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Attributing discrimination to weight: Associations with well-being, self-care, and disease status in patients with type 2 diabetes mellitus

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Abstract

This study examined the association between attributing self-reported discrimination to weight and diabetes outcomes (glycemic control, diabetes-related distress, and diabetes self-care). A community dwelling sample of 185 adults (mean age = 55.4; 80% White/Caucasian, 65% female) with poorly controlled Type 2 diabetes (HbA1c level ≥7.5%) provided demographic and several self-report measures (including diabetes-related distress, diabetes self-care activities, discrimination, and attributions of discrimination), and had height, weight, and glycated hemoglobin (HbA1c) assessed by trained research staff as part of a larger research study. Individuals who attributed self-reported discrimination to weight had significantly higher HbA1c levels, higher levels of diabetes-related distress, and worse diabetes-related self-care behaviors (general diet, exercise, and glucose testing). These relationships persisted even when controlling for BMI, overall discrimination, depressive symptoms, and demographic characteristics. Results indicate that the perception of weight stigma among individuals with type 2 diabetes is strongly associated with a range of poor diabetes outcomes. Efforts to reduce exposure to and/or teach adaptive coping for weight stigma may benefit patients with type 2 diabetes.

Keywords

discrimination; weight; obese; diabetes; self-care behavior; distress

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Introduction

Worldwide, an estimated 370 million people have type 2 diabetes mellitus (Bell et al., 2014), with 23.6 million in the United States (Wardian & Sun, 2014) – a number which is estimated to double over the next two decades (Lopez et al., 2014). Type 2 diabetes is commonly comorbid with (Teixeira & Budd, 2010), and often emergent from overweight/obesity (Wilding, 2014). Rising obesity rates are often coincident with increased prevalence of type 2 diabetes (Teixeira & Budd, 2010). Obese men and women have a 7-fold and 12-fold higher risk for the disease, respectively (Wilding, 2014). An estimated 35% of U.S. adults are obese (Centers for Disease Control and Prevention, CDC, 2014) – a number that will continue to rise (Teixeira & Budd, 2010; Wyatt et al., 2006) – thus understanding the psychosocial conditions that make up and potentially contribute to type 2 diabetes prognosis is critical.

Individuals who are overweight (Body Mass Index, BMI, between 25.0 and 29.9 kg/m^2) or obese (BMI >29.9 kg/m^2) are at increased risk for a broad array of chronic medical conditions in addition to diabetes, such as cancer, cardiovascular disease, sleep apnea, and osteoarthritis (Wyatt et al., 2006). When combined with diabetes, these weight-related conditions place individuals at even greater risk for health complications and a poor disease trajectory. In part, this is because overweight/obesity cause decreased sensitivity to insulin in target organs (Ciechanowski et al., 2003; Furukawa et al., 2004), which leads to hyperglycemia among other adverse consequences. Left unmanaged, this can lead to heart disease (Gaede et al., 2003; Grover et al., 2014), stroke (Patel et al., 2008), kidney failure, and death (Inzucchi et al., 2012).

Moreover, individuals who are overweight/obese are at risk for psychosocial consequences including stigma, victimization, and unfair treatment (Puhl & Heuer, 2009). In fact, overweight/obese individuals frequently report experiencing weight-related discrimination at rates similar or higher to that of individuals who are discriminated against due to race or age (Andreyeva et al., 2008; Pearl & Dovidio, 2014). Discrimination is related to poor physical health (Williams et al., 2003), as such it may further complicate the health and well-being of overweight/obese individuals with type 2 diabetes. As evidence regarding the impact of weight discrimination specific to patients with type 2 diabetes is lacking, this paper examines the effects of attributing self-reported discrimination to weight on three different domains of diabetes outcomes: disease status, diabetes-related distress, and self-care behaviors.

Weight, Discrimination, and Health

Negative stereotypes of overweight/obese individuals include pervasive beliefs that they are lazy, lacking in self-control, and incompetent (Puhl & Heuer, 2009). Evidence suggests that overweight/obese individuals are often ridiculed by others and are targets of derogatory and unfair treatment in public settings, romantic relationships, public health campaigns, the media and across a range of other settings (see Andreyeva et al., 2008; Puhl & Brownell, 2001; Vartanian et al., 2014). Weight-related discrimination is present in the workplace, such that overweight job applicants are perceived as lacking potential, ambition and professionalism, and are less likely to be hired than non-overweight/obese applicants (Puhl

& Heuer, 2009). Similarly, in educational settings, overweight children report being belittled by their peers and by teachers who express anti-fat attitudes towards overweight students, which may result in differential treatment and lower educational attainment (Puhl & Heuer, 2009). People who are overweight/obese also report weight-related discrimination within their families. Obese individuals commonly identify spouses, parents, siblings, and children as common sources of weight stigma (Puhl & Heuer, 2009; Vartanian et al., 2014).

