

Mount Saint Vincent University
Department of Applied Human Nutrition

**The Student Body Project: Evaluating a multi-strategy weight bias reduction intervention
with food and nutrition students in Nova Scotia, Canada**

by
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Abstract

Title: **The Student Body Project: Evaluating a multi-strategy weight bias reduction intervention with food and nutrition students in Nova Scotia, Canada**
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Introduction: Research has demonstrated that weight bias exists in areas such as education, most stages of employment and healthcare. The prevalence of weight bias in healthcare is troublesome, as it can negatively influence the thoughts and actions of health practitioners in practice and create barriers for patient health behaviours and outcomes. Registered dietitians (RDs) are one example of healthcare providers in which weight bias has been documented globally. It has been suggested that current healthcare university programs, such as nutrition and dietetics, do not provide enough training for future healthcare professionals regarding interactions with individuals having overweight or obesity and that additional education is needed for RDs to improve attitudes towards individuals with overweight or obesity. Multiple approaches have been utilized in intervention studies to detect and reduce weight bias among students and professionals in various health disciplines; however, none have been trialed with students studying food and nutrition in Canada.

Objectives: To address the gap in the literature where little research exists on the presence or reduction of weight bias among students studying food and nutrition in Canada by evaluating a novel multi-strategy weight bias education workshop with a group of food and nutrition students enrolled in a professional university program in Nova Scotia.

Methods: A quantitative repeated-measures research design was employed to assess explicit weight bias and anti-fat attitudes among students. Data was collected from participants at three time points: pre- and post-workshop (T₁ and T₂), and follow-up (T₃), using self-report surveys. The surveys measured three constructs related to anti-fat attitudes (AFA): dislike, fear of fat, and willpower, and three constructs associated with universal bias against heavy individuals (UMB-FAT): negative judgment, discomfort with proximity, and equal rights.

Results: Twenty-two participants completed the workshop and pre- and post-workshop surveys; however, there was a high attrition rate at follow-up (77%). Students expressed low explicit weight bias at baseline on all measured constructs of the UMB-FAT and AFA, apart from the fear of fat subscale of the Anti-Fat Attitude Scale, where participants demonstrated moderate explicit weight bias. There was a significant decrease in mean AFA scores from pre- to post-workshop, and from pre-workshop to follow-up, on all three subscales, but not from post-workshop to follow-up. No significant effect was observed when measuring the three constructs associated with the UMB-FAT.

Conclusions and Implications: There is some evidence to suggest that the weight bias education workshop, evaluated in this study, may help to reduce anti-fat attitudes, associated with dislike, fear of fat, and willpower, among food and nutrition students. However, the data are limited by small sample size and lack of control group. The moderate fear of overweight or obesity detected among students in this study may indicate a need for increased focus, within the food and nutrition curriculum, on how personal relationships with food and weight can influence professional practice.

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Terms and Definitions

- **Body Mass Index (BMI):** measure used for classifying weight and evaluating associated health risks; can be calculated by dividing a person's weight in kilograms by the square of their height in meters (kg/m^2) (8).
- **Discrimination:** unjustifiable negative behaviour toward a group or its members (9).
- **Explicit Bias:** attitudes or behaviours that are expressed flagrantly and at one's discretion (10).
- **Ideology:** culturally-shaped concepts about how we see and make sense of the world around us; play a crucial role in the prediction of behavior (11).
- **Implicit Bias:** a rapid automatic response that occurs unconsciously without intent and is not expressed openly (10).
- **Overweight:** a BMI greater than or equal to $25 \text{ kg}/\text{m}^2$ indicates overweight (8).
- **Obesity:** a BMI greater than or equal to $30 \text{ kg}/\text{m}^2$ indicates obesity (8).
- **Prejudice:** a negative attitude toward a group (9).
- **Stereotype:** a belief about the personal attributes of a group or individual (9).
- **Stigma:** an attribute, or characteristic, that conveys a social identity that is devalued in some particular social context (12).
- **Stigmatization:** prejudice, bias, and discrimination directed toward individuals possessing a stigma (12).
- **Weight bias:** negative weight-based assumptions, stereotypes, or judgments that affect behaviours and interactions with those believed to have a body size that deviates from the cultural norm; is bi-directional (underweight versus overweight) (13).

Chapter 1: Introduction

Despite decades of research on weight bias and its negative effects, overweight and obesity remain the last socially acceptable form of prejudice and discrimination in western Europe and North America (14). This is concerning, as the number of individuals in Canada reporting overweight or obesity continues to rise (8). A recent trend analysis, using data from Canadian Community Health Surveys (CCHS) administered between 1985 and 2011, shows that the prevalence of adults having overweight or obesity increased from 27.8 to 33.6 percent, and 6.1 to 18.3 percent, respectively (15). New data from the CCHS, indicate that, as of 2014, over half (54%) of the Canadian adult population are classified as having overweight or obesity, with the highest rates existing in the Territories and Atlantic provinces (16).

A great deal of research has demonstrated the complex and multifactorial etiology of overweight and obesity (17–19). Yet, body weight is habitually perceived to be under one's personal control (20). Attributing excess body weight to personal responsibility and controllability fuels weight bias, which can be defined as negative weight-based assumptions, stereotypes, or judgments that affect behaviours and interactions with those believed to have a body shape and/or size that deviates from the cultural norm (13). These negative attitudes can be expressed implicitly or explicitly and can lead to prejudice and discrimination. Implicit bias is a rapid automatic response that occurs unconsciously without intent and is not expressed openly (10). For example, assuming an individual possesses or lacks certain characteristics, such as being lazy, sloppy, weak-willed, unmotivated or lacking self-discipline, and subsequently avoiding eye contact or distancing oneself from this individual (10,21–26). By contrast, explicit bias is expressed flagrantly and at one's discretion (teasing, derogatory remarks, social exclusion) (10). It has been proposed that implicit and explicit attitudes are distinct constructs. Implicit attitudes are developed through repeated exposure to socially constructed and environmentally propagated interpretations of body weight and size and they occur despite deliberate attempts to evade them (27). Explicit thoughts are internalized and affirmed as one's personal beliefs (28). Unlike implicit attitudes, these thoughts are open to conscious inspection and one can choose whether or not to overtly express their bias (27).

Implicit and explicit weight bias can have profoundly detrimental ramifications for the health of targeted individuals. From physical outcomes, like high blood pressure and cortisol levels (as a result of stress) to poor psychosocial health (29,30). For example, it has been reported that

anticipated or experienced weight bias can increase vulnerability to mood and anxiety disorders, depression, low self-esteem and body dissatisfaction (30–35). Exposure to weight bias has also been shown to negatively affect vital health behaviours, such as the development of maladaptive eating patterns, increased caloric intake, decreased motivation for physical activity, and exercise avoidance (12,36–43). Furthermore, it has been postulated that weight bias acts as a social stressor in a vicious cycle whereby it facilitates weight gain and subsequently, results in greater experiences of weight bias (44,45).

In spite of negative documented effects, weight bias remains pervasive in the industrialized world and exists in multiple life domains (46). It has been documented that negative attitudes and behaviours toward individuals with overweight or obesity start as early as pre-school, where students categorize heavier peers as mean, stupid, ugly, and having few friends (47,48). These negative attitudes continue through childhood and into adolescence, where individuals with overweight or obesity are teased, chosen less as playmates and excluded from social activities (49). In addition to harassment and rejection from peers, adolescents having overweight or obesity are perceived by educators as more emotional, less tidy, and less likely to succeed than students characterized as normal weight (49,50). Furthermore, educators hold biased opinions about the academic capabilities of youth living with overweight or obesity, believing they have lesser social, reasoning, physical, and teamwork skills than their slimmer peers, as well as lower performance expectations (51,52). It has also been demonstrated that body size affects education attainment, where adolescents with overweight or obesity are less likely to be admitted into post-secondary institutions, despite comparable applications to their normal weight peers (53,54).

Weight bias carries over from the education system into the workplace, where negative weight-based attitudes are observed in most stages of employment, including hiring, wage determination, promotion, and termination (55–60). Furthermore, victims of bias report unequal treatment by coworkers and supervisors, who often stereotype larger individuals as less meticulous, agreeable, emotionally stable, and extraverted than normal-weight colleagues (61,62). In a recent study, participants viewed resumes of women applying for a managerial position and were asked to evaluate the applicants across a number of selection criteria. Each resume had an attached photo of either a female with obesity, pre-bariatric surgery, or the same female post-bariatric surgery (non-obese). It was discovered that individuals with obesity received more

negative responses on leadership potential, predicted success, likelihood of being selected, salary, total employment rating, and order of preference compared to the slimmer job candidates (63).

Negative weight-based attitudes have also been witnessed at home in interpersonal relationships. Puhl and Brownell (2006) examined 22 different sources of stigma among 2449 women with overweight or obesity and discovered that 72 percent of participants reported weight bias from family members, including mothers, fathers, sisters, brothers, sons, and daughters. Friends were slightly lower sources of weight bias (60 percent), followed by spouses (47 percent) (64). In romantic relationships women tend to experience greater weight bias than men, where women categorized as overweight or obese are said to have fewer dating prospects, are less likely to date, and are perceived as less sexually attractive, skilled, and less likely to experience sexual desire than their thinner peers (65–69). Furthermore, women are more likely to report relationship dissatisfaction and predict relationship termination (67,70).

The permeation of weight bias into interpersonal relationships may result from repeated exposure to weight prejudice and discrimination in the media. A number of content analyses of television and film media targeting children, adolescents, and adults have identified verbal, nonverbal, direct, and indirect weight bias incidents and comments (71–74). For example, characters with overweight or obesity are typically underrepresented, recipients of derogatory humour, and play more stereotypical roles (71–76). Similarly, individuals categorized as overweight or obese are frequently represented in the news with an unflattering rear view of their excess adiposity, eating unhealthy foods, engaging in sedentary behaviours, and dressed in clothing that fit improperly (77,78). Furthermore, news stories about obesity often frame the condition in terms of personal responsibility, focusing on individual causes and solutions (eat less, move more) (78,79). This framing is also evident in the advertising of weight-loss products and programs, where promises are made of a quick and easy reduction of one's waistline and emphasis is placed on the simplicity of weight-loss achievement (80,81).

More currently, weight bias has been visible on social networking platforms. For example, authors of a recent study discovered, over a four-hour period, a total of 4596 comments on Twitter that included the term "fat" to describe someone living with overweight or obesity. Of these comments, 57 percent embraced negative stereotypes (gluttonous, unattractive, not sexually desirable, sedentary, lazy, and stupid) (82). Another content analysis of the global video-sharing website, YouTube, discovered that videos displaying weight bias are watched frequently, with an

average viewing of almost 2.5 million (83). Although Twitter and YouTube are just a small sample of existing social networking platforms available to the public, it is evident that negative weight-based attitudes are present in these online communities.

Most disconcerting is the presence of weight bias in entrusted healthcare settings. Pre-service and professional physicians, nurses, mental health workers, exercise scientists, and dietitians are all occupational categories in which negative attitudes toward persons with overweight or obesity have been expressed (59,60,84). For instance, two systematic reviews of current weight bias literature have revealed that health practitioners engage in less patient-centered communication, allocate their time differently in appointments, over attribute symptoms to overweight and obesity, and have less respect and empathy for patients with overweight or obesity compared to those characterized as having a normal weight (4,60). Moreover, persons with overweight or obesity have been documented to delay or avoid seeking preventative healthcare services to not only escape the negative attitudes and disrespectful treatment, but also to alleviate the embarrassment of being weighed and encountering medical equipment that is inadequately sized (84,85).

The existence of weight bias in healthcare is particularly troublesome, as many health practitioners work directly with individuals experiencing overweight or obesity for the prevention and treatment of associated chronic conditions. Among health professionals, registered dietitians are considered experts and leaders in this area, as they work closely with individuals who seek or require preventative measures, or treatment, of afflictions associated with overweight or obesity. (86). These nutrition professionals practice in a society where weight bias exists and they too are not immune; negative weight-based attitudes have been documented globally among dietitians and food and nutrition students for over two decades (6,7,87–93).

Problem Statement

The presence of weight bias in healthcare has been shown to negatively impact patient health behaviors and outcomes (1–3). It has been suggested that current university-level health science programs, such as nutrition and dietetics, do not provide sufficient training for future healthcare professionals regarding clinical interactions with individuals having overweight or obesity (6). Furthermore, it has been proposed that additional education is needed for registered dietitians to improve attitudes towards individuals with overweight or obesity (7). Increased efforts must be taken to improve negative weight-based attitudes among dietitians and prepare students

to work with people of all shapes and sizes without bias. Multiple approaches have been utilized in intervention studies to measure and reduce weight bias among students and health professionals; however, none have been trialed with food and nutrition students or registered dietitians in Canada.

Purpose of the Study

The present study aims to fulfill two knowledge gaps in the literature where a) little is known about the existence of weight bias among students enrolled in food and nutrition university programs in Canada and b) limited studies exist examining the effectiveness of weight bias interventions with food and nutrition university students in Canada. To do so, a novel multi-strategy weight bias education workshop was implemented and evaluated with a group of food and nutrition students from Nova Scotia, Canada, to answer the following research questions.

Research Questions

1. To what extent does explicit weight bias exist among students enrolled in a mandatory fourth-year professional practice course, as partial fulfillment of the Bachelor of Science Applied Human Nutrition (BScAHN) undergraduate program, at Mount Saint Vincent University (MSVU) in Nova Scotia, Canada?
2. How, if at all, does participation in a novel multi-strategy weight bias education workshop impact explicit weight bias among students enrolled in a mandatory fourth-year professional practice course, as partial fulfillment of the BScAHN undergraduate program, at MSVU in Nova Scotia, Canada?
3. If participation in the novel multi-strategy weight bias education workshop is effective at reducing explicit weight bias among students enrolled in a mandatory fourth-year professional practice course, as partial fulfillment of the BScAHN undergraduate program, at MSVU, Nova Scotia, Canada, will this reduction be sustained over a five-month period?

Chapter 2: Literature review

Origin of Weight Bias: Ideology, Beliefs, and Values

In order to address the issue of weight bias, it is important to understand the underlying ideology that fuels negative attitudes and behaviours. Ideologies are culturally shaped concepts that reflect and support how we see and make sense of the world around us. They also play a crucial role in the prediction of behavior (4). Weight prejudice is said to result from ideologies that use negative attributions to explain negative life outcomes (21). These dominant ideas generally function to reinforce personal beliefs and values, such as protestant values, just-world beliefs, and authoritarianism (12,21). Individuals who maintain protestant values place significance on hard work and self-determination (12,21). In the words of Crandall (1994, page 885), those who hold these values “tend to celebrate the victories of heroes and, conversely, blame victims for their fates” (21). Just world beliefs are similar, in that positive attitudes are directed toward those who work hard and sanction that those who work hard should be rewarded. In contrast, those who are perceived as lazy or non-contributing to society are rejected (12,21). General intolerance and dislike arise from authoritarianism values, where any deviance from social norms is considered repugnant and unacceptable (12,21). For example, one with an authoritarian view may devalue those who fail to meet personal or cultural health and beauty expectations.

Several studies have shown that blaming individuals for their condition is a strong predictor of attitudes and behaviours toward these individuals (94–96). For example, Weiner et al. assessed the connection between perceptions of personal controllability and stigmatizing conditions and found that conditions considered to be beyond one’s control (such as cancer) were associated with higher scores of likeability, and elicited more pity and helping intentions from others (95). In contrast, persons with conditions perceived to be under one’s control (such as obesity) were disliked, conjured little pity, elicited anger, and were less likely to be helped by others. Another study examined participant views toward 66 different diseases and health conditions (including obesity) and discovered that the degree to which personal responsibility was attributed to the disease predicted social distance and rejection (94).

These beliefs and values are reflected in Attribution Theory, which has received much empirical attention within weight bias research (12). The premise of the theory is that the perceived cause of a condition influences intuitive reactions toward individuals with that condition, which subsequently shapes future expectations and behavioural responses to all affected individuals

(95,96). Perceived causes can be external and due to outside forces, such as the environment, or internal and under ones' control (personality, motives, beliefs, etc.) (95). Whether or not targeted individuals are ridiculed will depend on the perceived cause of their condition (22,95). For example, excess body weight is often attributed to controllable factors such as laziness, lack of willpower, and poor eating and exercise behaviours; therefore, persons having overweight or obesity are deemed responsible for their condition and are criticized for it.

These deeply ingrained and dominant societal beliefs place blame and shame on the individual; therefore, targeting those with overweight or obesity as both the perpetrator and the solution for their excess weight. It is astounding that the socio-cultural and environmental elements that contribute to the propagation of overweight and obesity continue to be neglected, considering the empirical evidence that exists to support overweight and obesity as complex and multi-factorial conditions.

The Overlooked Complexities of Overweight and Obesity

Simplifying overweight and obesity as a behavioural ailment disregards the complex multifactorial etiology of the conditions. There are numerous noteworthy contributors to overweight and obesity, beyond those controlled by individuals, that create barriers to achieving weight-loss, weight-maintenance, and good health (97). In addition to the significant role of biological factors in regulating body weight, such as genetics, multiple societal influences have considerably transformed the environment to one which encourages overweight and obesity (17,19,98–100). This has often been referred to in the literature as the “obesogenic” environment and can be conceptualized in four dimensions, including physical, economic, political and socio-cultural (18). There is evidence to suggest that the these four dimensions present barriers for the acquisition of nutritious foods and physical activity, thus contributing to the energy imbalance that develops and maintains overweight and obesity (101,102).

Factors within the physical environment that impact eating and exercise behaviours include urban design, land use, and transportation systems (18,101). For instance, proximity and access to supermarkets, convenience stores, fast-food and full-service restaurants, and access to green-spaces have all been associated with overweight and obesity (102–106). In addition, street connectivity and design can either expedite or hinder active transportation. For example, pedestrians and cyclists require side walks, transit stops, bike lanes, and safety provisions, as well

as visual appeal of their route (101). Furthermore, development of suburban areas, which can be described as homogenous and segregated land uses with an extensive disconnected road network, makes traveling by vehicle necessary and active transport unsafe and impractical (101).

The economic dimension of the “obesogenic” environment includes issues of food insecurity, socioeconomic status, and education (18). Low-cost foods and beverages of high caloric and low nutrient value tend to be more readily available and selected more frequently by groups of lower socioeconomic status, where food budgets are typically insufficient to ensure good nutrition (104). For example, low dietary costs, income, and education have been associated with less fruit and vegetable consumption when compared to individuals with higher dietary costs, income and education (107). Another study from the Canadian city of Hamilton, Ontario found that, although supermarket food costs were not higher in the low-income neighbourhood of interest, they were much higher in convenience stores, which dominated in the low-income neighbourhood (108). In addition, there was also a very low availability of fruits and vegetables in the convenience stores. Adding to this, Liese and colleagues (2007), discovered in their study that staple foods, such as low-fat milk, apples, high-fibre bread, eggs, and smoked turkey were available in 75 to 100 percent of supermarkets, where in contrast, these same foods were only available in 4 to 29 percent of convenience stores (109). Furthermore, food items that were available at both supermarkets and convenience stores were considerably more expensive at convenience stores (109).

The political dimension consists of factors that shape any regulations, policies, standards, and guidelines (18). This environment can include any ruling that is enforced on individuals, from workplace policies regarding break times and time allocated to physical activity in public schools, to household rules for children regarding screen time and industry regulations, including portion sizes and the advertising and marketing of “junk” foods to minors (18). For instance, a recent meta-analysis and systematic review seeking the association between childhood sedentary behaviour and various health indicators revealed a moderate-strong link between the screen time (TV viewing, computer use, video games, etc.) of children and overweight and obesity (110). However, it has been suggested that enforcing TV viewing rules for children can lead to less screen time and more time spent engaging in outdoor play (111). Furthermore, in addition to the increasing portion sizes of energy-dense food items, such as sugar-sweetened beverages, salty snacks, French fries, and pizzas served at restaurants, marketing and advertising of these foods by

the food industry has contributed to excessive caloric intakes in children, adolescents, and adults (112–115).

Lastly, the socio-cultural dimension explores factors such as neighbourhood crime or social support from family and/or friends for healthy behaviours (18). For example, parental-perceived crime safety, traffic safety, and “stranger danger” safety has been associated with adolescent physical activity and active transport within the neighborhood and parks (116). In contrast, adolescent-perceived neighborhood safety had no effect, indicating that parental anxiety regarding the safety of their neighborhood may play a role in childhood inactivity. In terms of social relationships, mirroring unhealthful behaviors of friends, family, co-workers or neighbors (eating in front of the TV), adapting specific behaviours to achieve a sense of belonging (eating out frequently), or having attempts to implement healthy behaviours undermined (lack of support) can all contribute to unhealthy practices that lead to overweight and obesity (117).

