionals. Table 1 provides additional directions for future research to advance understanding of weight bias among exercise and nutrition professionals.

Finally, while the existing evidence has primarily focused on documenting weight bias in nutrition and exercise professions, there remains an absence of systematic research efforts to identify effective strategies to reduce stigma in these

 

**Table 1** Directions for future research to advance understanding of weight bias among exercise and nutrition professionals

| | Future research directions |
|---|---|
| Population/domain | |
| Clinical exercise professionals | Compare prevalence of weight bias among clinical exercise professionals with various certifications, licences and degrees |
| | Evaluate inclusion of training/education on weight bias certification, licence and degree curriculum |
| | Evaluate weight bias among other exercise professionals working in a clinical setting, including clinical exercise physiologists and clinical exercise specialists |
| Physical education professionals | Assess effectiveness of weight bias education and training in programmes intended to promote physical activity among overweight and obese youth |
| | Examine whether sociodemographic characteristics of physical educators moderate levels of weight bias |
| Exercise professionals in the fitness industry | Compare prevalence of weight bias among exercise professionals in the fitness industry with various exercise certifications and degrees |
| Nutrition professionals | Conduct additional studies examining weight bias among nutrition professional trainees to clarify if the amount of experience (e.g. working years) in the field moderates attitudes towards individuals with overweight/obesity |
| Study design | Conduct longitudinal, randomized, controlled trial designs to better establish causes of weight bias among exercise and nutrition professionals |
| Methodology | Collect data on larger, more diverse samples of practitioners |
| | Include samples of equal number of men and women to better generalize results among men |
| | Assess weight bias across studies using consistent measures to confirm reliability and validity of results |
| | Clarify if sociodemographic background (e.g. race/ethnicity, age and work experience) as well as the exercise and nutrition professional's own body weight moderate their weight bias |
| | Examine how existing or other theoretical frameworks of weight bias can inform current understanding of this issue in nutrition and exercise professionals and its implications for their treatment practices |
| Patient experiences | Further establish the influence of weight bias on the hiring of overweight/obese exercise and nutrition professionals in their respective industries |
| | Examine the influence of having a family history of obesity on weight bias among both the client/patient and exercise and nutrition professionals |
| Behavioural outcomes | Further examine the effect of weight bias on the way exercise and nutrition professionals practice (e.g. poorer quality treatment of patients) |
| | Further examine the effect of weight bias on exercise and nutrition programme adherence |
| Stigma reduction efforts | Study client and patient responses to weight bias from exercise and nutrition professionals to help inform intervention approaches |
| | Test existing or newly developed weight bias reduction strategies in exercise and nutrition professional settings |
| | Develop a standardized weight stigma training module that is included in all health professional training certifications |

groups and professional settings. A clear priority for future work is to identify ways to effectively prevent and reduce weight bias in these professions. A key part of these efforts will be identifying potential changes needed in academic curriculums to improve professional programmes for trainees so that they are knowledgeable about weight bias and prepared to deliver compassionate and sensitive care to individuals affected by overweight and obesity in their respective fields. This training may in part need to address increased acceptance of diverse body types among exercise and nutrition professionals themselves, who can also be victims of weight bias (48,76).

Puhl and Wharton (77) offer additional strategies for fitness professionals to reduce weight bias, several of which can be implemented by nutrition professionals (15) as well. As a first step, the authors recommend increasing self-awareness of weight bias through self-reflection and examining one's own comfort level, sensitivity, stereotypes, assumptions and feedback towards clients of diverse body sizes. It is also important to engage in sensitive and appropriate communication, to avoid unintentional weight bias, which includes both verbal interactions (e.g. language used to discuss body weight) and nonverbal behaviours (e.g. facial expressions). Several recent studies examining preferences for weight-based terminology in adults indicate that certain words to describe weight are perceived to be stigmatizing and blaming and that people prefer more neutral language (e.g. 'weight' and 'body mass index') from health professionals (78–80). Thus, it may be helpful to ask clients what words they feel most comfortable using for discussions about weight-related health. These findings mirror a recent resolution approved by the American Medical Association House of Delegates to improve obesity treatment by educating medical professionals to engage in respectful, non-biased communication about obesity (81). Beyond communication, nutrition and exercise professionals can create supportive facilities that accommodate clients of diverse body sizes, including the physical office environment (e.g. allowing sufficient space for clients to be easily mobile and providing sturdy armless chairs and

 

furniture for clients to sit in), and techniques (e.g. weighing clients in a private setting using scales that accommodate individuals with high body weight).

## Conclusion

The current systematic review adhered to PRISMA contemporary standards (31). Findings of our review show that there is an established and consistent body of evidence demonstrating weight bias among exercise and nutrition professionals, using both implicit and explicit measures of weight bias. However, these results are based on cross-sectional and interpretative qualitative study designs, and longitudinal, randomized, experimental studies are needed, as is more consistent measurement of weight bias. Addressing key gaps and methodical limitations in the current literature can provide essential knowledge that can potentially improve academic curriculums and best-practice strategies to effectively reduce weight bias in the exercise and nutrition professions.

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## Conflict of interest statement

No conflict of interest was declared.

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## Supporting information

Additional supporting information may be found online in the Supporting Information section at the end of the article.
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**Supplement 1**. Systematic Search Methods

**Supplement 2.** Characteristics of studies (*N*=31) examining weight bias among exercise and nutrition professionals.

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