Furthermore, discriminatory attitudes towards overweight/obese patients prevail in health care settings. This may be especially problematic for overweight/obese patients with concomitant health problems as the quality of care they receive may suffer due to some medical professionals' preconceived notions about them. For example, some physicians report viewing obese patients as lazy and lacking in self-control and, as a result, consider it futile to attempt to assist patients with losing weight in an effort to manage other chronic medical conditions (Foster et al., 2003). Physicians also spend less time with obese patients, which, together with negative attitudes towards them, may translate into patient discomfort and less favorable diagnoses and treatment outcomes (Hebl et al., 2003). Successful management of type 2 diabetes requires carefully prescribed lifestyle and medical regimens. Yet health behaviors, including but not limited to adherence to type 2 diabetes regimens, are largely influenced by one's social context (Bhattacharya, 2012). Such findings suggest that that some overweight/obese individuals may be less inclined to perform health behaviors necessary for successful type 2 diabetes management (Garber, 2012). For instance, the potential of encountering weight-related discrimination in medical settings may lead individuals to delay seeking care due to embarrassment or fear of poor treatment (Budd et al., 2011). Indeed, compared to normal weight individuals, obese individuals are less likely to utilize preventive services (e.g., Ostbye et al., 2005).

In summary, weight discrimination experiences occur frequently (almost daily) across many different contexts in the lives of overweight individuals (Vartanian et al., 2014). Such experiences, in turn, have important implications for disease progression, health behavior, and well-being of overweight/obese individuals, including those with type 2 diabetes.

The general link between discrimination and poor health outcomes is well established (e.g., Williams et al., 2003). Regarding physical health, perceived racial discrimination has been associated with exaggerated physiological responses to stress, such as elevated blood pressure and increased catecholamine release, which in turn, may enhance vulnerability to disease states (e.g., hypertension and breast cancer, respectively; Pascoe & Smart Richman, 2009; Taylor et al., 2007). Perceived discrimination is also associated with coping strategies such as substance use, overeating, and avoidance of exercise, which may lead to or exacerbate existing health problems such as obesity (Pascoe & Smart Richman, 2009). Similarly, among patients with type 2 diabetes, discrimination is associated with poor metabolic and glycemic control, perhaps through maladaptive behavioral coping such as poor dietary choices (Wagner et al., 2013). Evidence also links discrimination to negative psychological outcomes. For instance, among stigmatized groups, such as racial and sexual minorities (i.e., identifying as lesbian, gay, or bisexual; Strutz et al., 2015), discrimination is associated with low self-esteem (Greene et al., 2006), depression (Finch et al., 2000; Kessler et al., 1999), stress (Huynh et al., 2012), poor psychological adjustment (Greene et al.,

2006), and increased psychological distress (see Schmitt et al., 2014). Similarly, weight-related discrimination among otherwise healthy overweight/obese individuals has been linked to unfavorable outcomes such as internalization of anti-fat attitudes, low self-esteem, poor body image, and psychological distress (Durso & Latner, 2008). Among patients with type 2 diabetes, racial discrimination is associated with diabetes-related distress, characterized by frustration, poor motivation and adherence to self-care, and fatigue (Wagner et al., 2015). Diabetes-related distress is highly prevalent among patients with type 2 diabetes and is associated with depressive symptoms (Lebron et al., 2014) and poor glucose control (Pandit et al., 2014), suggesting that overweight/obese individuals with type 2 diabetes who encounter mistreatment due to their weight may experience poor clinical outcomes.

Despite the extensive work documenting the pervasive relationships between discrimination and poor health outcomes, evidence specific to self-reported discrimination attributed to weight among patients with type 2 diabetes is limited. One study showed that weight-related discrimination is relatively common for patients with type 2 diabetes, and that it could inhibit the use of services essential for diabetes management and decrease self-efficacy regarding diabetes management behaviors (Teixeira & Budd, 2010). Importantly, successful management of type 2 diabetes greatly depends on the self-care behaviors of patients (Henderson et al., 2014). As such, perceived weight discrimination, which may lead to negative psychosocial states (i.e., psychological stress and depression), unhealthy behaviors (e.g., smoking and alcohol use; Pascoe & Smart Richman, 2009), or less willingness to adopt behavior change (Henderson et al., 2014), may have detrimental effects in patients with type 2 diabetes.