Noting the empirical evidence that exists to support overweight and obesity as complex and multi-factorial conditions, it is shocking that there remains such a narrow focus on behavioural factors in healthcare. For example, it has been indicated that the general consensus among healthcare professionals, regarding the causes of overweight and obesity, is that excess weight is a product of a patient’s inability to exercise self-control and that poor weight-loss outcomes are attributed to a lack of motivation and compliance to recommendations (84).

Pervasiveness of Weight Bias in Healthcare

The prevalence of overweight and obesity is seen as a major public health concern, as excess adiposity is consistently linked to several chronic diseases, including cardiovascular disease, gallbladder disease, type 2 diabetes, osteoarthritis, respiratory difficulties, and some forms of cancer (118). Furthermore, overweight and obesity have been associated with impaired mental health and vulnerability to depression and anxiety disorders (119–122). In response to the rising rates of overweight and obesity and their associated co-morbidities, many healthcare professionals with diverse scopes of practice have become involved with prevention and treatment of the condition (123). The management of overweight and obesity primarily targets behavioural factors, with little consideration for social, cultural and environmental influences (123). The consequence of this narrow view is that individuals are blamed for their excess weight (or inability to lose

weight) and often become victims of weight bias, prejudice, and discrimination within the healthcare system (60,84,124,125).

Medical Practitioners

Medical practitioners include family physicians, nurses, or any medical specialist whose role includes assessing a person's health status and risk factors (123). Physicians are often the first point of contact for patients in the healthcare system, yet they have been reported as one of the most common sources of weight bias. In a study that surveyed more than 2400 adult women about their encounters with weight bias, doctors were said to be the second most frequent source of bias out of a list of more than 20 options. Close to 70 percent of respondents testified that physicians were a source of weight bias, and 52 percent reported they had experienced weight bias from a doctor on numerous occasions (64). These findings are supported by research demonstrating that overweight and obesity elicit negative attitudes from physicians and that they generally endorse stereotypical inferences about this population (126). It has been documented that physicians believe individuals living with overweight or obesity are lazy, non-compliant, unmotivated, undisciplined, and lacking willpower, and that these qualities are major barriers to patient care (124,127–129). Furthermore, increasing patient BMI has been associated with physicians liking their job less, having less patience, and less desire to help, as they see patients having obesity as a greater waste of time and more annoying (130).

Similar attitudes have been witnessed among medical students. For instance, Phelan and colleagues (2014) examined weight bias among a nationally representative sample of 4732 medical students from 49 medical schools in the United States and discovered that the majority of students demonstrated both implicit (74 percent) and explicit (67 percent) bias (131). Explicit bias was also evident in a recent study conducted by Puhl et al. (2014), where 43 percent of students training in health disciplines indicated that patients living with overweight and obesity were frequent targets of deprecating humour in medical settings (132). Moreover, jokes and negative comments about individuals with overweight or obesity were witnessed among peers (63 percent), healthcare providers (43 percent), and professors/instructors (40 percent). A smaller study examining the effect of a virtual patient's weight on medical students' attitudes, beliefs and interpersonal behaviours toward the patient found that students reported more negative stereotyping, anticipated less patient compliance, worse perceived health, more responsibility attributed for weight-related

complaints and less visual contact with the obese virtual patient than the non-obese virtual patient (133).

A review published in 2006 examined 11 empirical studies focusing on nurses' attitudes towards adult patients living in larger bodies (134). Although the author noted that many of the studies reviewed had weaknesses of sampling and measurement, negative weight-based attitudes and beliefs were consistently present within nurses. These biased attitudes were reflected in nurses' tendency to endorse common stereotypes about persons living in larger bodies, such as lazy, self-indulging, lacking self-control and motivation, and non-compliant. Furthermore, nurses reported working with heavier individuals as physically exhausting and repulsing. Another study of undergraduate nursing students and registered nurses exposed similar negative attitudes, with the majority of participants (60-88 percent) perceiving individuals living with obesity as liking food, more likely to overeat, shapeless, slow, and unattractive (135).

Mental Health Workers

Mental health workers have many roles to play in the management of overweight and obesity, including helping people challenge and overcome barriers that interfere with weight loss and maintenance (123). Individuals seeking care from mental health workers reach out in anticipation of sharing their thoughts and concerns in a safe, unbiased, and non-judgmental space. Yet, several studies indicate that this may not be the case (136–139). For instance, one study examined participant perceptions of client psychological dysfunction using an inventory of 20 items describing negative psychological symptoms. Participants were asked to rate these symptoms on a six-point Likert scale for “best weight”, “overweight”, or “obese” individuals. What they found was, of the 20 symptoms identified, over half were rated more harshly for the client with obesity than their thinner counterparts, with emotional and self-injurious behaviours being rated the highest (136). More recently, Puhl and colleagues (2014) assessed weight bias among 329 professionals specializing in the treatment of eating disorders, including psychologists, psychiatrists, therapists, and social workers. It was discovered that those reporting stronger weight bias were more likely to attribute obesity to behavioral causes. Moreover, these individuals expressed greater negative attitudes and frustrations about treating patients experiencing obesity, and perceived poorer treatment outcomes for these patients (138).

Exercise Professionals

Exercise professionals, such as kinesiologists and personal trainers assist in the management of obesity by completing fitness assessments, providing ongoing guidance, supervision and support to individuals as they work toward increasing their level of physical activity, and provide practical advice on how to incorporate activity into daily life and prevent injury. It has been reported that these professionals, as well as students, also express explicit and implicit weight bias and endorse stereotypes towards persons living with overweight or obesity, such that they are lazy, physically unattractive, buy too much junk food, and could lose weight if they really wanted to do so (140–142). This bias appears to be higher in females and exercise professionals who themselves had never been overweight, had high task and ego goals, and high internalization of an athletic body type ideal (141,142). Furthermore, it is frequently reported in the literature that these professionals also attribute overweight and obesity to interpersonal behaviours, such as sedentary lifestyles, poor eating behavior, excessive calorie consumption, and psychological problems (140–143).

Dietitians

Dietitians are experts in the field of food and nutrition and work with individuals living with overweight or obesity to assist with achieving health goals and minimizing risk of developing chronic health conditions (144). To do this, they provide counseling and individualized diet information based on the person's unique life circumstances, encourage documentation of food intake to monitor progress, and assess intake and barriers to weight loss during ongoing assessment (123). Although these professionals play a crucial role in supporting individuals with overweight and obesity, they are also not immune to weight bias. For two decades negative weight-based attitudes toward patients affected by overweight and obesity have been documented globally among dietitians and food and nutrition students, with research conducted in the United States, United Kingdom, Germany, Australia, and Israel (93,145,146).

One of the earliest studies examining weight bias among this population looked at the attitudes of 439 dietitians toward personal overweight and overweight clients (88). The results of this investigation revealed that 35 percent of dietitians perceived themselves as overweight; however, only one third of these dietitians would have been classified as overweight according to their BMI. Dietitians also judged their body weight severely, indicating acceptance of society's

glorification of thinness. For example, dietitians held themselves liable for their personal weight status, had concerns about excess weight, and were troubled about physical well-being when overweight. Furthermore, dietitians expressed beliefs that clients with overweight or obesity were unable to set realistic weight loss goals and they were hesitant about the ability of clients to follow a nutrition or exercise regimen for weight reduction. It has also been documented that dietitians see frame of mind, eating too much of the wrong foods, repeated dieting, and interpersonal factors as important elements contributing to overweight and obesity (89). Building on this, a qualitative exploration of negative weight-based attitudes among Israeli dietitians found that patients with obesity, who possessed an internal locus of control (accepted responsibility for their failure to diet), triggered positive feelings, such as pity and empathy. However, patients with an external locus of control (blamed others for their failure) triggered negative feelings of anger and frustration (146).

Food and Nutrition students share similar negative attitudes towards persons experiencing overweight or obesity and demonstrate support for common stereotypes (87,91,93). For instance, two separate studies conducted in the United States revealed that over 50 percent of their student participants rated individuals living with overweight or obesity as having poor self-control, low self-esteem, insecure, liking food and overeating, inactive, slow, and having no endurance (6,90). In another study, Puhl and colleagues (2009) randomly assigned food and nutrition students to read one of four mock health profiles of patients who differed only by weight and sex and asked them to make judgments about the patient's health status and participation in treatment (6). It was discovered that the students perceived patients experiencing obesity as less compliant and having poorer health and diet quality than their non-obese counterparts, despite comparable nutrition and health information across all weight categories. Overall, it appears that food and nutrition students who self-report having a healthy weight have slightly more negative attitudes, whereas a higher BMI and a stronger belief that obesity cannot be personally controlled is associated with less negative attitudes (87,91).

Consequences of Weight Bias in Healthcare

Weight bias is pervasive among an array of healthcare providers and students. This is vexing, as there is significant evidence to suggest that negative weight-based attitudes can effect professional perceptions, judgments, behaviours, and decision-making (147). Consequentially,

this may influence the quality of patient care administered, the use of healthcare services, and overall health outcomes. Stone and colleagues (2012) identified three themes in their qualitative study that described dietitians prejudice and discriminatory actions towards patients experiencing obesity: instrumental avoidance (shorter sessions), professional avoidance (less energy and effort put forward in appointments), and interpersonal avoidance (negative tone and indirect verbal and body language) (146). These themes are consistent with weight prejudice and discriminatory practices across all healthcare professionals and will be discussed, along with their consequences, in detail below.

Instrumental Avoidance

Both primary care physicians and dietitians holding negative weight-based attitudes have testified to spending less time in appointments and allocating their time differently with patients having overweight and obesity compared to those perceived as having a normal weight (146,148,149). For instance, in one study researchers examined how the weight of a patient affects both physician attitudes and their prescribed treatments by randomizing participants to evaluate a medical chart of either a patient classified as normal weight, overweight, or having obesity (130). It was discovered that providers who evaluated the chart of the patient with obesity were more likely to consider the encounter as a waste of time and indicated that they would spend 28 percent less time with the patient compared with those of a normal weight. Moreover, in a qualitative study of Israeli dietitians, it was admitted that shorter sessions were held with patients having obesity that triggered feelings of anger and resentment, while allotting additional time and scheduling appointments more frequently for those who elicited pity, empathy, and desire to help (146). This time deficit may result in hurried explanations and less time spent educating patients about their health and establishing rapport (148,150,151). In addition, it has been reported that primary care physicians tend to be more reluctant to carry out certain preventative health screenings on patients presenting with overweight or obesity and are more likely to over-attribute symptoms to the individuals' weight rather than other possible factors compared to those patients of a normal (147,152).

Professional Avoidance

Professional avoidance can have a negative impact on client treatment or interactions between health professionals and patients. For example, strong feelings of anger and frustration

elicited by patients have been shown to result in reduced enthusiasm and initiative put forward by dietitians in consultations (146). In another study, Harvey and colleagues (2002) found that lower acceptance of obese patients by dietitians was associated with a decrease in time spent in developing a good relationship with clients (89). Building rapport with patients is essential for establishing trusting and supportive patient-provider relationships that are conducive of open communication and requires the input of respect and empathy (151). However, among physicians demonstrating weight bias in the treatment of persons living with overweight or obesity, both of these elements have been reported as deficient (126,149,153). The failure of healthcare providers to demonstrate empathy during interactions with patients may leave clients feeling blamed or judged for their weight and decrease their trust in the patient-provider relationship (5,151). Furthermore, low respect has been associated with less positive communication and information giving from healthcare providers (154). Mistrust, in addition to perceived lack of support, may render persons with overweight or obesity reluctant to openly discuss weight or health concerns during appointments (5,151,155). Moreover, patients could withdraw from the patient-provider interaction, thus causing them to forget or misinterpret advice or instructions and not comply to recommendations (147). For example, impaired patient-centered communication has been associated with a 19 percent greater risk of patient non-adherence, decreased motivation to reduce weight, and poorer weight loss outcomes (156–158).

Interpersonal Avoidance

Patient-centered communication involves using appropriate verbal and non-verbal language during patient-provider encounters; however, it has been admitted among a group of dietitians that when a patient provoked negative feelings in them, they used a negative tone of voice and non-verbal displays of dissatisfaction, such as not smiling (146). As mentioned previously, verbal language that lacks the expression of empathy, reassurance, and support result in less desirable patient health outcomes (159). Terminology used within patient-provider interaction can also have a large impact on patient health outcomes and healthcare utilization. For instance, Puhl and colleagues (2013) examined public preferences and perceptions of ten common terms used by healthcare providers to describe excess weight among a nationally representative sample of adults from the United States (160). They discovered that the terms “weight” and “unhealthy weight” were most acceptable, and the terms “unhealthy weight” and “overweight”

were most motivating for initiating weight-loss. The terms “morbidly obese”, “fat” and “obese” were the most undesirable and blaming language used by health practitioners. Furthermore, 19 percent of participants stated that they would avoid future medical visits and 21 percent would seek a new doctor if they felt marginalized because of their weight.

Healthcare practitioners who hold negative attitudes about persons having overweight or obesity may also express non-verbal behaviours that convey disengagement and absence of empathy towards a patient. These behaviours can be implicit or explicit and include lack of eye contact, decreased proximity to patient, negative facial expressions, and inattentive mannerisms, such as fidgeting or flipping through medical charts (161). Poor non-verbal cues can negatively affect the patients’ perception of received healthcare. For, example, patients report less satisfaction with medical visits when a physicians’ non-verbal behaviour lacks expressiveness and indicates that they are disengaged from the encounter (162).

Healthcare Utilization and Avoidance

Experienced or perceived differential treatment during patient-provider encounters may interfere with the use of healthcare services by individuals affected overweight or obesity. For instance, there is evidence to suggest that patients avoid or delay clinical care if they perceive that their body size will be a source of embarrassment or ridicule within the healthcare setting (97). It has been reported that women categorized as overweight or obese are less likely to seek recommended screenings for cervical, breast, and colorectal cancer, than women within a normal BMI range (163). Moreover, Amy and colleagues (2006) established that women who delayed screenings were significantly less likely to participate in timely examinations, even though they were “moderately” or “very concerned” about cancer symptoms (85). Common reasons for avoiding or delaying medical screenings include patients negative perceptions of personal appearance, weight gain since last appointment, disrespectful treatment, embarrassment at being weighed, negative attitudes of providers, unsolicited weight-loss advice, and encountering medical equipment that is inadequately sized (85,152,164). The long-term consequences of avoiding and delaying healthcare can be profound, as patients can present with more advanced and difficult to treat symptoms (147).

Weight Bias Reduction Interventions

The presence of weight bias in healthcare is incongruous and contradictory, as the consequences can have detrimental effects on mental and physical health outcomes. Various interventions have been implemented and evaluated to reduce weight bias among healthcare professionals and trainees. Most weight bias reduction strategies have similar goals in mind: to improve provider attitudes about patients with overweight or obesity and reduce the probability of negative attitudes influencing their behaviour in the provision of care. A number of interventions have been proposed in recent years and are based on four distinct paradigms, including manipulating beliefs about causality/controllability, modifying social consensus and norms, counter-conditioning, and evoking empathy (1,3,60).

Causality/Controllability Interventions

As noted previously, beliefs about the etiology of obesity are a powerful predictor of weight bias. When a condition, such as overweight or obesity, is attributed to modifiable causes, negative evaluations are made about the individual or group having that condition (95). Causality/controllability interventions are based on the aforementioned theory of attribution and seek to address attributions about the causes of overweight and obesity by targeting beliefs about the origin of peoples weight status and their ability to control it (2,60). The majority of these interventions have sought to compare participants' judgments of persons with overweight or obesity after being exposed to non-controllable (genetic/environmental) versus controllable (diet/exercise) explanations for their weight (22,165–168). The common hypotheses are that weight bias will be lower when participants are informed that the primary cause of obesity is due to non-modifiable factors and higher when obesity is said to be caused by modifiable factors.

A recent systematic analysis of weight bias reduction efforts concluded that these types of interventions have generated mixed results, with some research showing improved attitudes and others no change (3). For example, Diedrichs and Barlow (2011) found that, when exposed to a lecture on the multiple determinants of weight, Australian undergraduate psychology students were less likely to believe that weight is exclusively within individual control and to hold negative attitudes towards individuals with overweight or obesity when compared to those who took part in a lecture on the behavioural determinants of weight (168). Moreover, these changes were maintained three weeks' post-intervention. In contrast, authors of another study found that

informing participants that obesity is due to genetic factors did not result in lower bias (165). Although some causality/controllability interventions have been deemed successful at altering beliefs about the controllability of weight, according to the empirical evidence, one might conclude that these interventions may not be as effective at challenging negative attitudes and beliefs about the character and stereotypes of persons having overweight or obesity (3).

Social Interventions

Social interventions are generally based on social consensus theory, which proposes that stereotypes result from one's perceptions of other's beliefs and that underlying prejudice may be subdued when one perceives others' views as being less negative than their own (1,60). The goal of social consensus interventions is to utilize respected and trusted peers', leaders or societies acceptance of persons with overweight and obesity to manipulate participants' perceptions of members in this group (2). In the past, this tactic has proven to be successful at changing racial beliefs and more recently for improving negative weight-based attitudes (169–172). For instance, Puhl and colleagues (2005) conducted three experiments to determine whether providing fake peer feedback about views regarding individuals with obesity would alter participants ensuing views of the same target group (170). The first study randomized participants to receive fictitious feedback about their peers, which was manipulated to show that peers had either less or more negative beliefs about people with obesity than those stated by the participant. As the authors hypothesized, negative attitudes decreased, and positive attitudes increased after learning that others held more friendly and accepting attitudes toward persons with obesity. In their second study, this effect was enhanced when participants received the feedback from supposed in-group members (people with whom the participant identifies) when compared to receiving the same feedback from an out-group member. Lastly, the third experiment compared the consensus approach with five other anti-fat prejudice reduction methods, and it was found that positive in-group consensus feedback and fake feedback on the scientific prevalence of stereotypical traits about obesity both significantly improved weight-based attitudes.

A few years later, Zitek and Hebl (2007) examined the role of social norm clarity on the expression of prejudice against five different target groups, including individuals experiencing obesity (171). Women around a college campus were approached by research assistants and invited to participate in the study. Additional research assistants who were 'coincidentally' walking by and

posed as students also volunteered to participate in the study shortly after the true student agreed. The participants were asked to verbally report their agreement/ disagreement with statements that either favor or oppose a target group, with the research assistant posing as the student always chosen to respond first. The disguised student responded verbally or by writing their response discretely (control). What they found was that participants were more likely to condemn or condone discriminatory statements after hearing another peer do it first. Moreover, these differences persisted and remained significant one-month post-intervention.

More recently, Ciao and Latner (2011) looked at the effectiveness of cognitive dissonance and social consensus interventions at reducing weight bias (172). To do this, the authors assessed participants' values and beliefs about individuals with obesity subsequent to receiving one of three types of randomly selected feedback about their values and beliefs: feedback that their beliefs about individuals living with obesity was conflicted with their personal values (cognitive dissonance condition), feedback that their beliefs about individuals living with obesity was contradictory to their peers (social consensus condition), or feedback that their beliefs about individuals living with obesity was both consistent with their own values and similar to the beliefs of their peers (control condition). Analysis revealed no significant differences between the social consensus and control condition, however, the cognitive dissonance condition proved successful at improving beliefs about obesity.

Few researchers have examined social consensus and cognitive dissonance interventions and their influence on weight bias; however, there is evidence to suggest positive and enduring effects on the manipulation of negative weight-based attitudes. In addition, observing conflict between one's values and beliefs may be more effective than perceiving a difference between one's own beliefs and the beliefs of their peers (1,3).

Counter Conditioning

Another approach that has been deemed successful at reducing negative weight-based attitudes is intergroup contact (173,174). This phenomenon can be explained by the contact hypothesis, which states that positive contact with outgroup members (members of a group to which one does not belong) is linked to reduced prejudice towards the outgroup (174). In contrast, negative contact with an outgroup may strengthen rather than improve prejudice. Therefore, in the

context of obesity, ones' personal closeness or experiences with persons living with overweight or obesity may be associated with the extent to which people report weight bias.