Current Study

To our knowledge, our study is the first to examine the effect of attributing self-reported discrimination to weight on a broad array of self-reported and objective health indicators in patients with type 2 diabetes (particularly while controlling for established risk factors, such as BMI). In doing so, we consider the potential confounding by important factors that may predispose individuals to discrimination in general and to poor health. First, one's objective physical weight status, typically indexed by BMI, is associated with poor health outcomes that may further complicate the conditions of individuals with type 2 diabetes (i.e., worsen diabetes outcomes). Second, type 2 diabetes is highly prevalent among certain demographic groups, such as racial minorities, older individuals (Lopez et al., 2014), and females (Thorand et al., 2007), all of whom are at risk for health conditions (e.g., cardiovascular disease; Berry et al., 2012) that may worsen diabetes outcomes. Moreover, discrimination occurs in multiple domains (e.g., in employment, healthcare, and education settings) and due to various reasons (e.g., age, race, weight). Further, depressive symptoms are highly prevalent among patients with type 2 diabetes and may impact glucose control and self-care (Ciechanowski et al., 2003) and may predispose individuals to report discrimination (Berg et al., 2011). As overall amounts/levels of discrimination are related to stress, well-being, and health, it is important to distinguish any effects uniquely due to the attribution of discrimination experiences to weight from the negative impact of discrimination experiences more broadly. Therefore, to examine whether diabetes outcomes are related specifically to

self-reported discrimination due to one's weight, rather than being related to overall levels of discrimination or other determinants of health (age, race, BMI, depressive symptoms), we statistically account for the potentially confounding effect of these factors.

Self-reported discrimination that is attributed to weight may play an important role in how diabetes progresses and is behaviorally and psychological managed by the patient. In this study, we tested two research questions: Is the attribution of self-reported discrimination due to weight among individuals with type 2 diabetes related to worse diabetes outcomes?; and, Is the attribution of self-reported discrimination due to weight among individuals with type 2 diabetes related to worse diabetes outcomes when we control for other factors that predispose individuals to discrimination and/or poor health, such as BMI and one's total amount of self-reported discrimination? We hypothesized that attributing self-reported discrimination to weight would be related to worse diabetes outcomes, specifically higher HbA1c, greater diabetes-related distress, and poorer self-care behavior above and beyond the effect of other sources of self-reported discrimination and/or negative health outcomes (i.e., BMI and total discrimination).

Methods

Sample and Procedure

Patients (n = 185) with type 2 diabetes were recruited to take part in a study examining how daily experiences related to health and well-being among individuals with diabetes. This report utilizes baseline data from a parent intervention study; only pre-intervention (pre randomization) baseline data are used for this report. Respondents attended a baseline session where HbA1c was assessed by trained research staff using the DCA 2000+ Analyzer, height was assessed using a stadiometer, and weight was assessed using a scale, by trained research staff. Participants also completed a packet of self-reported subjective health measures (described below).

Participants were recruited from three communities in New York (N = 46), Pennsylvania (N = 76), and Tennessee (N = 63), through the use of written advertisements in diabetes medical centers and other public locations, as well as through advertisements in newspapers and on the internet to take part in a study examining how daily experiences related to health and well-being among people with chronic illness. Initial screenings were conducted over the phone. Eligibility criteria included that participants were between 22 and 75 years of age, had physician diagnosed type 2 diabetes, reported not using insulin to control diabetes in the first year following diagnosis and reported that they were free from substance use and psychiatric disorders. Additionally, only participants with relatively poor diabetes control (defined for this study as HbA1c level ≥7.5% at baseline assessment, as verified by trained research staff) were eligible. Female participants were excluded if they had given birth in the past three months, were pregnant, or reported planning to be pregnant in the two years following the start of the study. Informed consent was obtained from all individual participants included in the study and participants were compensated $30 at this baseline visit.