Koball and Carels (2015) examined whether direct or indirect intergroup contact could reduce weight bias and increase intentions to interact with persons experiencing overweight or obesity among people deemed as normal weight (175). Participants were randomized into one of three experimental conditions (direct, imagined, and vicarious contact) and a control condition. In the direct contact condition, participants were instructed to engage in conversation with a research assistant, who was posing as a fellow participant living with obesity, using provided lists of questions that become increasingly intimate (from "What is your name?" to "What are your greatest fears?"). The imagined contact condition required participants to imagine themselves meeting a stranger for the first time (a picture of the research assistant disguised as a participant with obesity was shown) and that during a conversation with them, they learned intriguing and unforeseen facts about this person. In the vicarious condition, participants were instructed to watch a video of a positive interpersonal interaction between two friends (the assistant posing as a participant with obesity and an actress of a normal weight). Finally, those participants in the control group completed all measures online and did not engage in any intergroup contact tasks. The measures revealed lower levels of weight bias and greater intentions to interact with persons experiencing obesity among participants in the direct contact group than both of the indirect and control conditions.

In another study utilizing the contact hypothesis, Roberts and colleagues (2011) developed a pilot program to educate medical students about obesity and the care of affected patients (176). As a part of the program, third-year medical students were paired with patients categorized as obese and undergoing evaluations for bariatric surgery. The student-patient pair were united for a one-year period and attitude measures were obtained before and after the program. These measures were compared against a control group, which did not participate in the pilot program. During this time, students in the program also documented their reflections in a journal, which were analyzed for prevailing themes. Subsequent to completing their third-year practicum, students involved in the pilot program differed from the control group in that they were less likely to strongly agree with the statements "obesity is a chronic disease" and "physicians should be role models by maintaining a normal weight." Furthermore, these students more strongly disagreed that "most obese patients could reach a normal weight if motivated to do so" and that "medications to treat

obesity should be used chronically.” Themes that arose in the students’ documented reflections during the length of the pilot program included acknowledgement of obesity stereotypes, improved estimation of body mass index, and awareness of physicians’ attitudes about obesity. Although the current study produced fascinating results, the data must be interpreted with caution, as the program was piloted on a small (n = 13) group of students.

It is evident that intergroup contact has potential to produce positive outcomes, such as improving attitudes towards outgroups. This positive effect has been proposed to be a result of multiple mechanisms, such as greater inclusion of the outgroup in oneself, increased outgroup trust, reduced intergroup anxiety (fear of being criticized for interacting with a member of an outgroup), and greater perceptions of a common in-group identity - from “us” and “them” to “we” (173,175–177).

Empathy Interventions

Empathy can be defined as one’s capacity to understand a persons’ concerns, situation, and feelings by taking on the perspective of that person (178). Evoking empathy has been shown to be promising in reducing prejudice against groups, such as individuals with AIDS and men who are homeless, and has been gaining popularity in weight bias reduction research (2,60,179). Attempts to reduce weight bias by evoking empathy have also produced mixed results, most of which were unsuccessful.

In part 2A of their investigation on the malleability of implicit weight bias, Teachman et al. (2003) randomized participants to read descriptions of social rejection and derision experienced by either women with obesity, women restricted to a wheel-chair, or a similar case that was neutral to the study (control) (165). In part 2B, participants completed a short critical reflection after reading the narratives. Despite results indicating that the obesity and wheelchair conditions evoked significantly greater empathy than the control condition, post-intervention measures did not reveal significant differences in implicit or explicit weight bias compared to the control group, except among participants having excess weight.

Studies utilizing audiovisual techniques to evoke empathy for weight bias reduction have also been trialed. Hennings and their research team (2007) instructed 602 students to watch a video that presented interviews with adolescents living with obesity, where they discussed personal experiences with weight discrimination and reasons for their excess weight (180). It was found that, between baseline and follow-up (three months’ post-intervention), there was an increased

understanding of the issues faced by individuals with obesity. However, students also displayed stronger prejudice against them. Another study by Gapinski et al. (2006) primed participants with an empathy-evoking video of a person experiencing obesity or a non-weight-related control before assigning them to view another video, either portraying individuals having obesity with positive characteristics (competent, motivated, energetic, etc.) or negative stereotypical characteristics (unprofessional, unintelligent, sluggish, etc.) (178). Following the video viewings, participants rated thin and overweight job applicants on a number of characteristics (competence, professionalism, conscientiousness, etc.). Strong implicit and explicit weight bias was observed across all conditions, indicating that both the empathy-evoking and positive video were ineffective at reducing bias. Interestingly, participants rated overweight job applicants more highly in most domains while also disfavoring overweight candidates on a personal level.

Daníelsdóttir and colleagues (2010) suggest in their systematic review that interventions focusing on the empathy paradigm may be ineffective for reducing weight bias, as they tend to emphasize the disadvantages of living with overweight or obesity (1). This issue was also acknowledged in an article where Hoyt and colleagues (2016) discussed the indirect and conflicting effects of conceptualizing obesity as a disease (181). It was posited that framing obesity as a disease, and therefore arising from biological, or unmodifiable factors, has the potential to both indirectly decrease and increase weight bias. Research based in attribution theory has suggested that conceptualizing overweight and obesity as conditions that result from uncontrollable elements (genetics) has the ability to reduce weight prejudice (1,3). However, according to implicit entity theory, proposing that a previously devalued characteristic, such as excess weight, is static may highlight the fixed nature of obesity, thus instilling targeted individuals with innate qualities that deviate from the social norm and indirectly strengthening negative weight-based attitudes (181).

Hoyt et al. (2016) tested this theory in three separate experiments where they randomly assigned participants to a “disease” or “weight is changeable” condition (181). In the “disease” condition, participants read an article discussing the benefits and drawbacks of the decision of the American Medical Association to categorize obesity as a disease, including compensation for medications, surgery and counselling. Participants assigned to the “weight is changeable” condition read an article about the ability of individuals to change their weight. As predicted, messages fixated on obesity as a disease decreased blame and weight prejudice and increased the

belief in the unchangeable nature of weight, compared to messages focusing on the controllability of weight. However, through this mechanism, weight prejudice also increased. The authors call these opposing effects the Stigma Asymmetry Model and suggest that, although the obesity as a disease standpoint is important, it is also incomplete without also considering the effect of implicit theories of weight.

Rather than eliciting pity and empathy from others and focusing on the fixed nature of obesity, it has been put forward that encouraging acceptance, equality, and respect for individuals living with overweight or obesity may be more effective (1). The Health at Every Size (HAES) paradigm utilizes such an approach, where emphasis is placed on weight inclusivity and the adoption of healthy habits for the sake of health and well-being, rather than weight control. More specifically, the HAES approach includes the acceptance of natural body shape and size diversity, the inadequacy and perils of cyclical dieting for weight loss, intuitive eating, and the influence of social, emotional, spiritual, and physical factors on health and contentment (182). This concept is based on body image and eating disorder research where the damaging effects of societies preoccupation with body weight are well recognised (183). Two intervention studies based on this approach have been trialed in an attempt to reduce weight bias among dietetic and nutrition students, both of which demonstrated improved intuitive eating, body esteem, anti-fat attitudes, and reduced dieting behaviours among students in the HAES intervention compared with students in the control group (184,185).

Current research implies that HAES is a sensible approach for modifying negative attitudes about overweight and obesity. However, this paradigm creates tension and disagreement among health professionals for two reasons. First, its principles do not view weight as a sufficient indicator of health, or weight loss as an appropriate goal. While it is viable to engage in healthy behaviours that provide health benefits for a broad range of body sizes, it is argued that it is not possible to be or stay truly healthy at every size, because it's not currently possible to predict who will remain metabolically healthy in spite of excessive adiposity (183). Therefore, it may be risky to generalize that all people can achieve or maintain health at every size. Furthermore, current intervention studies utilizing HAES approaches have limitations relating to size and design, generalizability to other populations (gender, individuals with a BMI within obesity class II and III, and those without disordered eating) and its relevance to certain personal and social influences (186).

Combination Approaches

A recent meta-analysis of existing weight bias reduction research has concluded that the results of current interventions are encouraging, as they appear to have a small to medium effect on reducing weight bias. However, an analysis of effectiveness by intervention type revealed no significant between-group difference, suggesting that there is insufficient evidence to suggest one approach is better for weight bias reduction than the other (2,3). Furthermore, Daníelsdóttir and colleagues (2010) advise in their systematic analysis that using a single approach, such as re-shaping beliefs about the causality and controllability of obesity, is insufficient to reduce the implicit attitudes about weight that could be strong among health professionals (1). In a more recent systematic analysis of the literature, Alberga et al. (2016) state on multiple occasions that interventions will need to be multi-faceted, multi-level, and applied repeatedly in order to sustainably address the many mechanisms of weight bias (3,187).

An early example of such an approach comes from Wiese et al. (1992), who developed and evaluated an educational intervention that consisted of a videotaped interview of a female nurse discussing her weight history and experiences with health professionals, reading materials about the causes of obesity, and role-playing exercises, where students took on the perspective of a person living with obesity (188). The intervention was a part of a regularly scheduled communications course and took place over a five-week period. Post-intervention measures revealed that first-year medical students who participated in the educational intervention were more-likely to rate genetic determinants of obesity as high and to rate caloric intake differences between normal weight and obese individuals as low when compared to the control group. Moreover, these students were also less likely to endorse negative stereotypes of obesity and blame obese individuals for their weight. However, students in the intervention group also unexpectedly rated lifestyle changes as being less difficult for individuals with obesity than did the control group. At the one-year follow-up, those students in the intervention group remained more likely to rate genetic factors as important and less likely than controls to blame individuals for their weight.

In another study Rukavina and colleagues (2008) conducted a service-learning intervention with the intention of modifying negative weight-based attitudes among students (187). This intervention was integrated into a course that was a part of the core curriculum for kinesiology students. The intervention took place over a six-week period and included both a classroom component and service-learning project. The lecture/questioning session included topics, such as

public health initiatives in kinesiology, weight bias prevalence and its barriers for individuals living with obesity, shifting ideals to the “health at every size” paradigm, and perspective taking. Following the lecture, students participated in group activities where they were instructed to list healthy lifestyle barriers and share them with the class. The service-learning project involved basic training on specific peer fitness testing procedures and practices, which was followed by hands-on experience, where students administered fitness tests to multiple classes of fourth and fifth grade children, evaluated the results, and reflected on their experience. Measures were completed before and after the intervention and indicated that weight control/blame stereotypes were significantly reduced through the intervention. However, the intervention did not produce significant changes in the lazy/motivated or physical/romantic attractiveness scales of the AFA Test. In addition, five motifs were derived from the students’ reflections, including healthy lifestyle as an individual choice, barriers to physical activity, the complex nature of obesity, and promotion of physical activity through information and encouragement.

Limited weight bias intervention studies exist, especially those evaluating weight bias interventions with students enrolled in various healthcare programs in Canada. This is troublesome, as addressing weight bias early in education is crucial to ensure negative attitudes do not carry into entry-level practice and affect the health and well-being of future patients. Alberga and colleagues (2016) concluded, in their systematic analysis of weight bias reduction in health professionals, that future research remains necessary to assess and compare the effects of single and multi (combined) strategies on weight bias reduction (3). The current study seeks to contribute to the literature utilizing a novel multi-strategy approach.

A Novel Multi-Strategy Intervention

Dr. Sara Kirk is a Professor of Health Promotion and Scientific Director of the Healthy Populations Institute, at Dalhousie University, Nova Scotia, Canada. Her research explores the creation of supportive environments for chronic disease prevention, using a ‘socio-ecological’ approach that considers how individual behaviours are influenced by other broader factors, such as income, education and societal norms. Recently, Dr. Kirk and her team constructed a weight bias education workshop. However, this workshop has yet to be formally evaluated on its impact on student perceptions of individuals with overweight or obesity who present for care within the health system.

The weight bias education workshop uses a multi-strategy approach with educational, audiovisual, discussion, and group activity components. Similar to the intervention study conducted by Rukavina et al. (2008), the current intervention first aims to manipulate controllability beliefs by teaching students about recognizing one's own biases about overweight and obesity, how healthcare practices might contribute to weight bias, and the barriers that people living with overweight or obesity experience when talking with healthcare providers about their health or weight status (187). Second, students are indirectly exposed to an individual living in a larger body through a recorded dramatic presentation of a patient-provider encounter. The intention of this video is to enlighten students' perspectives about the disconnect that exists in patient-provider communication during appointments and to evoke empathy. Following the video, several group activities facilitate personal reflection on the video and encourage open discussion about the issues raised. Sharing views and ideas with peers may elicit the social consensus effect discussed in Chapter Two and positively influence one's personal beliefs. The later two mechanisms proposed for the current study are analogous to those employed by Wiese et al. (1992) in their research discussed previously, which produced positive results (188).

Poustchi and colleagues (2013) piloted a similar intervention with second- and third-year medical students ($n = 64$), where participants watched a video about weight bias and took part in a facilitated discussion about their experiences interacting with patients having obesity (189). The video included appearances from experts and dramatic presentations portraying difficult situations that patients living in larger bodies encounter in healthcare settings. It was discovered that the intervention increased beliefs in the genetic and environmental causes of excess adiposity, rather than the absence of personal control, and decreased negative stereotyping of patients living in larger bodies.

Another pilot study assessed the effects of two educational films designed to reduce weight bias on a sample of pre-service dietetic and medical students ($n = 43$) (190). One film discussed the facts and myths of weight prejudice, the other was about weight bias in healthcare and was the same video used in the previous investigation by Poustchi et al. (2013). Students in the control group watched a documentary that was unrelated to food or body weight. Prior to partaking in the intervention, students demonstrated weight bias, on both implicit and explicit measures, as well as strong beliefs that obesity is under the control of the individual. Post-intervention, students who

viewed the weight bias films reported significantly improved explicit attitudes and beliefs toward people with obesity; however, there were no improvements in implicit weight bias.

Research conducted by Matharu et al. (2014), compared the effectiveness of play-reading versus a standard lecture in reducing weight prejudice among medical students (n = 129) (191). In the play-reading condition, students read narratives of women and how they came to terms with their weight in the context of social prejudice and discrimination. After the reading, all students present discussed the play among themselves. The lecture condition received a lecture on the medical management of obesity, which included topics such as the presence of weight bias in society and among health professionals, how bias is counterproductive to treatment, and the importance of actively involving the patient in their care. Students were randomized to each group and both explicit and implicit measures of weight bias were obtained at baseline and post-intervention. The authors discovered that participants in the play-reading group had significantly reduced explicit weight bias at follow-up than the standard lecture group, where students reported favouritism toward a prescriptive model of care rather than a patient-centered approach. Empathy significantly increased for students in both conditions, however, the intervention failed to have a significant effect on implicit bias.

Existing studies, using similar approaches for reducing weight bias among health professionals and students as those proposed for the current study, have produced mixed results. However, Dr. Kirk's workshop is based on unique research and employs a different number, order, and combination of strategies than previous research. Therefore, it is worth investigating whether the proposed multi-strategy intervention can positively influence negative weight-based attitudes.

Chapter 3: The Research Paradigm - Ontology, Epistemology, and Methodology

As mentioned in the introduction, the present study has two objectives. The first is to examine the extent to which explicit weight bias exists among a sample of students enrolled in a mandatory fourth-level professional practice course, as partial fulfillment of the Bachelor of Science Applied Human Nutrition (BScAHN) undergraduate program, at Mount Saint Vincent University (MSVU) in Nova Scotia, Canada. The second objective has two parts. Part one involves the evaluation of a novel, multi-strategy, weight bias education workshop on its ability to reduce explicit weight bias among the same group of students. Part two is to determine if this reduction is sustained over the five-month period following participation in the workshop.

Following an extensive review of the literature, it is anticipated that participants will demonstrate moderate-to-high weight biased attitudes, participation in the novel, multi-strategy, weight bias education workshop will result in improved attitudes towards individuals with overweight or obesity, and improved attitudes towards individuals with overweight or obesity will be sustained over a five-month period following participation in the workshop. This collection of information will fulfill two knowledge gaps in the literature where a) little is known about the existence of weight bias among students enrolled in food and nutrition university programs in Canada and b) limited studies exist examining the effectiveness of weight bias interventions with food and nutrition university students in Canada.

Ontology

I believe that students who are enrolled in professional food and nutrition university programs possess weight biased attitudes, and that education or training aimed at recognizing or addressing these weight biases are lacking. I have encountered weight bias on multiple occasions in my lifetime and have, regrettably, been a perpetrator. It wasn't until the first year of my Master of Science Applied Human Nutrition (MScAHN) program, when Dr. Sara Kirk presented the topic of weight bias in healthcare, as a guest speaker in one of my courses, that I was able to recognize it as an issue. It was an eye-opening experience and prompted many questions, the two most pressing being: 'why have I not heard of weight bias before?' and 'am I biased against heavier individuals?'. These questions led to a deep reflection of my time spent in the BScAHN program, where overweight and obesity had been a topic discussed at length in medical terms, but rarely in a humanizing context. For instance, I had gained sufficient knowledge on how to prevent and treat

the accompanying ailments of overweight and obesity; however, I've never received formal training on how to successfully counsel individuals on a sensitive subject, such as body weight, or how personal attitudes and beliefs may influence interactions with patients and the delivery of care. This realization, that there may be a gap of relative importance in my education, was troublesome and motivated me to dive deeper into the subject.

Epistemology

To meet the objectives of the research study, it is believed that a scientific paradigm is warranted, that is, the research should be grounded in science and mathematics and be based on the assumption of a scientific approach to the advancement of knowledge (192). This paradigm is governed by the philosophical theory of positivism, which is a worldview that accepts only things that can be seen or proved (192). In other words, only knowledge that is inferred from sensory experience, interpreted through reason and logic, and scientifically verified, is valid and regarded as true (192,193). A positivist view of reality dictates an epistemology of objectivism, which is the belief that reality exists independently of human knowledge or perception (192,194,195). Therefore, positivists believe that new knowledge should be gained objectively, to ensure that the investigator does not influence the data being gathered; they are two separate entities (11,192). Investigators who hold a positivist worldview, also tend to favor quantitative methodologies, which are based on numbers and use traditional mathematical procedures to measure and interpret results decisively. A Quantitative investigation was chosen for this research, as it is the standard experimental method of most scientific disciplines (196). For this study, I adopted a positivist stance. The method is described below.

Methodology

Quantitative experiments seek to examine relationships between variables and establish generalisations, which can be applied to the same phenomenon in different settings (192,194). One method for examining such relationships is to use the categories of one variable to define different groups (independent variable) and then measure a second variable to obtain a set of scores within each group (dependent variable) (196). For the present study, the independent variables are the treatment condition (workshop) and time; weight bias and anti-fat attitude scores are the dependent variables. Weight bias and anti-fat attitude scores were collected from the same group of participants at three different time points. This is known as a single-factor, repeated measures

design. The aim of this design is to demonstrate a relationship between these variables by showing persistent differences in scores between groups (196).

The single-factor, repeated measures research design is well suited for observing changes in attitudes and behaviours over time, as it measures dependent variables at multiple time points with the same group of study participants. The advantage of a repeated-measures design is that it uses the same individuals in the control and experimental groups, therefore, there is no risk that the participants in one group are significantly different from the participants in the other. This reduced variability eliminates problems caused by individual differences (age, IQ, gender, personality, etc.) and allows the researcher to draw statistical conclusions with a relatively small set of subjects (196). Conversely, there are two limitations of the repeated-measures research design. First, the way the design is structured allows for time-related factors, other than the effect of the workshop, to cause participants scores to change from one time-point to the next. Examples of these factors include health, mood, weather, and life experience. Second, participation in the first survey (pre-workshop) can influence the individuals scores on the second and third surveys (post-workshop and follow-up). For instance, practice/exposure gained from completing the first survey may influence their performance on the next – this effect can distort the mean differences (196).

Chapter 4: Methods

Research Design

As previously noted, a single factor repeated measures design was employed to meet the research objectives. Data were collected from the same group of participants, at three different time points, using self-report surveys. Secondary pre- and post- data (T₁ and T₂) was obtained from its proprietor, who had previously collected the data for personal use. These data were gathered immediately before and after students participated in a weight bias education workshop via paper survey. At the third time point (T₃), approximately five-months post-workshop, raw follow-up data were collected by the primary investigator of the current research study with an online survey. The independent variable is time (T₁, T₂, T₃) and the AFA scale and UMB-FAT scores are the dependent variables.

Participants

A non-probability purposive sampling approach was used for participant recruitment. The sample consisted of students who were enrolled in a mandatory fourth-level professional practice course, as part of the Bachelor of Science in Applied Human Nutrition program, at Mount Saint Vincent University (MSVU) in Nova Scotia, Canada during the fall 2017 semester. The rationale for choosing this sampling frame was threefold. First and foremost, participants enrolled in a professional food and nutrition university program at MSVU were selected because of their convenient accessibility and proximity to the primary investigator. Moreover, although this course is categorized as a fourth-level course, third, fourth, and even Masters level students can register. Students in these levels of study are adults (18 years of age or greater) and are presumably autonomous and capable of providing informed consent without input from a guardian. Second, the Professional Practice course at MSVU was chosen for workshop implementation because the topic of weight bias fits naturally with the content of its curriculum. For instance, the course description states that students are encouraged to examine how theory, history, philosophy, ethics, standards, competencies and their interrelationships influence professional practice (197). Finally, students first entering the Human Nutrition Program at MSVU may lack knowledge of the complexities of obesity, their own weight-related biases, and how these biases can influence behaviors in practice; however, students going into their final year of the program should have had ample opportunity to receive education on these subjects. Therefore, the fourth level course was

chosen, because it is of great interest to examine the extent to which weight bias exists among students who will soon be graduating and entering practice.

Context

Much of this study (pre-post surveys and workshop) took place on-site at MSVU, which is located just outside of the downtown core of Halifax, Nova Scotia and hosts a diverse population of both national and international students. Follow-up surveys were disseminated and collected off-site via online survey software. The weight bias education workshop was facilitated by its creator, Dr. Kirk, who was scheduled to fill in as a guest speaker for the original course instructor during the final week of the fall 2017 semester. Students attended the workshop during the morning hours (the regularly scheduled class time for this Professional Practice course) and it took approximately two and a half hours to complete.

Weight Bias Education Workshop

The workshop that was evaluated in this study was designed to educate healthcare providers and trainees about weight bias and how it impacts respectful care within the health system. During the workshop, participants are provided with an overview of the project from which the workshop is based and are instructed to watch a film. The film is a dramatization based on research, published in 2014, entitled *Blame, Shame, and Lack of Support: A Multilevel Study on Obesity Management* (198). Within this study, the authors explored multiple perspectives on how obesity is managed in the healthcare system through interviews with individuals living with obesity, healthcare professionals, and policymakers. The narratives obtained from participants in this study have been developed into a script by Dr. Kirk and her research team at Applied Research Collaborations for Health (ARCH), Halifax, Nova Scotia. This script portrays the relationship between a health professional and an individual living with obesity. Subsequent to showing the film, the results of the study are presented to participants and a series of engaging group activities follow, including a discussion of the film and re-writing of the script. See **Appendix A** for a detailed description of the workshop. The learning objectives of this workshop include the ability to:

- Recognize one's own biases about obesity
- Explain how healthcare practices might contribute to bias about obesity

- Describe the barriers that people with obesity experience when talking with healthcare providers about weight
- Discuss ways in which one can address weight bias in their own practice

Data Collection Tools

Secondary Data

As mentioned previously, existing data were used for secondary analysis, meaning that data were formerly gathered for an alternative purpose and accessed for use in the current study (196). The proprietor of the original data informed the present researcher of the pre-existing pre-post workshop data and brought to their attention that the data had yet to be formally analyzed or interpreted. The original researcher acknowledged the benefits of sharing their data, such as greatly increasing the productivity of the initial research team and was willing to share their data with the primary investigator of the current study, who displayed the interest and skills to conduct analyses. An agreement was reached, and details were clarified regarding data sharing procedures and how the data should be used.

The original pre-post data were collected using the self-report survey method. Two previously validated questionnaires, the Anti-Fat Attitudes (AFA) scale and the Universal Measure of Bias against heavy individuals (UMB-FAT), were combined to create the paper survey that was disseminated to students before and after participation in the workshop. Demographic inquiries were also included in this survey, such as year of study, previous training or education in weight bias, and an alpha-numeric code. The survey contained 32 items and took participants approximately 15 minutes to complete (please see **Appendix B** for survey components).

Primary Data

Raw follow-up data were gathered by the primary investigator of the current study. Data collection took place five months after the secondary data were obtained, from the same group of individuals. The same survey, used in the original study, was transcribed to an online format and a link to the survey was delivered to participants via email communications. (please see **Appendix B**). The online survey was created using Opinio survey software from ObjectPlanet. Survey responses collected using this software are stored on a secure Dalhousie webserver that is under the control of the Dalhousie University Networks and Systems Department. Systems are in place

to limit access only to Network and Systems staff who provide operating systems level support (i.e. ensuring the survey and associated databases are working properly), the primary investigator, and project supervisor. Access to the server, and hence the survey, is password protected and data are encrypted. The level of security is at or above a level that would be recommended for the transmission of sensitive information such as credit card details.

The AFA scale and UMB-FAT measured three constructs related to anti-fat attitudes: dislike, fear of fat, and willpower, and three constructs associated with universal bias: negative judgment, discomfort with proximity, and equal rights. How these constructs, as well as the demographic inquiries, were utilized and measured will be elaborated on in the next section.

Measures

Anti-Fat Attitudes (AFA) Scale

The AFA scale is a 13-item assessment that examines three factors concerning the extent to which people a) dislike individuals having overweight or obesity (dislike), b) fear personal overweight or obesity (fear of fat), and c) believe that these conditions are controllable (willpower) (21). To measure these constructs, participants responded to each item on a scale with intervals ranging from zero (anchored with “very strongly disagree”) to nine (anchored with “very strongly agree”). High mean scores indicate stronger endorsement of anti-fat attitudes. It should be noted that the language in this questionnaire was modified slightly to use People-First language (160,199). For example, statements were reformed to read “people with overweight”, instead of “fat people”.

Crandall’s AFA scale is perhaps the most frequently used method of assessment for weight prejudice among the weight bias literature. There is evidence to suggest that this tool has good validity and reliability, meaning that the AFA scale truly measures what it claims and is therefore a psychometrically sound measure (21,200). For example, the dislike and fear of fat scales have acceptable reliability estimates ($\alpha > .70$) and the reliability estimate for the willpower scale is just 0.4 units from the acceptable reliability coefficient ($\alpha = 0.66$) (21,200). An assessment tool is deemed reliable when repeated measures are consistent. To evaluate reliability, it is common to use correlations to determine the relationship between two measures. When minimal variability occurs between scores and the correlation is computed, the result is a strong positive correlation (reliability coefficient), thus indicating good reliability. A large difference between the scores

indicates a weak correlation, meaning that no consistent relationship exists and the reliability is poor (196).

The Universal Measure of Bias Against Heavy Individuals (UMB-FAT)

The UMB is a 20-item scale designed by Latner et al. (2008) to apprehend the underlying components of bias across different targets, such as individuals of gay or lesbian sexual orientation (UMB-GAY), religious minority groups (UMB-MUS), or persons having overweight or obesity (UMB-FAT) (201). This tool contains broadly phrased items, so that it can be used interchangeably with various target groups. For the purpose of the intended research, the UMB-FAT scale was utilized as an additional measure of explicit bias. This assessment tool examines a number of constructs that differ slightly from those of the AFA scale, including negative judgment, discomfort with proximity, attraction, and equal rights. For the current investigation, the attraction scale was deemed irrelevant and was omitted from the surveys. These constructs are represented by a number of items, which are typically measured on a 7-point Likert scale (“strongly agree” to “strongly disagree”). For the purpose of the current study, the scale was enlarged from the original 7-point scale to a 10-point scale (“very strongly agree” to “very strongly disagree”, analogous to the AFA scale, for survey consistency. Higher scores signify greater bias against persons affected by overweight or obesity. The original UMB-FAT scale has generated good reliability ($\alpha = 0.87$) and validity, which has been supported through the association of this scale with two others commonly used for the assessment of weight bias (200,201). Furthermore, unlike the AFA scale, it has been demonstrated that the UMB-FAT is not significantly associated with socially desirable response styles, indicating that this measure is less susceptible to social desirability response bias and is thus likely more accurate.

Demographics Questionnaire

Several demographic items, such as year of study and previous training or education in weight bias were included in the survey. Collecting information on these variables helped describe the characteristics of the sample and allowed the primary investigator to both breakdown survey data into meaningful groups of respondents and compare survey data across these groups. An alphanumeric code was also requested in each survey, which was made up of the students first and last initial and day and month of birth (e.g., TF2003). This code enabled the primary researcher to

track the number of surveys that were completed at each time point by each individual while maintaining anonymity.

Procedures

Ethical Considerations

This research involved human participants and therefore warranted ethical consideration. A research ethics application package was submitted to the MSVU research ethics board and a clearance certificate was received November 2017. Research ethics clearance for use of secondary data was obtained January 2018.

There was minimal risk associated with participation in the current research. The probability and magnitude of possible harms, including physical, psychological, social, legal, and economical, implied by participation in the research was no greater than those encountered by participants in those aspects of their everyday life that relates to the research (202).

Participant Recruitment and Data Collection

Access to pre-post secondary data was granted by the original investigator mid-October 2017. Mid-late March 2018 all third- and fourth-year undergraduate food and nutrition students enrolled in the NUTR 4444: Elements of Professional Practice course during the fall 2017 semester at MSVU were recruited on a voluntary basis through blind-copied email communications. An invitation to participate in the study was drafted and provided to the administrator of the food and nutrition department at MSVU, who disseminated the email to the students of interest. The email included pertinent information about the study, and a Web-link to the follow-up survey. Similarly, a pre-constructed reminder to complete the survey was sent to students by the administrator of the department one-week after the initial email was delivered. An example of each email correspondence can be found in **Appendix C**. All together, students were allotted a two-week period to consider the information, ask questions, and complete the survey.

Consent and Confidentiality

Upon opening the Web-link contained within the invitation to participate, participants were redirected to the first page of the survey, which contained an information letter (see **Appendix C**). This information letter included a detailed account of research study, such as the description and purpose of the research, nature of participants' involvement and duration, research procedures, an

overview of the survey, reassurance of voluntary involvement or withdrawal without consequence, and measures to be undertaken for dissemination of research results (202). The contact information of the primary researcher, MSVU Research Ethics Board, and the Wellness Centre on campus were also provided on this page as supports for participant questions and concerns regarding the research and its conduct, research ethics, and any psychological discomfort experienced during participation. Informed consent was obtained from participants at the bottom of the first page of the survey. Participants were given the option to click a 'yes' button, which directed them to the survey, or click a 'no' button, which automatically dismissed them from the survey. Completion of the survey indicated informed consent.

Data Analysis

Statistical Analysis was carried out using IBM® SPSS® Statistics Version 24 (IBM Corp. Released 2016. IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp). Raw scores obtained from the surveys were entered into SPSS for each student. Of the 32 questions, questions 20 and 22-28 were reverse coded, as the UMB-FAT section contains both negatively and positively worded questions. The last-observation-carried-forward (LOCF) method was used to compensate for missing data from students who did not complete the follow-up survey (T₃). This approach adheres to the Intention-to-Treat (ITT) principle, which is commonly applied in research where follow-up data are missing (203). The LOCF approach substitutes the missing value is with the participants previously observed value, then both the observed and carried over data are merged and then analyzed as though there are no missing data (203). In the case of the present study, participant scores from the post-workshop survey (T₂) were carried forward to replace missing scores from the follow-up survey (T₃). A repeated-measures analysis of variance (ANOVA) was carried out to compare main effects. This analysis included descriptive statistics, estimates of effect sizes and the Bonferroni post-hoc test. A p-value of less than 0.05 was considered statistically significant. When interpreting the data, if the assumption of sphericity was violated, the Greenhouse-Geisser correction was applied.

Chapter 5: Results

Participant Attributes

Twenty-two food and nutrition students registered in a Professional Practice course, at a Halifax University, participated in this research. Of the students that participated, 17 reported being in their fourth year of study with 3 in their third year of study and 2 being in the program for five or more years. Just over half of the participants (n=12) had received previous education or training on the topic of weight bias, the other students involved in the study had not (n=10). For the purpose of this study, previous education or training is defined as any formal learning or acquisition of knowledge, guided by an educator, regarding the topic of weight bias, that was undertaken prior to participation in the study.

There were thirty students enrolled in the professional practice course at the time of the study, twenty-two of whom attended class on the day that the workshop and pre-post data collection took place. All twenty-two students that attended class participated in the workshop and completed the pre- and post-workshop surveys. Approximately five months' later, the follow-up survey was disseminated to all thirty students who were registered in the Professional Practice course during the fall semester. The attrition rate for students who completed the follow-up survey was high at 77 percent. Only nine students responded to the follow-up survey; one survey was incomplete and three were completed by students who did not partake in the workshop or pre-post surveys, leaving workable follow-up data from only five participants. A sample size this small is less than ideal, as it can reduce the power of the study and increases the margin of error (196). This means, there is insufficient power to generalize the outcomes of the study to the overall population. However, because it is uncertain whether data is missing for random or non-random reasons, it was decided not to ignore the data previously collected from those participants who failed to complete the follow-up survey. Therefore, missing data were imputed using the LOCF approach mentioned previously in Chapter 4, to provide a full data set of 22 participants for analysis and avoid attrition bias.

AFA Scale

The means, standard deviations, and pairwise comparisons for the dislike, fear of fat, and willpower factors of the AFA scale at pre-workshop (T₁), post-workshop (T₂), and the five-month follow-up (T₃) are presented in Table 1. Figure 1 demonstrates a line graph comparing AFA

dislike, fear of fat, and willpower mean scores at each time point. The text below will elaborate on the results presented in Table 1 and Figure 1.

Table 1: Mean participant scores, standard deviations, and pairwise comparisons for the AFA dislike, fear of fat, and willpower subscales.

Factor	T ₁ ^a	T ₂ ^b	T ₃ ^c	T ₁ -T ₂	T ₁ -T ₃	T ₂ -T ₃
Dislike	1.23 ± 0.81	0.87 ± 0.74	0.81 ± 0.79	0.36*	0.43*	0.07
Fear of Fat	4.76 ± 2.32	3.48 ± 2.17	3.58 ± 2.19	1.27*	1.18*	-0.09
Willpower	2.33 ± 1.48	1.38 ± 1.30	1.5 ± 1.48	0.96*	0.83*	-0.12

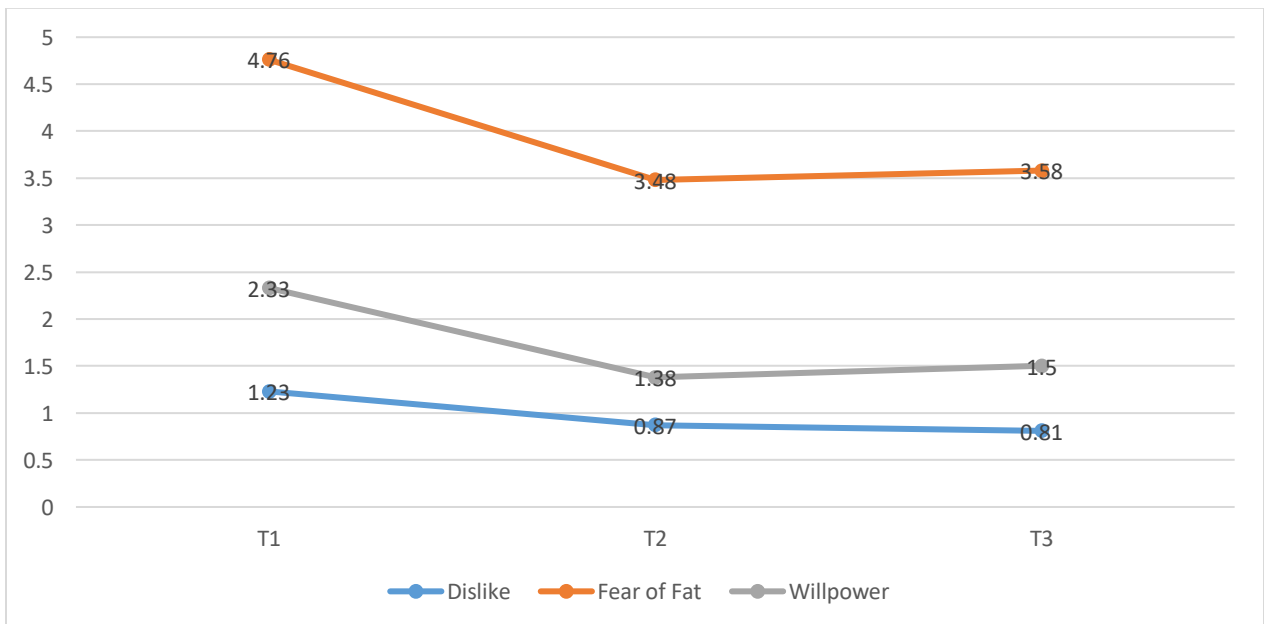
^a Pre-workshop

^b Post-workshop

^c Follow-up

* $p < .05$

Figure 1: Comparison of mean AFA dislike, fear of fat, and willpower scores at T₁, T₂, and T₃



Dislike

The repeated measures ANOVA for the AFA dislike factor revealed a nonsignificant result using Mauchly's test statistic ($p = 0.306$); therefore, sphericity was assumed and the Greenhouse-Geisser correction was not applied. The results of the analysis of variance indicate significant differences in AFA Dislike scores among the three time points $F(2, 42) = 5.32, p = 0.009$. Post hoc tests using the Bonferroni correction revealed a significant decrease in mean dislike scores from pre-workshop to post-workshop ($p = 0.023$) and from pre-workshop to the five-month follow-up ($p = 0.015$), as seen in Table 1. Although there was a further reduction in AFA dislike scores from post-workshop to the five-month follow-up, this change was not statistically significant ($p = 1.000$). Therefore, we can conclude that participation in the two-hour multi-strategy weight bias education workshop elicited a significant reduction in AFA dislike scores immediately post-workshop among this population, although this reduction was not sustained over a five-month period.

Fear of Fat

Mauchly's test indicated that the assumption of sphericity had been violated, $p = 0.000$, therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon = 0.582$). After correcting for the violation of the sphericity assumption, the results show that mean scores for the fear of fat factor of the AFA were significantly different $F(1.17, 24.46) = 13.36, p = 0.001$. As seen in Table 1, post-hoc tests indicate that there was a significant reduction in AFA fear of fat scores between pre-workshop and post-workshop ($p = 0.002$) and between pre-workshop and the five-month follow-up ($p = 0.007$). In contrast, there was a slight increase in AFA fear of fat scores from post-workshop to the five-month follow-up; however, this change was not significantly different ($p = 1.000$). As a result, it may be concluded that participation the two-hour multi-strategy weight bias education workshop significantly lowered AFA fear of fat scores among students immediately post-workshop, but this decrease was not maintained over a five-month time period.

Willpower

Mauchly's test indicated that the assumption of sphericity had been violated, $p = 0.001$, therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon = 0.667$). After correcting for the violation of the sphericity assumption, the results demonstrated

a significant change in AFA Willpower scores after participating in the weight bias educational workshop $F(1.34, 28.03) = 12.01, p = 0.001$. Post hoc tests affirmed that AFA willpower scores were significantly lower at the post-workshop measurement point than the pre-workshop measurement point ($p = 0.003$). A decrease in AFA willpower scores was also observed between pre-workshop and the five-month follow-up, which was also statistically significant ($p = 0.008$). Similar to the AFA fear of fat scores, there was a slight increase in scores from post-workshop to the five-month follow-up; however, this change was not statistically significant ($p = 0.913$). Therefore, we can conclude that participation in the two-hour multi-strategy weight bias education workshop results in a significant reduction in AFA willpower scores immediately post-workshop, but this decrease is not sustained over a five-month period. See Table 1 for details.

UMB-FAT

The means, standard deviations, and pairwise comparisons for the negative judgement, distance, and equal rights factors of the UMB-FAT at pre-workshop (T_1), post-workshop (T_2), and the five-month follow-up (T_3) are presented in Table 2. Figure 2 demonstrates a line graph comparing mean scores of each factor of the UMB-FAT at each time point. The text below will elaborate on the results presented in Table 2 and Figure 2.