The resulting sample was 65% female (n = 120) and 80% White/Caucasian (n = 148). The mean age was 55.42 years old (*SD* = 10.10). Fifty-seven percent were married (n = 105), 58% worked full- or part-time (n = 108), and 74% had children (n = 137). Thirty-four percent of participants completed high-school or less, 30% completed some college, and 35% had a bachelor's, master's, or doctoral degree (mean years of education completed = 14.33, *SD* = 2.64). Of those who reported their annual income, 43% indicated an income of less than $40,000, 22% reported an income of $40-60,000, and 34% reported an income of more than $60,000. Average HbA1c level was 9.1% (*SD* = 1.7). Average body mass index (BMI) was 37.49 kg/m^2 (*SD = 8.28*); based on CDC standards for body mass index (CDC, 2014), less than 2% (n = 3) fell into the “healthy weight” category (BMI 18.5-24.9), 18.4% (n = 34) fell into the “overweight” category (BMI 25-29.9), 50.3% (n = 93) fell into the “obese” category (BMI 30-39.9), and 29.7% (n = 55) fell into the “morbidly obese” category (BMI ≥ 40). No participants were “underweight” (BMI ≤ 18.5).

Measures

Discrimination—Participants' perceived everyday discrimination was assessed using the Everyday Discrimination Scale (EDS; Essed, 1991). The EDS presents nine situations related to unfair treatment (e.g., “Do you receive poorer service than other people at restaurants or stores?”) to which respondents rate the frequency of unfair treatment in their daily lives on a scale of 1 to 4 (1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often). Ratings were summed across all items for a *total discrimination* score; higher scores indicate higher perceived everyday discrimination. The EDS demonstrates high validity (see Lewis et al., 2012), and internal consistency (Cronbach's alpha) of the EDS was .86 in the present sample.

Subsequently, respondents who reported having experienced any discrimination (i.e., rating of 2 or higher on any item on the scale) indicated their perceived attributions for discrimination by answering Yes (1) or No (0) to each of 15 potential reasons for discrimination (e.g., weight/height, race, ethnicity, gender or sex, medical condition). For this report, we focus solely on the “weight/height” item in order to determine whether participants attributed their self-reported discrimination to this reason; this was used as the *weight discrimination* variable. The wording of the attribution variable (due to “weight/height”) leaves open the possibility that participants perceived to be discriminated against due to their height (although we consider this relatively unlikely in our sample); therefore, in order to ensure that discrimination was solely attributable to weight status and not height, we controlled for participants' height in the final step of each model in the analyses, as described below.

PAID—Participants' level of diabetes-related distress was assessed using the Problem Areas In Diabetes scale (PAID; Polonsky et al., 1995). The scale presents 20 situations that portray potential sources of diabetes-related distress (e.g., feeling discouraged with diabetes regimen, worrying about diabetes complications, not coming to terms with disease status). Respondents rated how much each item was a problem on a scale of 0 (Not a problem) to 4 (Serious problem). Ratings were summed across all items for a total PAID score; higher overall scores indicate greater diabetes-related distress. Internal consistency (Cronbach's

alpha) of the PAID was .93 in the present sample. Prior psychometric studies demonstrate that this measure has high concurrent validity with scales assessing constructs related to PAID (e.g. diabetes coping, diabetes social support; Welch et al., 1997)

Self-care—Participants' diabetes self-care behavior was measured using the Summary of Diabetes Self-Care Activities (SDSCA; Toobert et al., 2000). The scale presents 11 self-care activities to which respondents rated the frequency of carrying out each activity over the previous week (0-7 days) (e.g., “On how many of the last seven days did you check your feet?”). The SDSCA captures five core areas related to diabetes self-care: general diet, specific diet, exercise, blood glucose testing, and foot care. The glucose testing subscale contains only one item. Cronbach's alpha for the other self-care dimensions in our sample are: general diet (0.91), specific diet (0.13), exercise (0.85), and foot care (0.38). The observed reliabilities are consistent with those that have been reported elsewhere, and the scale shows high validity (see Toobert et al., 2000).

Analytic Plan

All analyses were conducted using SAS Version 9.4. We first obtained descriptive statistics for the entire study sample. Subsequently, we used separate PROC GLM models to test the effect of attributing self-reported discrimination to one's weight on each of the three diabetes-related outcomes (HbA1c, PAID, and self-care). The PROC GLM option MANOVA was used for the self-care analyses because it allowed us to enter all five dimensions of self-care (general diet, specific diet, exercise, glucose testing, and foot care) as dependent variables in the same model. This multivariate analysis takes into consideration the relationships (i.e., correlations) among the five dimensions of self-care.