Table 2: Mean participant scores, standard deviations, and pairwise comparisons for the UMB-FAT negative judgement, distance, and equal rights subscales

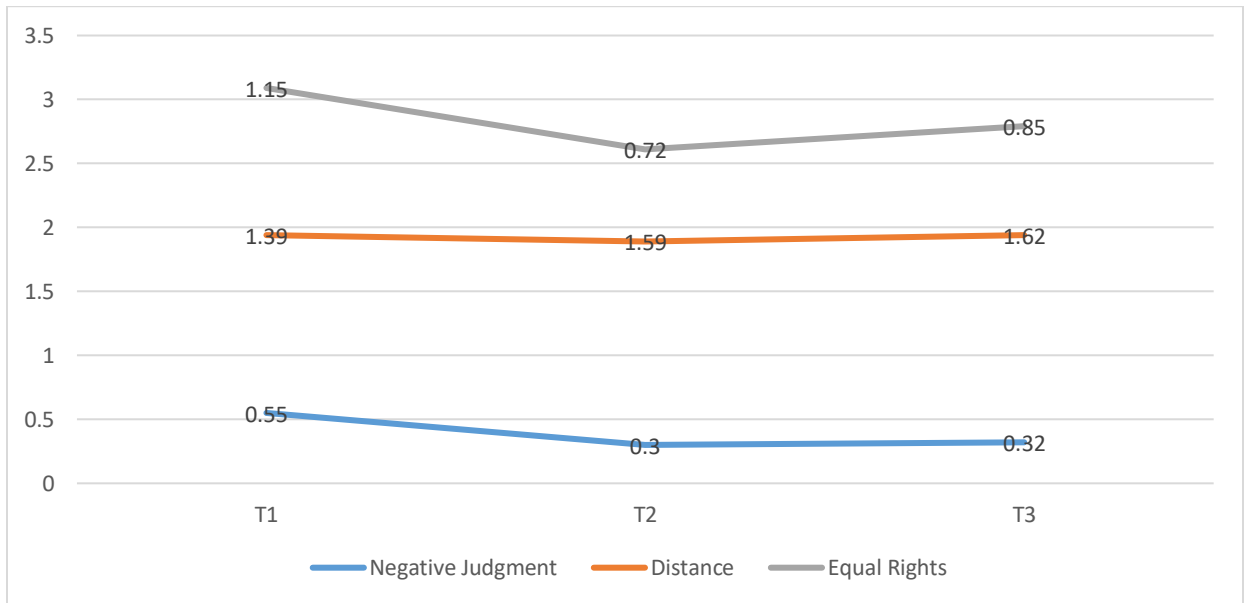
Factor	T_1^a	T_2^b	T_3^c	T_1-T_2	T_1-T_3	T_2-T_3
Negative Judgment	0.55 ± 0.70	0.30 ± 0.47	0.32 ± 0.61	0.25	0.23	-0.18
Distance	1.39 ± 1.13	1.59 ± 1.42	1.62 ± 4.12	0.03	-0.69	-0.72
Equal Rights	1.15 ± 1.71	0.72 ± 1.24	0.85 ± 1.49	0.427	0.30	-0.13

^a Pre-workshop

^b Post-workshop

^c Follow-up

Figure 2: Comparison of mean UMB-FAT negative judgement, distance, and equal rights scores at T₁, T₂, and T₃



Negative Judgement

Mauchly's test indicated that the assumption of sphericity had been violated, $p = 0.001$, therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon = 0.672$). After correcting for the violation of the sphericity assumption, the results show that there was no significant effect on UMB-FAT negative judgement scores after participation in the weight bias education workshop $F(1.35, 28.24) = 3.66, p = 0.055$. It can be concluded then, that participation in the two-hour multi-strategy weight bias education workshop does not result in a significant change in UMB-FAT negative judgment scores among food and nutrition students.

Distance

Mauchly's test indicated that the assumption of sphericity had been violated, $p = 0.000$, therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon = 0.518$). After correcting for the violation of the sphericity assumption, the results show that there was no significant change in UMB-FAT distance scores after participating in the weight bias education workshop $F(1.04, 21.77) = 0.58, p = 0.459$. These results indicate that participation in

the two-hour multi-strategy weight bias education workshop has no significant effect on UMB-FAT dislike scores among food and nutrition students.

Equal Rights

Mauchly's test indicated that the assumption of sphericity had been violated, $p = 0.000$, therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon = 0.583$). After correcting for the violation of the sphericity assumption, the outcomes demonstrate no significant effect on UMB-FAT equal rights scores after participating in the weight bias education workshop $F(1.17, 24.48) = 0.97, p = 0.349$. Therefore, we can conclude that partaking in the two-hour multi-strategy weight bias education workshop does not result in a significant change in UMB-FAT equal rights scores among participants.

Demographic Differences

As mentioned previously, 50 percent of students had prior education or training on the topic of weight bias before participating in the workshop and 45 percent had not. An ANOVA was conducted to examine the variation in AFA and UMB-FAT scores between these groups of participants at baseline, but no significant differences were found. This indicates that responses to the AFA and UMB-FAT were not significantly influenced by whether participants had previous education or training on weight bias, or not.

Chapter 6: Discussion

The discussion contains a brief overview of the problem statement and aim of the study, followed by a discussion of the study outcomes, as they relate to the research aim and questions. Research limitations, implications for future research and professional practice, and a personal reflection are also included.

Problem and Aim of Study

In the introduction and literature review of this study, I have demonstrated the pervasiveness of weight bias in society. The presence of weight bias in healthcare is concerning, given that researchers continue to establish how negative weight-based attitudes held by health professionals can influence behaviours in the provision of care (1–3); thus, creating significant barriers for patient health outcomes and health service utilization (4,5).

Registered dietitians are healthcare professionals who specialize in human nutrition and often work closely with individuals living in larger bodies for the prevention and treatment of associated chronic conditions (86). As with other health professionals, dietitians are expected to approach weight-related topics with compassion and reserve judgment about people's circumstances, behaviours, and decisions (204). These nutrition professionals practice in a society where weight bias exists and they too are not immune, as weight bias and anti-fat attitudes have been documented globally among both dietitians and food and nutrition students for over two decades (6,7,87–93). Researchers have suggested that current healthcare university programs, such as nutrition and dietetics, do not provide sufficient training for future healthcare professionals regarding clinical interactions with individuals having overweight or obesity (6). Others have proposed that additional education is needed for registered dietitians to improve attitudes towards individuals with overweight or obesity (7).

Multiple paradigms and strategies have been developed and trialed in intervention studies in an attempt to detect and reduce weight bias among students enrolled in professional health-related programs and qualified health practitioners (1–3). However, there remains a gap in the literature where little is known about the existence of weight bias among students enrolled in food and nutrition university programs in Canada, or the effectiveness of single or multi-strategy weight bias reduction interventions on this group. To fill this gap, the current study evaluated a novel

multi-strategy weight bias education workshop with a sample of students enrolled in a professional food and nutrition program at a university, located within the Canadian province of Nova Scotia.

Significant Findings and Discussion

Presence of Explicit Weight Bias Among Food and Nutrition Students

The first phase of the study was to determine the extent to which explicit weight bias exists among the chosen sample of food and nutrition students. Baseline measures demonstrated lower than expected explicit weight bias among participants on two of the three AFA subscales. Low mean AFA dislike and willpower scores (see Table 1) indicate that participants do not dislike individuals living in larger bodies, nor do they believe that overweight or obesity are controllable conditions. Similarly, students exhibited lower weight bias on all three subscales of the UMB-FAT: negative judgement, distance, and equal rights at baseline (see Table 2). These results show that participants do not judge individuals with overweight or obesity as negatively as might have been anticipated based on the general population, nor do they experience discomfort within close proximity of these individuals. Furthermore, students displayed positive attitudes toward equal rights for individuals with overweight or obesity in areas such as employment, education, and treatment. These results do not align with the original hypothesis, which I asserted that students would report moderate-to-high weight biased attitudes at baseline. This assumption was advanced in consideration of previous weight bias research, where similar groups of participants reported medium-to-high weight bias and/or fat-phobia on similar and dissimilar weight bias measurements prior to partaking in an intervention (6,87,90,91,93).

Interestingly, the mean score for the third AFA subscale, fear of fat, was greater than the mean scores for all other AFA and UMB-FAT subscales (see Tables 1 and 2). The score indicates moderate fear of personal overweight or obesity among participants, which is congruous with other studies examining similar groups of students and using similar measurements as the current study (93,205). Just under half of the participants in the current study agreed moderately-to-very highly with the statement “I feel disgusted with myself when I gain weight” and just under 60% agreed that they worry about becoming overweight. Likewise, 64% of participants agreed that one of the worst things that could happen to them would be to gain 25 pounds.

Fear of personal overweight is not a new concept among food and nutrition students and professional dietitians. Past research has shown that dietitians tend to judge themselves harshly

regarding body weight, hold themselves liable for personal overweight, have concerns about excess weight, and are troubled about physical well-being when overweight (88). In addition, it has been suggested that food and nutrition students have a more favourable opinion of persons with overweight than they do about themselves when they perceive, they themselves, as overweight (205). Students have also reported feeling pressured to maintain or attain an ideal body weight, and model healthy eating behaviours because of the importance of physical appearance to a dietitian's social and professional success (206).

The demonstration of concern for personal overweight, by students in this study, could be a direct reflection of the societal preoccupation with weight. Individuals are consistently surrounded by cultural pressures to pursue a desirable body shape or size that adheres to sociocultural standards of beauty. This social discourse is both perpetuated and reinforced in Western cultures by mass media and the diet industry (207). Through these media, weight is presented as a physical attribute that can be simply modified by eating less and moving more. As a result, body weight becomes a target for scrutiny from both self and society (207). This self-criticism, can lead to social comparison and body dissatisfaction, which are important mediators of maladaptive coping mechanisms, including disordered eating (208,209). Taking into account the affiliation that can exist amongst diet, body image, and professional and societal demands, it is vital to consider the relationship that nutrition students have with their own bodies, and food, and how this relationship may affect their interactions with future clients and delivery of care in professional practice.

Although understanding the etiology of these attitudes is critical for developing effective interventions to combat anti-fat attitudes and weight bias in the dietetic profession, it may be difficult to change or counteract a social ideology that has become deeply rooted in our culture. However, challenging society's way of thinking about people with overweight or obesity, especially those whose responsibility it is to care for individuals with compassion and respect in order to help them reduce any health risks associated with their body weight, may be a good place to start.

Impact of Weight Bias Education Workshop

The second research question was how, if at all, participation in a novel multi-strategy weight bias education workshop impacted explicit weight bias among fourth-level food and

nutrition students? I postulated that participation in the workshop would result in improved attitudes towards individuals living in larger bodies. Consistent with this hypothesis, participation in the multi-strategy weight bias education workshop did appear to result in improved attitudes toward individuals with overweight or obesity. A significant improvement in anti-fat attitudes was observed among participants on all three subscales (dislike, fear of fat, and willpower) of the AFA immediately after participating in the weight bias educational workshop (see Table 1). Decreases in weight bias scores were also witnessed on all three subscales of the UMB-FAT immediately post-workshop, however, these changes were not significant (see Table 2).

Finally, I assessed whether the observed reduction in explicit weight bias among students was sustained five-months after participation in the multi-strategy weight bias educational workshop. I hypothesized that this reduction would remain stable over the five-month follow-up period. At follow-up, mean dislike, fear of fat, and willpower subscale scores of the AFA remained significantly lower than scores obtained pre-workshop. However, the limited number of participants at follow-up means this result must be interpreted with caution

Due to the small sample size obtained at follow-up, the LOCF approach was implemented in an attempt to minimize false-positive results and over-estimation of the degree of association (196). However, the LOCF method does have limitations of its own, as it assumes that students' survey responses remained stable from post-workshop to follow-up, instead of regressing or improving. For this reason, the finding that no statistically significant changes were observed between the post-workshop and follow-up measurements is unsurprising. This assumption can underestimate the variability in the results and may produce unreliable, or potentially biased, outcomes (210). For example, it is impossible to know if the workshop was truly ineffective at sustaining reduced explicit weight bias scores among students over the five-month follow-up period, or if outcomes are a consequence of the dropouts (210). Therefore, the outcomes of the follow-up survey cannot be considered representative or conclusive.

Potential explanations for these outcomes will be discussed further in the next section of this paper along with limitations of the current study design.

Limitations

Outcomes of the current study are not representative of all students studying food and nutrition in Canada, and there are several limitations that must be acknowledged. The first of these

limitations involves the constitution of the sample. Participants were not randomly selected from a larger population to participate in the study, rather, they were recruited using non-probability purposive sampling. Though this sampling method has been deemed appropriate and efficient for the purpose and scale of the current study, it does sacrifice all benefits of having a random sample, such as generalizability of the data. Sample size also poses a limitation in this study. Although a small sample size was originally anticipated due to the narrow sampling frame, the final number of participants was lower than expected. A sample size of 22 participants is not representative of the entire population of food and nutrition students in the program, and therefore affected the precision of the results. Granted, one of the benefits of the repeated-measures research design used in this study is reduced variability, which eliminates problems caused by individual differences and allows statistical conclusions to be drawn from a small set of participants. However, conducting a similar study with a larger sample size could generate results with more power.

There are a number of potential explanations for the small sample size, including student time restraints (i.e. balancing academics with employment or studying for exams), volunteer work, extracurricular activities. In addition, the workshop was delivered by a guest speaker near the end of the semester; therefore, students may have concluded that the class was not mandatory, and attendance was optional. All these variables may have affected the students' decisions to attend class on the day of the workshop (therefore, forfeiting their opportunity to participate in the pre-posts surveys), or to complete the online follow-up survey. The time of year that the data were collected may have also been unsuitable for students, as all surveys were disseminated close to final examination periods. The low response rate to the follow-up survey may be explained by the absence of an incentive, lack of accountability, or that the subject was not of interest. For example, completion of the follow-up survey was carried out online and was unsupervised, whereas the pre- and post-workshop surveys were filled out using paper and pen and under the supervision of the workshop facilitator.

The high dropout rate at follow-up generated a small sample size; however, rather than drop participants or exclude data, the LOCF approach was implemented to avoid attrition bias. As noted previously the LOCF method assumes that survey responses remain stable from post-workshop to follow-up, rather than revert or improve. This assumption has disadvantages, such as underestimating the variability in the results, and has the potential to produce unreliable or biased outcomes (210,211). This may be the case in the current study, where the change in scores between

post-workshop and follow-up were not statistically significant. It is difficult to know whether the lack of statistical power is a result of, a) no true difference in explicit weight bias scores between post-workshop and follow-up, or b) the inability to detect a difference. Therefore, it is speculative to draw definitive conclusions from this portion of the study.

Other approaches do exist to accommodate for missing data in research, such as the baseline-observation-carried-forward (BOCF). This method uses the baseline observation to substitute the missing value, instead of the last observed value (212). However, the BOCF approach has similar limitations to the LOCF method. To mitigate the risk of attrition bias and minimize over/under-estimation of the magnitude of the effect of the workshop in the future, it would be ideal to recreate the study on a larger scale (212). This way, either missing data would be avoided altogether, or more practically, the sample size would be large enough to manage missing data without jeopardizing the power of the study outcome.

Other limitations of this study include the data collection method and tools. Data were collected for this study using the self-report survey method. Although this method is widely used in behavioural science research because of its cost-effectiveness and ease of implementation with large samples, it has drawbacks. First, this surveying method relies on the honesty of participants, that can be influenced by both the subject being studied and individual personality. Participant interpretation of survey questions is also a limitation of the self-report survey method, as it is impossible to know if everyone who completed the survey interpreted all questions in the same way. For instance, the UMB-FAT was designed with both positively and negatively worded statements, where the negatively worded statements appeared in the first half of the questionnaire, and the positively worded items were in the back half. It was noted during the data entry process that several participants responded to the positively worded statements in a way that was not consistent with the attitudes that were portrayed when responding to those worded negatively. Two explanations for this phenomenon may be that students either overlooked the transition from positive to negative statements in the UMB-FAT when responding, or the responses revealed high weight bias on these specific characteristics. Similar to interpretation of survey statements, individuals may also decipher rating scales differently; what someone rates as '2' on a 10-point scale (like that used in this study), another person with a comparable opinion might rate as a '4' because they interpret the significance each point on the scale differently. Decreasing the size of the scale may reduce the variance in interpretation. This is another disadvantage of the

questionnaire method, where response probing was limited, and participants were inhibited from justifying their feedback. To overcome this disadvantage, providing a space for comments with each question or statement is suggested, as comments may provide insightful information that could have otherwise been lost.

The measures used in this study to assess weight biased attitudes are themselves a limitation, as they include wording that could be construed as biased. Many of the measures commonly used in weight bias research have been developed prior to the debate concerning terminology preferences. For instance, current validated questionnaires tend to use languages that are stigmatizing or dehumanizing (199). Though derogatory wording may be deliberate, to encourage the open expression of negative attitudes, it may inadvertently normalize weight bias. This reflects a tension between using validated questionnaires to ensure comparability with previous studies and measures that may no longer be fit for purpose. Another argument, regarding language preferences, concerns the medicalization of obesity. Debates are raging between those who feel we should stop using the words “obesity” or “overweight”, as these words may pathologize the size of a body, and those that recognize that there are health risks from excess adiposity, which cannot be ignored (213, 214). These are important discussions within an emergent area for research, policy, and practice. While society, and weight bias research, has come a long way since the development of existing measures, there is a need for updated questionnaires. Future research is necessary to reevaluate existing measures, for not only their reliability and validity, but also their relevancy. Additional investigation of terminology preferences is also suggested, in addition to the development and evaluation of questionnaires with more acceptable wording. Furthermore, there is a clear need for a more nuanced understanding around framing weight bias, including consideration of the health risks of adiposity, which requires consideration of the multiple perspectives that are in operation so as to identify areas of convergence to adequately address weight bias and stigma at a societal level (215).

A final limitation is that the *Behind the Scenes* multi-strategy weight bias education workshop evaluated in this study was designed by the supervisor of this research project. This could be perceived as a power imbalance in that the researcher might feel pressure to report more positive findings to please the supervisor. This was mitigated through the role of the committee members in reviewing the thesis, as well as through personal reflection outlined in a later section. However, it remains an important limitation, particularly given the small sample size obtained.

Study Implications, Recommendations, and Reflections

Despite the limitations, this study resulted in a number of outcomes that will contribute greater insight in relation to the current weight bias literature. Participants in this study presented with lower anti-fat attitudes and weight bias toward others than anticipated, but moderate weight bias toward themselves, which was expressed as a fear of personal overweight. This contradiction is troubling and may indicate a gap in education, as well as the prevailing societal norms around body size noted previously (207-209). For instance, the current curriculum at the participants host institution may sufficiently encourage students to challenge negative weight-based stereotypes, foster sensitive and empathic communication skills, and ensure adequate education on the complexities of overweight and obesity; however, more work might need to be done regarding the internalization of these teachings and applying them to oneself.

This fear of personal overweight or obesity is also an example of a disordered eating attitude. Eating attitudes can be defined as the thoughts, beliefs, and behaviours that form the relationship a person has with food (216). An individual with a disordered eating attitude may demonstrate an obsession with food and dieting, dietary restrictions, and harmful methods of weight control (216). Houston et al. (2015) proposed that a professional with disordered eating attitudes may bring their personal feelings into the delivery of nutritional care, thus jeopardizing evidence-based practice and, potentially, the health of the patient (217). Therefore, increased focus may be needed to assist students to recognize their own negative attitudes toward personal overweight and eating, and how these attitudes could influence their practice.

Addressing anti-fat and negative eating attitudes early on in education may be most effective, as previous research has indicated that pre-existing personal issues with bodyweight and eating may be motivators for studying nutrition (207, 217). One preliminary approach that has been suggested is the development, or introduction, of a mandatory screening tool that evaluates student's eating attitudes prior to admission to a professional food and nutrition program (218). Certainly, there are ethical concerns that may arise with screening, however, Drummond and Hare (2012) propose that such dilemmas may be avoided by screening each student confidentially and providing results to the student only (219). Furthermore, involving all students in the screening could lessen stigmatization and a potential bias among students and between faculty and students (219). Ensuring that nutrition faculty and members of the department are knowledgeable of, and sensitive to, this issue and that policies and procedures for assistance are in place, are other factors

that would need to be considered prior to screening. For example, once students are screened, those deemed at risk for disordered eating attitudes could be provided with a confidential referral to counselling services made available, free of charge, through the university's Wellness Centre. This service could also be promoted within the department.

For students already enrolled in a food and nutrition program, a course focused on personal/professional body-image and self-esteem, diet-food relationships, and implications for professional practice, could be incorporated into the curriculum. In addition to this course, professional dietitians could also be invited individually, or on a panel, to speak to food and nutrition students about their own feelings and experiences regarding individuals with overweight or obesity and counselling, as well as to encourage students to share their personal stories and feelings on the subject. Courses and workshops, such as these could first be developed and evaluated in intervention studies to determine their feasibility.

Although students initially demonstrated low-moderate anti-fat attitudes and weight bias, participation in the workshop appeared to contribute to lower anti-fat attitudes, although, without a control group, it is difficult to say whether this is a result of participation or another factor. While a multi-strategy weight bias educational workshop, such as the one evaluated in this study, may be a useful tool to implement with students preparing to enter the healthcare sector, this study did not fully demonstrate its value. More attention may be needed to challenge the knowledge, attitudes, and beliefs about people living in larger bodies before students enter into practice.

Evaluation of the *Behind the Scenes* multi-strategy weight bias education workshop provided some evidence to suggest that this educational strategy might influence anti-fat attitudes and weight bias among food and nutrition students, but as noted previously, the study was limited by a small sample size.

As the low follow-up survey response rate indicates, there may be a need to reconsider the data collection approach used in this study. For instance, consistency with the data collection method (pen-and-paper versus online survey) or including an incentive with completion of the online survey may be more effective at retaining participants. Planning to conduct the surveys at a time of year that does not conflict or interfere with student mid-term or final examination schedules may also yield a higher response rate. Conducting a similar study with different data collection tools may also be of interest. For example, using other existing questionnaires to avoid

the confusion encountered with the positively and negatively worded statements found in the UMB-FAT, or adding in an assessment of implicit weight bias.

Reflections of the Researcher

I believe that weight bias has deep roots in society and that challenging a social ideology that has become so firmly implanted is difficult. However, through this dilemma, weight bias research has evolved significantly over the years and our way of thinking has progressed. We now have a solid foundation of evidence demonstrating the prevalence of weight bias and its adverse consequences, and recognition of these issues has triggered actions for change. A number of investigations have examined strategies to reduce weight bias among various populations, although, most intervention studies investigating weight bias reduction have yielded mixed findings. It is my opinion that this ambiguity exists for several reasons. First, and most notably, the area of weight bias research and societal views has progressed and measurement tools have not; there is a great need for updated questionnaires, as previously noted. Furthermore, most research examining weight bias reduction interventions, including the present study, use quantitative research methods. Contrary to the strong preference for quantitative research methods stated in the epistemology (Chapter 3), I believe that a qualitative or mixed/multiple-method approach may be more fitting for investigation of this topic, due to its sensitive and controversial nature, and would provide deeper insight. On reflection, there may have been other ways to better incorporate this qualitative perspective within the research. For example, conducting interviews with students regarding fear personal overweight, to obtain a comprehensive understanding of this complex issue and gain perspectives on how this view of personal overweight differs from how others living in large bodies are perceived.

In light of the research, educational institutions are also doing their due diligence. For example, core courses included in the food and nutrition program at Acadia University in Nova Scotia, Canada now include a selection of resources that address weight bias and body size. In addition, Mount Saint Vincent University is now offering an introductory course in the food and nutrition program that touches on communication and relationships with food. These examples mitigate the apprehension noted in my ontology (Chapter 3), regarding the food and nutrition curriculum, to some degree; although not being privy to the education or training myself, it is comforting to know that weight bias research has impacted the program and those who teach it.

This advancement in programing may play a role in the outcomes of my research, where participants presented with low-to-moderate weight bias, rather than the moderate-to-high weight bias demonstrated in other studies and that I had hypothesized would be present. However, I still feel that an increased focus needs to be placed on fear of personal overweight and relationships with food, as this was an area that demonstrated moderate weight bias.

Conclusions

Weight bias is pervasive and present in many life domains, including healthcare. This is concerning, as weight bias can negatively influence the behaviours of healthcare providers in their provision of care (1–3). Registered dietitians are one example of healthcare providers in which weight bias has been documented globally (6,7,87–93). Researchers have suggested that current healthcare university programs, such as nutrition and dietetics, do not provide sufficient training for future healthcare professionals regarding clinical interactions with individuals having overweight or obesity (6). Others have proposed that additional education is needed for registered dietitians to improve attitudes towards individuals with overweight or obesity (7).

Over the years, multiple paradigms and strategies have been developed and trialed in intervention studies in an attempt to reduce weight bias and anti-fat attitudes among both students enrolled in professional health-related programs and qualified health practitioners (1–3). The current study is the first to a) investigate the extent to which explicit weight bias and anti-fat attitudes exist within one nutrition program in Nova Scotia and b) evaluate a novel multi-strategy weight bias education workshop, within this group.

My research revealed three key findings. First, participants demonstrated lower anti-fat attitudes and weight bias than anticipated on all constructs, except for fear of personal overweight or obesity, where moderate anti-fat attitudes were expressed. Second, regardless of initial anti-fat attitudes and weight bias, reductions were observed among students on all constructs after participating in the workshop. These suggest that the *Behind the Scenes* multi-strategy weight bias education workshop may be a useful tool for reducing anti-fat attitudes and weight bias among food and nutrition students, although there were limitations noted within the study design and sample that limit the value of this conclusion. Lastly, reductions in anti-fat attitudes and weight bias observed at follow-up were insignificant, reflecting a lower response rate at follow-up, which is a significant limitation.

I believe that weight bias has deep roots in society and that existing research strategies only touch the surface. Society shapes what is acceptable and what is not, and we exist in a society which condemns individuals living in large bodies. However, I have confidence that, as nutrition professionals, we have the ability and training to challenge this discourse and change our behaviours and those of others in society. Therefore, I anticipate more research is required aimed at teaching individuals, including nutrition professionals as the focus of this research, how to recognize their own biases, understanding how biases can affect therapeutic relationships and delivery of care within the health system, and articulating the steps that can be taken to challenge biases so as to modify the way they are expressed.

References

1. Daniélsdóttir S, O'Brien K, Ciao A. Anti-fat prejudice reduction: A review of published studies. *Obes Facts*. 2010;3:47–58.
2. Lee M, Ata R, Brannick M. Malleability of weight-biased attitudes and beliefs: A meta-analysis of weight bias reduction interventions. *Body Image*. 2014;11:251–9.
3. Alberga A, Pickering B, Alix Hayden K, Ball G, Edwards A, Jelinski S, et al. Weight bias reduction in health professionals: a systematic review. *Clin Obes*. 2016;6(3):175–88.
4. Phelan SM, Burgess DJ, Yeazel MW, Hellerstedt WL, Griffin JM, van Ryn M. Impact of weight bias and stigma on quality of care and outcomes for patients with obesity. *Obes Rev*. 2015;16:319–26.
5. Gudzone K, Bennett W, Cooper L, Bleich S. Patients who feel judged about their weight have lower trust in their primary care providers. *Patient Educ Couns*. 2014;97:128–131.
6. Puhl RM, Wharton C, Heuer C. Weight Bias among Dietetics Students: Implications for Treatment Practices. *J Am Diet Assoc*. 2009;109(3):438–44.
7. Edelstein S, Silva N, Mancini L. Obesity bias among dietitians using the fat people-thin people implicit association test. *Top Clin Nutr*. 2009;24(1):67–72.
8. Health Canada. Canadian guidelines for body weight classification in adults. Ottawa, ON; 2003. Available from: http://preventdisease.com/pdf/weight_book-livres_des_poids_e.pdf
9. Myers D, Smith S. *Exploring social psychology*. 2nd ed. Toronto, ON: McGraw-Hill Ryerson Limited; 2009.
10. Bessenoff G, Sherman J. Automatic and controlled components of prejudice toward fat people: Evaluation versus stereotype activation. *Soc Cogn*. 2000;18(4):329–53.
11. Brookfield SD. *Challenging Ideology. Power Crit Theory Lib Adult Learn Teach*. San Francisco, CA: Jossey-Bass: A Wiley Imprint; 2005. p. 66–9.
12. Puhl RM, Brownell KD. Psychosocial origins of obesity stigma: toward changing a powerful and pervasive bias. *Obes Rev An Off J Int Assoc Study Obes*. 2003;4(4):213–27.
13. Bartoshuk L. This stigma of obesity. *Observer*. 2010;23(5).
14. Puhl RM, Andreyeva T, Brownell KD. Perceptions of weight discrimination: prevalence and comparison to race and gender discrimination in America. *Int J Obes*. 2008;32:992–1000.
15. Twells LK, Gregory DM, Reddigan J, Midodzi WK. Current and predicted prevalence of obesity in Canada: a trend analysis. *C Open*. 2014;2(1):E18–26.
16. Statistics Canada. Body mass index, overweight or obese, self-reported, adult, by sex,

- provinces and territories. CANSIM, table 105-0501 Cat. no. 82-221-X. 2016. Available from: <http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/health82b-eng.htm>
17. Lee Y. The role of genes in the current obesity epidemic. *Ann Acad Med Singapore*. 2009;38(1):45–47.
 18. Kirk S, Penney T, McHugh T. Characterizing the obesogenic environment: the state of the evidence with directions for future research. *Obes Rev*. 2010;11(2):109–17.
 19. Abbade E, Dewes H. Behavioral and societal drivers of an obesogenic environment worldwide. *Nutr Food Sci*. 2015;45(2):229–41.
 20. Puhl RM, Heuer CA. Obesity Stigma: Important Considerations for Public Health. *Am J Public Health*. American Public Health Association; 2010;100(6):1019–28.
 21. Crandall CS. Prejudice Against Fat People: Ideology and Self-Interest. *J Personal Soc Psychol*. 1994;66(5):882–94.
 22. Dejong W. The stigma of obesity: The consequences of naive assumptions concerning the causes of physical deviance. *J Health Soc Behav*. 1980;21(1):75–87.
 23. Wright E, Whitehead T. Perceptions of body size and obesity: a selected review of the literature. *J Community Health*. 1987;12(2–3):117–29.
 24. Staffieri J. A study of social stereotype of body image in children. *J Personal Soc Psychol*. 1967;7(1):101–4.
 25. Vartanian L, Thomas M, Vanman E. Disgust, contempt, and anger and the stereotypes of obese people. *Eat Weight Disord*. 2013;18(4):377–82.
 26. Brownell KD, Puhl RM, Schwartz MB, Rudd L. *Weight Bias: Nature, Consequences, and Remedies*. New York, N.Y.: The Guilford Press; 2005.
 27. Devine PG. Stereotypes and prejudice: Their automatic and controlled component. *J Personal Soc Psychol*. 1989;58(1):5–18.
 28. Vartanian L, Herman C, Polivy J. Implicit and explicit attitudes toward fatness and thinness: The role of internalization of societal standards. *Body Image*. 2005;2:373–81.
 29. Björntorp P. Do stress reactions cause abdominal obesity and comorbidities? *Obes Rev*. Blackwell Science Ltd; 2001;2(2):73–86.
 30. Hatzenbuehler M, Keyes K, Hasin D. Associations between perceived weight discrimination and the prevalence of psychiatric disorders in the general population. *Obesity*. 2009;17(11):2033–9.
 31. Friedman K, Reichman S, Costanzo P, Al. E. Weight stigmatization and ideological beliefs: relation to psychological functioning in obese adults. *Obes Res*. 2005;13:907–16.

32. Friedman K, Ashmore J, Applegate K. Recent experiences of weight-based stigmatization in a weight loss surgery population: Psychological and behavioral correlates. *Obesity*. 2008;16:S68–74.
33. Durso L, Latner J, White M, Masheb R, Blomquist K, Morgan P, et al. Internalized weight bias in obese patients with binge eating disorder: associations with eating disturbances and psychological functioning. *Int J Eat Disord*. 2012;45(3):423–7.
34. Krug I, Villarejo C, Jimenez-Murcia S, Perpina C, Vilarrasa N, Granero R, et al. No Titl. Eating-related environmental factors in underweight eating disorders and obesity: are there common vulnerabilities during childhood and early adolescence? *Eur Eat Disord Rev*. 2013;21(3):202–8.
35. Rosenberger P, Henderson K, Bell R, Grilo C. Associations of weight-based teasing history and current eating disorder features and psychological functioning in bariatric surgery patients. *Obes Surg*. 2007;17(470–477).
36. Olvera N, Dempsey A, Gonzalez E, Abrahamson C. Weight-related teasing, emotional eating, and weight control behaviors in Hispanic and African American girls. *Eat Behav*. 2013;14(4):513–7.
37. Puhl RM, Moss-Racusin C, Schwartz MB. Internalization of weight bias: Implications for binge eating and emotional well-being. *Obesity*. 2007;15:19–23.
38. Major B, Hunger JM, Bunyan DP, Miller CT. The ironic effects of weight stigma. *J Exp Soc Psychol*. 2014;51:74–80.
39. Schvey N, Puhl RM, Brownell KD. The impact of weight stigma on caloric consumption. *Obesity*. 2011;19:1957–62.
40. Pearl R, Puhl RM, Dovidio J. Differential effects of weight bias experiences and internalization on exercise among women with overweight and obesity. *J Health Psychol*. 2014;20(12):1626–32.
41. Pearl R, Dovidio J, Puhl RM, Brownell KD. Exposure to weight-stigmatizing media: Effects on exercise intentions, motivation, and behavior. *J ournal Heal Commun*. 2015;20(9):1004–13.
42. Vartanian L, Novak S. Internalized societal attitudes moderate the impact of weight stigma on avoidance of exercise. *Obesity*. 2011;19:757–62.
43. O’Brien KS, Latner JD, Puhl RM, Vartanian L, Giles C, Griva K, et al. The relationship between weight stigma and eating behavior is explained by weight bias internalization and psychological distress. *Appetite*. 2016;102:70–6.
44. Tomiyama AJ. Weight stigma is stressful. A review of evidence for the Cyclic Obesity/Weight-Based Stigma model. *Appetite*. 2014;82:8–15.

45. Sutin A, Terracciano A. Perceived weight discrimination and obesity. *PLoS One*. 2013;8(7):1–4.
46. Puhl RM, Latner JD, O’Brien K, Luedicke J, Danielsdottir S, Forhan M. A multinational examination of weight bias: predictors of anti-fat attitudes across four countries. *Int J Obes (Lond)*. 2015;39(7):1166–73.
47. Brylinsky J, Moore J. The identification of body build stereotypes in young children. *J Res Pers*. 1994;28(2):170–81.
48. Cramer P, Steinwert T. Thin is good, fat is bad. How early does it begin? *J Appl Dev Psychol*. 1998;19(3):429–51.
49. Puhl RM, Luedicke J, Heuer CA. Weight-based victimization toward overweight adolescents: Observations and reactions of peers. *J Sch Health*. 2011;81:696–703.
50. Neumark-Sztainer D, Story M, Harris T. Beliefs and attitudes about obesity among teachers and school health care providers working with adolescents. *J Nutr Educ*. 1999;31(1):3–9.
51. Greenleaf C, Weiller K. Perceptions of youth obesity among physical educators. *Soc Psychol Educ*. 2005;8(4):407–23.
52. Peterson JL, Puhl RM, Luedicke J. An experimental assessment of physical educators’ expectations and attitudes: The importance of student weight and gender. *J Sch Health*. 2012;82(9):432–40.
53. Burmeister J, Kiefner A, Carels R, Al. E. Weight bias in graduate school admissions. *Obesity*. 2013;21(5):918–20.
54. Swami V, Monk R. Weight bias against women in a university acceptance scenario. *J Gen Psychol*. 2013;140(1):45–56.
55. Rudolph C, Wells C, Weller M, Baltes B. A meta-analysis of empirical studies of weight-based bias in the workplace. *J Vocat Behav*. 2009;74:1–10.
56. Judge T, Cable D. When it comes to pay, do the thin win? The effect of weight on pay for men and women. *J Appl Psychol*. 2011;96:95–112.
57. Baum C, Ford W. The wage effects of obesity: a longitudinal study. *Health Econ*. 2004;13:885–99.
58. Roehling M. Weight-based discrimination in employment: Psychological and legal aspects. *Pers Psychol*. 1999;52(4):969–1016.
59. Puhl RM, Brownell KD. Bias, discrimination, and obesity. *Obes Res*. 2001;9(12):788–805.

60. Puhl RM, Heuer CA. The stigma of obesity: a review and update. *Obesity*. 2009;17(5):941–64.
61. Polinko N, Popovich P. Evil thoughts but angelic actions: responses to overweight job applicants. *J Appl Soc Psychol*. 2001;31:905–24.
62. Popovich P, Everton W, Campbell K, Al. E. Criteria used to judge obese persons in the workplace. *Percept Mot Ski*. 1997;85:859–66.
63. O'Brien KS, Latner JD, Ebnetter D, Hunter JA. Obesity discrimination: the role of physical appearance, personal ideology, and anti-fat prejudice. *Int J Obes. Nature Publishing Group*; 2013;37(3):455–60.
64. Puhl RM, Brownell KD. Confronting and coping with weight stigma: An investigation of overweight and obese adults. *Obesity*. 2006;14(10):1802–15.
65. Smith C, Schmoll K, Konik J, Oberlander S. Carrying weight for the world: Influence of weight descriptors on judgments of large-sized women. *J Appl Soc Psychol*. 2007;37:989–1006.
66. Sitton S, Blanchard S. Men's preferences in romantic partners: Obese versus addiction. *Psychol Rep*. 1995;77:1185–6.
67. Sheets V, Ajmere K. Are romantic partners a source of college students' weight concern? *Eat Behav*. 2005;6:1–9.
68. Chen E, Brown M. Obesity stigma in sexual relationships. *Obes Res*. 2005;13:1393–7.
69. Regan P. Sexual outcasts: The perceived impact of body weight and gender on sexuality. *J Appl Soc Psychol*. 1996;26:1803–15.
70. Boyes AD, Latner JD. Weight stigma in existing romantic relationships. *J Sex Marital Ther*. 2009;35(4):282–93.
71. Herbozo S, Tantleff-Dunn S, Gokee-Larose J, Thomson K. Beauty and thinness messages in children's media: A content analysis. *Eat Disord*. 2004;12(1):21–34.
72. Throop E, Skinner A, Perrin A, Steiner M, Odulana A, Perrin E. Pass the popcorn: "obesogenic" behaviors and stigma in children's movies. *Obesity*. 2014;22(7):1694–700.
73. Eisenberg M, Carlson-McGuire A, Gollust S, Neumark-Sztainer D. A content analysis of weight stigmatization in popular television programming for adolescents. *Int J Eat Disord*. 2014;48(6):759–66.
74. Himes S, Thomson K. Fat stigmatization in television shows and movies: A content analysis. *Obesity*. 2007;15(3):712–8.
75. Robinson T, Callister M, Tahlea J. Portrayal of body weight on children's television

- sitcoms: A content analysis. *Body Image*. 2008;5(2):141–51.
76. Greenberg B, Eastin M, Hofschire L, Lachlan K, Brownell KD. Portrayals of overweight and obese individuals on commercial television. *Am J Public Health*. 2003;93(8):1342–8.
 77. Puhl RM, Peterson JL, DePierre JA, Luedicke J. Headless, hungry, and unhealthy: A video content analysis of obese persons portrayed in online news. *J Health Commun*. 2013;18(6):686–702.
 78. Saguy A, Almeling R. Fat in the fire? Science, the news media, and the “obesity epidemic.” *Sociol Forum*. 2008;23(1):53–83.
 79. Kim S, Willis L. Talking about obesity: news Framing of who is responsible for causing and fixing the problem. *J Health Commun*. 2007;12(4):359–79.
 80. Blaine B, McElroy J. Selling stereotypes: Weight loss infomercials, sexism, and weightism. *Sex Roles*. 2002;46(9):351–7.
 81. Ata R, Thompson J. Weight bias in the media: A review of recent research. *Obes Facts*. 2010;3:41–6.
 82. Lydecker J, Cotter E, Palmberg A, Simpson C, Kwitowski M, White K, et al. Does this Tweet make me look fat? A content analysis of weight stigma on Twitter. *Eat Weight Disord*. 2016;21:229–35.
 83. Hussin M, Frazier S, Thompson K. Fat stigmatization on YouTube: A content analysis. *Body Image*. 2011;8(1):90–2.
 84. Budd GM, Mariotti M, Graff D, Falkenstein K. Health care professionals’ attitudes about obesity: An integrative review. *Appl Nurs Res*. 2011;24(3):127–37.
 85. Amy NK, Aalborg A, Lyons P, Keranen L. Barriers to routine gynecological cancer screening for White and African-American obese women. *Int J Obes Relat Metab Disord*. 2006;30:147–55.
 86. Dietitians promote health through food and nutrition. Dietitians of Canada. 2014 [cited 2015 Oct 1]. p. 1. Available from: <http://www.dietitians.ca/Downloads/Public/Diet-Promote-Health-1-pager-pdf.aspx>
 87. Oberrieder H, Walker R. Attitude of dietetics students and registered dietitians toward obesity. *J Am Diet Assoc*. 1995;95(8):914.
 88. McArthur LH, Ross JK. Attitudes of registered dietitians toward personal overweight and overweight clients. *J Am Diet Assoc*. 1997;97(1):63.
 89. Harvey EL, Summerbell CD, Kirk SFL, Hill AJ. Dietitians’ views of overweight and obese people and reported management practices. *J Hum Nutr Diet*. Wiley-Blackwell; 2002;15(5):331–47.