Our hypothesis was tested in separate model steps for each outcome. In the first model step, we examined the question of whether or not attributing self-reported discrimination to one's weight predicted diabetes outcomes without adjusting for covariates. In the second model step, we examined whether diabetes outcomes were related to attributing discrimination to one's weight above and beyond actual weight status (BMI). In the third step, we examined whether diabetes outcomes were related to attributing discrimination to one's weight after controlling for both actual weight status (BMI) and the overall amount of self-reported discrimination reported (i.e., total discrimination). As noted earlier, due to the wording of the response option for the discrimination measure, we also controlled for height in the final step in order to ensure that discrimination was solely attributable to weight status and not height. Exploratory analyses revealed that individuals who attributed discrimination to weight were significantly younger ($p = 0.02$); as aforementioned, prior work suggests that demographic characteristics (i.e., gender, race, age) and depressive symptoms (Berg et al., 2011; Ciechanowski et al., 2003) may place individuals at risk for exposure to discrimination (Kessler et al., 1999; Minichiello, et al., 2000). We therefore entered gender, race, age, and Center for Epidemiologic Studies Depression scale (CES-D; Radloff, 1977) score as additional covariates in the final step (i.e., in addition to BMI, total discrimination, and height) in order to establish whether diabetes outcomes were related to attributing discrimination to weight above and beyond the effect of other potential risk factors (results are similar without depression in the model; as such, the full model with depression is

presented). More than 80% of our sample was White/Caucasian, limiting our ability to carefully model or explore racial differences. As such, our racial group variable was coded as “White/Caucasian” or “non-White/Caucasian” for use as a covariate.

Results

Descriptive statistics are shown in Table 1 for the total sample, and also by those who attributed self-reported discrimination to weight versus not. In the total sample, the mean BMI was 37.49, the mean HbA1c was 9.13, the mean PAID score was 31.39, and the mean total discrimination score was 15.42. Among those who attributed self-reported discrimination to weight, the mean BMI was 41.10, the mean HbA1c was 9.41, the mean PAID score was 35.60, and the mean total discrimination score was 16.72. Among those who did not attribute self-reported discrimination to weight, the mean BMI was 33.65, the mean HbA1c was 8.61, the mean PAID score was 26.53, and the mean total discrimination score was 15.59. Table 2 presents correlations between study measures in the entire sample. Preliminary analyses showed that the large majority (87.03%; n = 161) of the sample self-reported at least some discrimination, whereas 12.97% (n = 24) did not self-report any discrimination (and thus were not asked to complete the second portion of EDS that assessed if they attributed self-reported discrimination to weight and/or other sources). Of those who self-reported any discrimination, the majority (88.89%; n = 143) completed the second portion of the EDS that assessed attributions for self-reported discrimination, whereas 11.18% (n=18) did not complete the second portion of the EDS despite instructions to do so. Of those who self-reported any discrimination and filled out the second portion of the EDS, 54.64% (n = 81) selected weight as a factor to which they attributed self-reported discrimination, 43.36% (n = 62), did not include weight as an attributed reason for self-reported discrimination.

HbA1c

Among those who self-reported any discrimination and completed the attribution measure, we first compared HbA1c of individuals who attributed self-reported discrimination to weight to those who did not endorse such an attribution. There was a significant relationship of attributing self-reported discrimination to weight with HbA1c [$F (1, 142) = 8.67$, $p = 0.004$], such that those who attribute, at least in part, experiences of discrimination as being due to their weight had significantly higher HbA1c levels (compared to individuals who did not make such an attribution). To control for actual weight status, in the second step we entered BMI into the model as a covariate. As predicted, the attribution of discrimination to weight continued to be related to HbA1c levels, even while controlling for actual weight status [$F (2, 141) = 11.04$, $p = 0.001$]. In the next step we entered total discrimination in the model (and continued to control for BMI) to control for the effect of the total amount discriminatory experiences encountered by participants and (due to the wording of the attribution variable of “weight/height”), we also controlled for participant height. Again, results indicated a significant relationship between the attribution of discrimination to weight and HbA1c [$F (4, 139) = 10.39$, $p = 0.002$], above and beyond the effects of BMI, height, and total discrimination. As gender, race, age, and depressive symptoms potentially increase self-reports of, we also entered gender, race, age, and CES-D score into the last step

of the model (and continued to control for BMI, total discrimination, and height). These results continued to indicate a significant relationship between the attribution of discrimination to weight and HbA1c [F (8, 127) = 7.80, $p = 0.006$], even when controlling for BMI, height, total discrimination, gender, race, and age (Table 3).