90. Berryman DE, Dubale GM, Manchester DS, Mittelstaedt R. Dietetics Students Possess Negative Attitudes toward Obesity Similar to Nondietetics Students. *J Am Diet Assoc.* 2006;106(10):1678–82.
91. Swift J, Hanlon S, El-Redy L, Puhl R, C G. Weight bias among UK trainee dietitians, doctors, nurses and nutritionists. *J. Hum. Nutr. Diet.* 2013. p. 395–402.
92. Hellbardt M, Riedel-Heller S, Sikorski C. Dieticians' attitudes towards obese patients. *Ernahrungsumschau.* 2014;61(5):78–81.
93. Robinson E, Ball L, Leveritt M. Obesity bias among health and non-health students attending an Australian university and their perceived obesity education. *J Nutr Educ Behav.* 2014;46(5):390–5.
94. Crandall CS, Moriarty D. Physical illness stigma and social rejection. *Br J Soc Psychol.* 1995;34:67–83.
95. Weiner B, Perry RP, Magnusson J. An attributional analysis of reactions to stigmas. *J Pers Soc Psychol.* US: American Psychological Association; 1988;55(5):738–48.
96. Crandall CS, D'Anello S, Sakalli N, Lazarus E, Wieczorkowska G, Feather NT. An Attribution-Value model of prejudice: Anti-fat attitudes in six nations. *Personal Soc Psychol Bull.* US: Sage Publications; 2001;27(1):30–7.
97. Forhan M, Salas X. Inequities in healthcare: a review of bias and discrimination in obesity treatment. *Can J Diabetes.* 2013;37(3):205–9.
98. Perusse L, Bouchard C. Gene-diet interactions in obesity. *Am J Clin Nutr.* 2000;72(5 suppl):1285S– 1290S.
99. Garver W. Gene-diet interactions in childhood obesity. *Curr Genomics.* 2011;12(3):180–9.
100. Tan L, Zhu H, He H, Wu K, Li J, Chen X, et al. Replication of 6 obesity Genes in a meta-analysis of genome-wide association studies from diverse ancestries'. *PLoS One.* 2014;9(5):1–14.
101. Feng J, Glass T, Curriero F, Stewart W, Schwartz B. The built environment and obesity: a systematic review of the epidemiologic evidence. *Heal Place.* 2010;16:175–190.
102. Papas M, Alberg A, Ewing R, Helzlsouer K, Gary T, Klassen A. The built environment and obesity. *Epidemiol Rev.* 2007;(29):129–143.
103. Michimi A, Wimberly M. Associations of supermarket accessibility with obesity and fruit and vegetable consumption in the conterminous United States. *Int J Health Geogr.* 2010;9:94–112.
104. Larson N, Story M, Nelson M. Neighborhood environments: Disparities in access to

- healthy foods in the U.S. *Am J Prev Med.* 2009;36:74–81.
105. Mehta N, Chang V. Weight status and restaurant availability: a multilevel analysis. *Am J Prev Med.* 2008;34:127–133.
 106. Ferdinand A, Sen B, Rahurkar S, Engler S, Menachemi N. The relationship between built environments and physical activity: a systematic review. *Am J Public Health.* 2012;102(10):e7–13.
 107. Mackenbach J, Brage S, Forouhi N, Griffin S, Wareham N, Monsivais P. Does the importance of dietary costs for fruit and vegetable intake vary by socioeconomic position? *Br J Nutr.* 2015;114(9):1464–70.
 108. Latham J, Moffat T. Determinants of variation in food cost and availability in two socioeconomically contrasting neighbourhoods of Hamilton, Ontario, Canada. *Health Place.* 2007;13(1):273–87.
 109. Liese A, Weis K, Pluto D, Smith E, Lawson A. Food store types, availability, and cost of foods in a rural environment. *J Am Diet Assoc.* 2007;107(11):1916–23.
 110. van Ekris E, Altenburg T, Singh A, Proper K, Heymans M, Chinapaw M. An evidence-update on the prospective relationship between childhood sedentary behaviour and biomedical health indicators: a systematic review and meta-analysis. *Obes Rev.* 2016;17(9):833–49.
 111. Xu H, Wen L, Rissel C. Associations of parental influences with physical activity and screen time among young children: a systematic review. *J Obes* 20151-23. 2015;2015:1–23.
 112. Piernas C, Popkin B. Increased portion sizes from energy-dense foods affect total energy intake at eating occasions in US children and adolescents: patterns and trends by age group and sociodemographic characteristics, 1977-2006. *Am J Clin Nutr.* 2011;94(5):1324–32.
 113. Nielsen S, Popkin B. Patterns and trends in food portion sizes, 1977–1998. *J Am Med Assoc.* 2003;289(4):450–3.
 114. Stanton R. Food Retailers and Obesity. *Curr Obes Rep.* 2015;4(1):54–9.
 115. Kraak V, Story M. Influence of food companies’ brand mascots and entertainment companies’ cartoon media characters on children’s diet and health: a systematic review and research needs. *Obes Rev.* 2015;16(2):107–26.
 116. Esteban-Cornejo I, Carlson J, Conway T, Cain K, Saelens B, Frank L, et al. Parental and adolescent perceptions of neighborhood safety related to adolescents’ physical activity in their neighborhood. *Res Q Exerc Sport.* 2016;87(2):191–9.
 117. Powell K, Wilcox J, Clonan A, Bissell P, Preston L, Holdsworth M, et al. The role of

- social networks in the development of overweight and obesity among adults: a scoping review. *BMC Public Health*. 2015;15:996.
118. Guh DP, Zhang W, Bansback N, Amarsi Z, Birmingham CL, Anis AH. The incidence of co-morbidities related to obesity and overweight: A systematic review and meta-analysis. *BMC Public Health*. BioMed Central; 2009;9:1–20.
 119. Xu Q, Anderson D, Lurie-Beck J. The relationship between abdominal obesity and depression in the general population: A systematic review and meta-analysis. *Obes Res Clin Pract*. 2011;5(4):e267– e78.
 120. Bjerkeset O, Romundstad P, Evans J, Gunnell D. Association of adult body mass index and height with anxiety, depression, and suicide in the general population: the HUNT study. *Am J Epidemiol*. 2008;167(2):193–202.
 121. Magallares A, Pais-Ribeiro J. Mental health and obesity: A meta-analysis. *Appl Res Qual Life*. 2014;9(2):295–308.
 122. Papadopoulos S, Brennan L. Correlates of weight stigma in adults with overweight and obesity: A systematic literature review. *Obesity*. 2015;23:1743–60.
 123. Canadian Medical Association. 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children. *Can Med Assoc J*. 2007;176((8 suppl)):Online-1–117. Available from: <http://www.cmaj.ca/content/suppl/2007/09/04/176.8.S1.DC1/obesity-lau-onlineNEW.pdf>
 124. Teachman B, Brownell KD. Implicit anti-fat bias among health professionals: is anyone immune? *Int J Obes*. 2001;25:1525–31.
 125. Schwartz MB, Chambliss HO, Brownell KD, Blair SN, Billington C. Weight bias among health professionals specializing in obesity. *Obes Res*. 2003;11(9):1033–1039.
 126. Huizinga M, Cooper L, Bleich S, Clark J, Beach M. Physician respect for patients with obesity. *J Gen Intern Med*. 2009;24(11):1236–9.
 127. Huizinga M, Bleich S, Beach M, Clark J, Cooper L. Disparity in physician perception of patients' adherence to medications by obesity status. *Obesity*. 2010;18(10):1932–7.
 128. Bocquier A, Verger P, Basdevant A, Andreotti G, Baretge J, Villani P, et al. Overweight and obesity: Knowledge, attitudes, and practices of general practitioners in France. *Obes Res*. 2005;13(4):787–795.
 129. Foster G, Wadden T, Makris A, Davidson D, Sanderson R, Allison D, et al. Primary care physicians' attitudes about obesity and its treatment. *Obes Res*. 2003;11(10):1168–1177.
 130. Hebl MR, Xu J. Weighing the care: Physicians' reactions to the size of a patient. *Int J Obes*. 2001;21:1246–52.

131. Phelan S, Dovidio J, Puhl RM, Burgess DJ, Nelson D, Yeazel MW, et al. Implicit and explicit weight bias in a national sample of 4732 medical students: The medical student CHANGES study. *Obesity*. 2014;22(4):1201–8.
132. Puhl RM, Luedicke J, Grilo C. Obesity bias in training: Attitudes, beliefs, and observations among advanced trainees in professional health disciplines. *Obesity*. 2014;22(4):1008–15.
133. Persky S, Eccleston C. Medical student bias and care recommendations for an obese versus non-obese virtual patient. *Int J Obes*. 2011;35(5):728–35.
134. Brown I. Nurses' attitudes towards adult patients who are obese: Literature review. *J Adv Nurs*. 2006;53(2):221–32.
135. Poon M, Tarrant M. Obesity: Attitudes of undergraduate student nurses and registered nurses. *J Clin Nurs*. 2009;18(16):2355–65.
136. Young L, Powell B. The effects of obesity on the clinical judgments of mental health professionals. *J Health Soc Behav*. 1985;26(3):233–46.
137. Agell G, Rothblum E. Effects of clients' obesity and gender on the therapy judgments of psychologists. *Prof Psychol Res Pract*. 1991;22(3):223–9.
138. Puhl RM, Latner JD, King KM, Luedicke J. Weight bias among professionals treating eating disorders: Attitudes about treatment and perceived patient outcomes. *Int J Eat Disord*. John Wiley & Sons, Inc; 2014;47(1):65–75.
139. Pratt K, Palmer E, Cravens J, Ferriby M, Balk E, Cai Y. Marriage and family therapy trainees' reports of explicit weight bias. *J Marital Fam Ther*. 2015;42(2):288–298.
140. Chambliss H, Finley C, Blair S. Attitudes toward obese individuals among exercise science students. *Med Sci Sport Exerc*. 2004;36:468–474.
141. Robertson N, Vohora R. Fitness vs. fatness: Implicit bias towards obesity among fitness professionals and regular exercisers. *Psychol Sport Exerc*. 2008;9(4):547–57.
142. Langdon J, Rukavina P, Greenleaf C. Predictors of obesity bias among exercise science students. *Adv Physiol Educ*. 2016;40(2):157–64.
143. Hare S, JH P, Flynn M, King K. Attitudes and perceptions of fitness professionals regarding obesity. *J Community Health*. 2000;25(1):5–21.
144. Dietitians promote health through food and nutrition. Canada: Dietitians of Canada; 2014. Available from: <http://www.dietitians.ca/Downloads/Public/Diet-Promote-Health-1-pager-pdf.aspx>
145. Jung F, Luck-Sikorski C, Wiemers N, Riedel-Heller S. Dietitians and nutritionists: Stigma in the context of obesity. A systematic review. *PLoS One*. 2015;10(10):1–16.

146. Stone O, Werner P. Israeli Dietitians' Professional Stigma Attached to Obese Patients. *Qual Health Res.* 2012;22(6):768–76.
147. Phelan SM, Burgess DJ, Yeazel MW, Hellerstedt WL, Griffin JM, Ryn M. Impact of weight bias and stigma on quality of care and outcomes for patients with obesity. *Obes Rev.* 2015;16(4):319–26.
148. Wong M, Gudzone K, Bleich S. Provider communication quality: Influence of patients' weight and race. *Patient Educ Couns.* 2015;98(4):492–8.
149. Richard P, Ferguson C, Lara A, Leonard J, Younis M. Disparities in physician-patient communication by obesity status. *Inq A J Med Care Organ Provis Financ.* 2014;51:1945–7243.
150. Bertakis K, Azari R. The impact of obesity on primary care visits. *Obes Res.* 2005;13:1615–1623.
151. Gudzone K, Beach M, Roter D, Cooper L. Physicians build less rapport with obese patients. *Obes (Silver Spring).* 2013;21:2146–2152.
152. Adams C, Smith N, Wilbur D, Grady K. The relationship of obesity to the frequency of pelvic examinations: do physician and patient attitudes make a difference? *Women Heal.* 1993;20:45–57.
153. Ferrante J, Seaman K, Bator A, Ohman-Strickland P, Gundersen D, Clemow L, et al. Impact of perceived weight stigma among underserved women on doctor-patient relationships. *Obes Sci Pract.* 2016;2(2):128–35.
154. Beach M, Roter D, Wang N, Duggan P, Cooper L. Are physicians' attitudes of respect accurately perceived by patients and associated with more positive communication behaviours. *Patient Educ Couns.* 2006;62(3):347–354.
155. Amy N, Aalborg A, Lyons P, Keranen L. Barriers to routine gynecological cancer screening for White and African-American obese women. *Int J Obes.* 2006;30:147–155.
156. Zolnierok K, Dimatteo M. Physician communication and patient adherence to treatment: a meta-analysis. *Med Care.* 2009;47(8):826–834.
157. Jay M, Gillespie C, Schlair S, Sherman S, Kalet A. Physicians' use of the 5As in counseling obese patients: is the quality of counseling associated with patients' motivation and intention to lose weight? *BMC Health Serv Res.* 2010;10:159.
158. Armstrong M, Mottershead T, Ronksley P, Sigal R, Campbell T, BR H. Motivational interviewing to improve weight loss in overweight and/or obese patients: a systematic review and meta-analysis of randomized controlled trials. *Obes Rev.* 2011;12(9):709–723.
159. Beck R, Daughtridge R, Sloane P. Physician-patient communication in the primary care office: a systematic review. *J Am Board Fam Pract.* 2002;15(1):25–38.

160. Puhl R, Peterson J, Luedicke J. Motivating or stigmatizing? Public perceptions of weight-related language used by health providers. *Int J Obes.* 2013;37(4):612–9.
161. Levine C, Ambady N. The role of non-verbal behaviour in racial disparities in health care: implications and solutions. *Med Educ.* 2013;47(9):867–76.
162. Hall J, Harrigan J, Rosenthal R. Nonverbal behavior in clinician—patient interaction. *Appl Prev Psychol.* 1995;4(1):21–37.
163. Cohen S, Palmieri R, Nyante S, Koralek D, Kim S, Bradshaw P, et al. A review: Obesity and screening for breast, cervical, and colorectal cancer in women. *Cancer.* 2008;112(9):1892–904.
164. Drury A, Louis M. Exploring the association between body weight, stigma of obesity, and health care avoidance. *J Am Acad Nurse Pract.* 2002;14:554–61.
165. Teachman B, Gapinski K, Brownell K, Rawlins M, Jeyaram S. Demonstrations of implicit antifat bias: the impact of providing causal information and evoking empathy. *Heal Psychol.* 2003;22:68–78.
166. O’Brien KS, Puhl RM, Latner JD, Mir A, Hunter J. Reducing anti-fat prejudice in preservice health students: A randomized trial. *Obesity.* 2010;18(11):2138–44.
167. Persky S, Eccleston C. Impact of genetic causal information on medical students’ clinical encounters with an obese virtual patient: Health promotion and social stigma. *Ann Behav Med.* 2011;41(3):363–72.
168. Diedrichs P, Barlow F. How to lose weight bias fast! Evaluating a brief anti-weight bias intervention. *Br J Health Psychol.* 2011;16(4):846–61.
169. Stangor C, Sechrist G, Jost J. Changing racial beliefs by providing consensus information. *Personal Soc Psychol Bull.* 2001;27(4):486–96.
170. Puhl RM, Schwartz MB, Brownell KD. Impact of perceived consensus on stereotypes about obese people: A New approach for reducing bias. *Heal Psychol.* 2005;24(5):517–25.
171. Zitek E, Hebl MR. The role of social norm clarity in the influenced expression of prejudice over time. *J Exp Soc Psychol.* 2007;43(6):867–76.
172. Ciao A, Latner JD. Reducing obesity stigma: The effectiveness of cognitive dissonance and social consensus interventions. *Obesity.* 2011;19(9):1768–74.
173. Turner R, Wildschut T, Sedikides C. Dropping the weight stigma: Nostalgia improves attitudes toward persons who are overweight. *J Exp Soc Psychol.* 2012;48(1):130–7.
174. Alperin A, Hornsey M, Hayward L, Diedrichs P, Barlow F. Applying the contact hypothesis to anti-fat attitudes: Contact with overweight people is related to how we interact with our bodies and those of others. *Soc Sci Med.* 2014;123:37–44.

175. Koball A, Carels R. Intergroup contact and weight bias reduction. *Transl Issues Psychol Sci.* 2015;1(3):298–306.
176. Roberts D, Kane E, Jones D, Almeida J, Bell S, Weinstein A, et al. Teaching medical students about obesity: a pilot program to address an unmet need through longitudinal relationships with bariatric surgery patients. *Surg Innov.* 2011;18(2):176–83.
177. Kushner R, Zeiss D, Feinglass J, Yelen M. An obesity educational intervention for medical students addressing weight bias and communication skills using standardized patients. *BMC Med Educ.* 2014;14:53.
178. Gapinski K, Schwartz M, Brownell K. Can television change anti-fat attitudes and behavior? *J Appl Biobehav Res.* 2006;11(1):1–28.
179. Batson C, Polycarpou M, Harmon-Jones E, Imhoff H, Mitchener E, Bednar L, et al. Empathy and attitudes: Can feeling for a member of a stigmatized group improve feelings toward the group? *J Pers Soc Psychol.* 1997;72(1):105–18.
180. Hennings A, Hilbert A, Thomas J, Siegfried W, Rief W. Reduction of stigma against obese people: effects of an educational film. *Psychother Psychosom Med Psychol.* 2007;57:359–363.
181. Hoyt C, Burnette J, Auster-Gussman L, Blodorn A, Major B. The Obesity Stigma Asymmetry Model: The indirect and divergent effects of blame and changeability beliefs on antifat prejudice. *Stigma Heal.* 2016;
182. Robison J. Health at every size: toward a new paradigm of weight and health. *Medscape Gen Med.* 2005;7(3):13.
183. Sainsbury A, Hay P. Call for an urgent rethink of the “health at every size” concept. *J Eat Disord.* 2014;2:8.
184. Humphrey L, Clifford D, Neyman Morris M. Health at Every Size college course reduces dieting behaviors and improves intuitive eating, body esteem, and anti-fat attitudes. *J Nutr Educ Behav.* 2015;47(4):354–60.
185. Rosalez A, Ozier A, Kubal A, Parker J. Teaching the Health At Every Size® curriculum to dietetics students: Do anti-fat attitudes change? *J Nutr Educ Behav.* 2015;47(4):S11.
186. Penney T, Kirk S. Framing health matters. The Health at Every Size paradigm and obesity: missing empirical evidence may help push the reframing obesity debate forward. *Am J Public Health.* 2015;105(5):e38–42.
187. Rukavina P, Weidong L, Rowell M. A service learning based intervention to change attitudes toward obese individuals in kinesiology pre-professionals. *Soc Psychol Educ* 2008;11(1)95-112. 2008;11(1):95–112.
188. Wiese H, Wilson J, Jones R, Neises M. Obesity stigma reduction in medical students. *Int J*

- Obes Relat Metabobolic Disord. 1992;16:859–868.
189. Poustchi Y, Saks N, Piasecki A, Hahn K, Ferrante J. Brief intervention effective in reducing weight bias in medical students. *Fam Med*. 2013;45(5):345–8.
 190. Swift JA, Tischler V, Markham S, Gunning I, Glazebrook C, Beer C, et al. Are anti-stigma films a useful strategy for reducing weight bias among trainee healthcare professionals? Results of a pilot randomized control study. *Obes Facts*. 2013;6(102):91–102.
 191. Matharu K, Shapiro J, Hammer R, Kravitz R, Wilson M, Fitzgerald F. Reducing obesity prejudice in medical education. *Educ Heal Chang Learn Pract*. 2014;27(3):231–7.
 192. Scotland J. Exploring the Philosophical Underpinnings of Research: Relating Ontology and Epistemology to the Methodology and Methods of the Scientific, Interpretive, and Critical Research Paradigms. *English Lang Teach*. 2012;5(9).
 193. Author N. Oxford Dictionaries: Positivism. Oxford Univ. Press. 2019. Available from: <https://en.oxforddictionaries.com/definition/positivism>
 194. Sobh R, Perry C. Research design and data analysis in realism research. *Eur J Mark*. 2006;40(11/12):1194–209.
 195. Oxford Dictionaries: Objectivism. Oxford Univ. Press. 2019. Available from: <https://en.oxforddictionaries.com/definition/objectivism>
 196. Gravetter F, Wallnau L. *Statistics for the behavioural sciences*. 9th ed. Belmont, CA, USA: Wadsworth, Cengage Learning; 2013.
 197. Mount Saint Vincent University Professional Studies - Applied Human Nutrition: Courses. 2019. Available from: <https://www.msvu.ca/en/home/programsdepartments/professionalstudies/appliedhumannutrition/courses.aspx>
 198. Kirk S, Price S, Penney T, Rehman L, Lyons R, Piccinini-Vallis H, et al. Blame, shame, and lack of support: A multilevel study on obesity management. *Qual Health Res*. 2014;24(6).
 199. Kyle TK, Puhl RM. Putting People First in Obesity. *Obesity*. 2014;22(5):1211.
 200. Ruggs EN, King EB, Hebl M, Fitzsimmons M. Assessment of weight stigma. *Obes Facts*. Department of Psychology, Rice University, Houston, TX 77005, USA.: Karger; 2010;3(1):60–9.
 201. Latner JD, O'Brien KS, Durso L, Brinkman L, MacDonald T. Weighing obesity stigma: the relative strength of different forms of bias. *Int J Obes*. 2008;32(7):1145–52.
 202. Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans. Available

from: www.pre.ethics.gc.ca

203. Altman D. Missing outcomes in randomized trials: addressing the dilemma. *Open Med.* 2009;3(2):e51–e53.
204. Principles of Professional Practice. Dietitians of Canada. 2012 [cited 2015 Oct 1]. p. 1. Available from: <http://www.dietitians.ca/getattachment/8e1af788-7c13-4e74-8082-151865bf9492/Principles-of-Professional-Practice.pdf.aspx>
205. McArthur LH. Nutrition and nonnutrition majors have more favorable attitudes toward overweight people than personal overweight. *J Am Diet Assoc.* 1995;95(5):593–956.
206. Kiziltan G, Karabudak E. Risk of Abnormal Eating Attitudes Among Turkish Dietetic Students. *Adolescence.* 2008;43(171):681–90.
207. Mahn HM, Lordly D. A review of eating disorders and disordered eating amongst nutrition students and dietetic professionals. *Can J Diet Pract Res.* 2015;76(1):38–43.
208. Dye H. Does Internalizing Society and Media Messages Cause Body Dissatisfaction, in Turn Causing Disordered Eating? *J Evidence-Informed Soc Work.* 2016;13(2):217–27.
209. Trekels J, Eggermont S. Beauty is Good: The Appearance Culture, the Internalization of Appearance Ideals, and Dysfunctional Appearance Beliefs Among Tweens. *Hum Commun Res.* 2017;43(2):173–92.
210. Ranstam J, Turkiewicz A, Boonen S, Van Meirhaeghe J, Bastian L, Wardlaw D. Alternative analyses for handling incomplete follow-up in the intention-to-treat analysis: the randomized controlled trial of balloon kyphoplasty versus non-surgical care for vertebral compression fracture. *BMC Med Res Methodol.* 2012 Mar;12(1):35. Available from: <https://doi.org/10.1186/1471-2288-12-35>
211. Dossing A, Tarp S, Furst D, Gluud C, Beyene J, Hansen B, et al. Interpreting trial results following use of different intention-to-treat approaches for preventing attrition bias: a meta-epidemiological study protocol. *BMJ Open.* 2014;4(9).
212. Liu-Seifert, Zhang S, D’Souza D, Skljarevski V. A closer look at the baseline-observation-carried-forward (BOCF). *Patient Prefer Adherence.* 2010;4:11–6.
213. MacInnis CC, Alberga AS, Nutter S, Ellard JH, Russell-Mayhew S. Regarding obesity as a disease is associated with lower weight bias among physicians: A cross-sectional survey study. *Stigma and Health.* 2019. doi:10.1037/sah0000180.supp (Supplemental).
214. Bacon L, Severson A. Fat Is Not the Problem—Fat Stigma Is. 2019 [cited 2019 July 14]. Available from <https://blogs.scientificamerican.com/observations/fat-is-not-the-problem-fat-stigma-is/>
215. Nutter S, Russell-Mayhew S, Alberga AS, et al. Positioning of Weight Bias: Moving towards Social Justice. *J Obes.* 2016;2016:3753650. doi:10.1155/2016/3753650

216. Rocks T, Pelly F, Slater G, Martin L. Eating attitudes and behaviours of students enrolled in undergraduate nutrition and dietetics degrees. *Nutr Diet.* 2017;74(4):381–7.
217. Houston C, Bassler E, St Germain A. Ethical considerations when students experience an active eating disorder during their dietetics training. *J Am Diet Assoc.* 2015;115:1715–17.
218. Hughes R, Desbrow B. Aspiring dietitians study: a pre-enrolment study of students motivations, awareness and expectations relating to careers in nutrition and dietetics. *Nutr Diet.* 2005;62(2/3):106–9.
219. Drummond D, Hare M. Dietitians and Eating Disorders: An International Issue. *Can J Diet Pract Res.* 2012;73(2):86–90.

Appendix A: Workshop facilitation plan

Title: Behind the Scenes: Using drama to Promote Healthy Weight Management without Blame or Shame

Objectives of session: By the end of the workshop, participants will be able to:

- Recognize their own biases about obesity
- Explain how health care practices might contribute to stigma and bias about obesity
- Describe the barriers that people with obesity experience when talking with health care providers about weight
- Discuss ways in which they can address weight bias and stigma in their own practice

Timeline of events:

Time	Item	Materials
10 minutes	Welcome and overview key messages: <ul style="list-style-type: none"> • Overview of workshop • Why we are talking to health professionals and trainees • Mention that there will be a break 	Title slide and a few points on PowerPoint, Agenda on PowerPoint
10 minutes	PowerPoint presentation overview of project	
5 minutes	Transition to Dramatic Presentation <ul style="list-style-type: none"> • Describe setting • Explain that the upcoming presentation is intended to promote thought and discussion about weight management. As you watch the presentation, think about what you would change in the scenario to result in a more positive experience. After the presentation, we will be discussing what we watched. 	
15 minutes	Dramatic Presentation	
20 minutes	Think-Pair-Share Activity <ul style="list-style-type: none"> • Instruct students to reflect on film you just saw using following questions and take some notes • What stood out for you the most in the film? Was there: a moment, a phrase, an interaction that was particularly impactful, and can you describe why? • Can you identify something in the film that could have happened differently to result in a more positive outcome? (Approx. 5 minutes)	Questions and instructions to participants on PowerPoint

	<ul style="list-style-type: none"> • Now pick someone in a seat next to you (introduce yourselves and share brief background) • Share your reflections with them 	
15 minutes	Share thoughts with larger group	Talking points on PowerPoint
10 minutes	Presentation of Study Results (overview only) Mention that although it was a doctor presented in play any health professional can share the practitioners' frustrations and we found that in the study (interprofessional lens)	
40 minutes	<p>Small Group Activity: Re-writing the play Based on your discussion before break and the information presented in the study results how would you rewrite part of the film script to make the scenario a more positive obesity management experience?</p> <ul style="list-style-type: none"> • Instruct students to discuss and have one person play note taker • Give excerpts and re-write (sections of the film) • Thinking about 'language', rethink the setting – what other characters, props, or actors should have been on the stage? • Re-think the script – re-write the film (keep specific to the film they just saw) • Point out to participants with dialogue that they need to break up the patient/doctor dialogue on the provided handout sheet <p>Give five-minute warning as time wraps up. Collect re-writes and organize same sections together.</p>	<p>Question on PowerPoint</p> <p>Handouts</p>
45 minutes	<p>Group Discussion</p> <ul style="list-style-type: none"> • Ask groups to read out their script rewrites. • Discuss what worked and didn't work • Talk about some of the things that might get in the way in real life 	
5 minutes	<p>Q&A</p> <ul style="list-style-type: none"> • Final opportunity to ask questions/cover anything that came up but wasn't already addressed • Perhaps opportunity to mention any insightful comments on graffiti wall or address any questions asked there • Handout evaluation sheet, explain why we are evaluating Closing Thank participants for attending 	Evaluation Sheet

Appendix B: Weight Bias Assessment Tools

NOTE: AFA and UMB-FAT text has been modified slightly to reflect person-first language, by replacing the word “fat” with “overweight”

B1a): Anti-Fat Attitudes (AFA) Scale (21)

Factor	Item Text
Dislike	I find people who are overweight disgusting. I don't have many friends that are overweight. I tend to think that people who are overweight are a little untrustworthy. Although some people who are overweight are surely smart, in general, I think they tend not to be quite as bright as people of a normal weight. I have a hard time taking people who are overweight too seriously. People who are overweight make me feel somewhat uncomfortable. If I were an employer looking to hire, I might avoid hiring a person who is overweight.
Fear of Fat	I feel disgusted with myself when I gain weight. One of the worst things that could happen to me would be if I gained 25 pounds. I worry about becoming overweight.
Willpower	People who weigh too much could lose at least some part of their weight through a little exercise. Some people become overweight because they have no willpower. People who are overweight tend to be overweight pretty much through their own fault.

B1b) AFA Scale Survey Layout

For the following questions, circle a number between 0 and 9 to indicate how much you agree or disagree with each of the following statements, where 0 = very strongly disagree and 9 = very strongly agree.

	<i>Very strongly disagree / Very strongly agree</i>									
1. I feel disgusted with myself when I gain weight	0	1	2	3	4	5	6	7	8	9
2. I have a hard time taking people who are overweight too seriously	0	1	2	3	4	5	6	7	8	9
3. People who are overweight tend to be overweight pretty much through their own fault	0	1	2	3	4	5	6	7	8	9
4. I tend to think that people who are overweight are a little untrustworthy	0	1	2	3	4	5	6	7	8	9
5. I worry about becoming overweight	0	1	2	3	4	5	6	7	8	9
6. People who are overweight make me feel somewhat uncomfortable	0	1	2	3	4	5	6	7	8	9
7. People who are overweight could lose at least some of their weight through a little exercise	0	1	2	3	4	5	6	7	8	9
8. I don't have that many friends that are overweight	0	1	2	3	4	5	6	7	8	9
9. One of the worst things that could happen to me would be if I gained 25 pounds	0	1	2	3	4	5	6	7	8	9
10. If I were an employer looking to hire, I might avoid hiring a person who is overweight	0	1	2	3	4	5	6	7	8	9
11. Some people are overweight because they have no willpower	0	1	2	3	4	5	6	7	8	9
12. Although some people who are overweight are surely smart, in general, I think they tend not to be quite as bright as people with a normal weight.	0	1	2	3	4	5	6	7	8	9
13. I find people who are overweight disgusting	0	1	2	3	4	5	6	7	8	9

B2a): The Universal Measure of Bias against heavy individuals (UMB-FAT) (201)

Factor	Item Text
Negative Judgment	People who are overweight tend toward bad behaviour. People who are overweight are sloppy. Sometimes I think that people who are overweight are dishonest. People who are overweight have bad hygiene. In general, people who are overweight don't think about the needs of others
Distance	I would not want to have a person who is overweight as a roommate. I like people who are overweight. I don't enjoy having a conversation with a person who is overweight. I would be comfortable having a person who is overweight in my group of friends. I would like having a person who is overweight at my place of worship or community centre.
Equal Rights	Special effort should be taken to make sure that people who are overweight have the same rights and privileges as other people. Special effort should be taken to make sure that people who are overweight have the same salaries as other people. Special effort should be taken to make sure that people who are overweight have the same educational opportunities as other people. Special effort should be taken to make sure that people who are overweight have the same housing opportunities as other people. I try to understand the perspective of people who are overweight.

B2b) UMB-FAT Survey Layout

For the following questions, circle a number between 0 and 9 to indicate how much you agree or disagree with each of the following statements, where 0 = very strongly disagree and 9 = very strongly agree.

	<i>Very strongly disagree / Very strongly agree</i>									
1. People who are overweight tend toward bad behavior.	0	1	2	3	4	5	6	7	8	9
2. People who are overweight are sloppy.	0	1	2	3	4	5	6	7	8	9
3. Sometimes I think that people who are overweight are dishonest.	0	1	2	3	4	5	6	7	8	9
4. People who are overweight have bad hygiene.	0	1	2	3	4	5	6	7	8	9
5. In general, people who are overweight don't think about the needs of other people.	0	1	2	3	4	5	6	7	8	9
6. I would not want to have a person who is overweight as a roommate.	0	1	2	3	4	5	6	7	8	9
7. I like people who are overweight.	0	1	2	3	4	5	6	7	8	9
8 I don't enjoy having a conversation with a person who is overweight.	0	1	2	3	4	5	6	7	8	9
9. I would be comfortable having a person who is overweight in my group of friends.	0	1	2	3	4	5	6	7	8	9
10. I would like having a person who is overweight at my place of worship or community centre.	0	1	2	3	4	5	6	7	8	9
11. Special effort should be taken to make sure that people who are overweight have the same rights and privileges as other people.	0	1	2	3	4	5	6	7	8	9
12. Special effort should be taken to make sure that people who are overweight have the same salaries as other people.	0	1	2	3	4	5	6	7	8	9
13. Special effort should be taken to make sure that people who are overweight have the same educational opportunities as other people.	0	1	2	3	4	5	6	7	8	9
14. Special effort should be taken to make sure that people who are overweight have the same housing opportunities as other people.	0	1	2	3	4	5	6	7	8	9
15. I try to understand the perspective of people who are overweight.	0	1	2	3	4	5	6	7	8	9

B3: Demographic Questions

Please select your current year of study from the drop-down menu below.

- 1
- 2
- 3
- 4
- 5+

Please indicate in the drop-down menu below whether you have, or have not, received previous training or education on the topic of weight bias before completing this survey.

- Yes
- No

Please enter the first and middle initial of your name and the day and month of your birthdate in the space below (i.e. TL2003). This alpha-numeric code will be used to track the number of surveys/ what surveys (i.e. pre-, post-, and/or follow-up) each participant completes.

****Intervention group only****

On October 27, 2017 a number of students enrolled in the fall semester of *NUTR 4444: Professional Practice in Dietetics* at MSVU participated in a weight bias education workshop that took place during a regularly scheduled class time. During this workshop, pre- and post-workshop evaluation data was collected by the workshop facilitator, Dr. Sara Kirk.

Do you grant the primary researcher of the current study permission to access and use your de-identified data that was collected during this weight bias education workshop?

- Yes
- No

The alpha-numeric code requested in the previous question will help match your response with the pre-post evaluations. For example, if permission is withheld, the code from this survey will be matched to the pre-post evaluations completed during the workshop and all data will be withdrawn from the study and disposed of in a secure manner.

Appendix C: Communications

C1: Invitation to Participate

Hello fellow students,

My name is Terri Finbow, and I am a graduate student at Mount Saint Vincent University (MSVU). I am completing my Master of Science degree in Applied Human Nutrition, and would like to invite you to participate in my thesis research project. The purpose of this research is to assess the attitudes of food and nutrition students about overweight and obesity.

Students enrolled in the NUTR 4444: Elements of Professional Practice course during the 2017-2018 academic year have been selected to take part in this study based on department, course level, and course content.

Participation in this research project will involve responding to a web-based surveys. The online survey will contain 32 items and will take approximately 15 minutes to complete. Your participation in this survey will provide important information on existing attitudes among food and nutrition students about overweight and obesity. This content will be useful for making decisions on how to address the learning needs of current and future food and nutrition students regarding interactions with patients living with overweight and obesity.

This study has received ethical approval from the MSVU Research Ethics Board.

If you are interested in taking part in, or learning more about this research, please visit the link below:

****WEB LINK TO SURVEY****

Thank you.

Terri Lynn Finbow
BScAHN, MScAHN (c)

C2: Information Letter and Informed Consent

Thank you for your interest in participating in this research.

This thesis research project is being led by Terri Finbow, a graduate student at Mount Saint Vincent University (MSVU) enrolled in the Master of Science Applied Human Nutrition program, under the supervision of Dr. Sara Kirk, Professor of Health Promotion and Canada Research Chair for Applied Research Collaborations for Health (ARCH) at Dalhousie University. The purpose of this project is to evaluate a novel multi-strategy weight bias workshop with food and nutrition students in Nova Scotia, Canada. This workshop will explore how societal discourses and some health care practices can contribute to weight bias and stigma in relation to excess body weight.

Participation in this research will involve the completion of one web-based survey. The survey contains 32 items and will take approximately 15 minutes to complete. Your participation in this survey will provide important information on existing attitudes among food and nutrition students about overweight and obesity and how these attitudes are influenced over time as a result of participation in a weight bias workshop. This content will be useful for making decisions on how to address the learning needs of current and future food and nutrition students regarding interactions with patients living with overweight and obesity.

Your participation in this study is voluntary, and you are under no obligation. You are free to skip any questions you do not wish to answer by selecting the “prefer not to answer” option. You may also choose to withdraw at anytime by submitting a blank or incomplete survey or exiting the web-browser. However, after you submit the survey, data cannot be withdrawn, as the surveys do not contain any identifiers to differentiate what survey belongs to which student. This survey is for research purposes only. Your future access, and delivery of academic services will not be affected in anyway by participating, or choosing not to participate, in this survey. Your participation or non-participation in this survey has no effect on your grade in the course in which the intervention is delivered, or any other course.

There is minimal risk associated with participation in the current research. The probability and magnitude of possible harms (i.e. psychological and social) is no greater than those encountered in those aspects of your everyday life that relates to the research. It is acknowledged that the survey contains sensitive content regarding body weight, shape, and size, which may cause individuals to feel uncomfortable, demeaned, embarrassed, worried, or upset. It should also be noted that exposure to this sensitive content survey, may elicit feelings and tendencies towards self-harm. It is the responsibility, and legal duty, of the researchers to report any verbal or written documentation of one’s intent to harm themselves to appropriate personnel. If participation in this study makes you feel uncomfortable or elicits negative emotions that requires additional attention, please contact MSVU counselling services by telephone at (902) 457-6567 or email at counselling@msvu.ca.

Survey responses will not be linked to your identity and will be kept confidential. Please do not enter your name anywhere in the survey. Do not complete the survey with anyone else and please do not share your answers. This is to help maintain everyone’s privacy, anonymity, and confidentiality. Data will be stored on a secure Dalhousie webserver that is under the control of

the Dalhousie University Networks and Systems Department. Once the data is analyzed it will be stripped of all identifying information, stored on a password protected USB and archived for up to five years for potential use in future research. After this time, the data will be destroyed.

A presentation of the research outcomes will take place at MSVU during the Spring 2019 semester. A detailed description of the outcomes and results will be made available in an online published version of the thesis on the MSVU library page under Research Guides – Applied Human Nutrition – Thesis and Dissertations - MSVU E-Commons: MSVU Graduate Theses.

If you have any further questions, about this research, you can contact the primary researcher at terri.finbow@msvu.ca.

If you have questions about how this study is being conducted and wish to speak to someone not involved with the study, you may contact the MSVU Ethics Board (UREB) through telephone at (902) 457-6350 or via email at brenda.gagne@msvu.ca.

Thank you for your time and participation.

Informed Consent:

Have you read, understand, and agree to the information provide above?

By consenting, you have not waived any rights to recourse in the event of research-related harm.

YES (continue to survey)

NO (please exit your web browser)

C3: Participation Reminder

Good morning Everyone,

You may recall receiving an invitation to participate in my research study last week. The purpose of this research is to assess the attitudes of food and nutrition students about overweight and obesity.

I am writing today, as a friendly reminder that access to the survey will close _____, 2018 at 11:59 PM. If you have not already done so, please visit the link below to complete the 32-item questionnaire, which will take approximately 15 minutes to complete. Details regarding my research can be found on the initial page of the survey.

This study has received ethical approval from the MSVU. Participation in the surveys is completely voluntary and you may withdraw your participation at any time.

If you are interested in taking part in this research, please complete the survey by clicking on the link below:

****WEB LINK TO SURVEY****

Thank you.

Terri Lynn Finbow
BScAHN, MScAHN (c)