PAID

Our second model compared PAID scores of individuals who attributed self-reported discrimination to weight to those who did not; we followed the analytic steps outlined previously. As predicted, the attribution of discrimination to weight had a significant relationship with PAID [F (1, 143) = 10.79, $p = 0.001$], such that those who attributed self-reported discrimination to weight reported significantly more diabetes-related distress. In the second step, participants who attributed self-reported discrimination to weight had significantly higher PAID scores, even after controlling for BMI [F (2, 142) = 5.38, $p = 0.02$]. The third step included total discrimination and height as additional covariates; the attribution of discrimination to weight continued to have a significant relationship with PAID [F (4, 140) = 4.73, $p = 0.03$], even after accounting for the effects of BMI, height, and total discrimination. We also found a significant relationship between total discrimination and PAID [F (4, 140) = 20.07, $p < 0.0001$], such that greater total self-reported discrimination was associated with more diabetes-related distress. Gender, race, age, and CES-D score were entered into the last step of the model. The relationship between total discrimination and PAID persisted [F (7, 129) = 15.42, $p = 0.0001$]. The relationship between attributing discrimination to weight and PAID scores remained similar in nature, but was reduced to statistical non-significance when including all covariates in the final model step [F (8, 128) = 2.26, $p = 0.13$] (Table 3); this is likely due to the strong relationship between depression (as indexed by CES-D) and diabetes-related distress (i.e., PAID), as both measure dysphoria and share substantial variance.

Self-care

Given that the self-care scale has 5 components thought to represent somewhat independent behaviors, we examined all components in a multivariate fashion, but otherwise following the same approach outlined above. Thus, our final model used MANOVA to compare individuals who attributed self-reported discrimination to weight versus those who did not on the number of days they participated in diabetes self-care behaviors. Individuals who attributed self-reported discrimination to weight reported significantly fewer days of self-care related to general diet, exercise, and glucose testing, but not for foot care or diabetes specific diet (see Table 3). Results stayed the same when controlling for BMI in the second step. When total discrimination and height were included as additional covariates in the third step, we again found that individuals who attributed self-reported discrimination to weight reported significantly fewer days of self-care related to general diet, exercise, and glucose testing. As done previously, we entered gender, race, age, and CES-D score as covariates, in addition to BMI, height, and total discrimination, in the last step of the model. Again, the results generally held, with fewer days of self-care related to general diet [F (8, 123) = 3.85, $p = 0.05$] and exercise [F (8, 123) = 4.46, $p = 0.04$], and glucose testing [F (8, 123) = 3.94, $p = 0.05$]. There was no significant relationship of attributing self-reported discrimination to weight with specific diet or foot care in any model step (Table 3). Although conceptually

and clinically the subscales are easier to interpret separately, we also explored these analyses using an overall self-care score (combining all subscales) as an alternative approach. This yielded similar results – individuals who attributed self-reported discrimination to weight reported less days of overall self-care as indicated by this composite of self-care behaviors [$F(8, 127) = 3.77$, $p = 0.05$].

Discussion

Previous work has shown that individuals with type 2 diabetes often perceive stigma related to their weight (Browne et al., 2013) and that weight stigma is related to poor medical treatment and worse health outcomes (Hebl et al., 2003). Little is known, however, about how attributing self-reported discrimination to weight may specifically impact the health of individuals with type 2 diabetes. This study investigated the relationship between the attribution of self-reported discrimination to weight and three health indicators among patients with type 2 diabetes. Findings supported our hypothesis, indicating that the attribution of self-reported discrimination due to weight was associated with higher HbA1c, more emotional distress due to diabetes, and fewer days of participation in diabetes self-care activities (general diet, exercise, and glucose testing); moreover, these associations held when controlling for weight status, total amount of discrimination reported, and other factors shown to predict discrimination and health outcomes. Our work builds on the current literature by showing that the attribution of self-reported discrimination to weight, after controlling for actual weight status, was independently related to objective markers of disease status (i.e., higher HbA1c) and self-reported diabetes-related distress and self-care behaviors.

Self-reported general discrimination has previously been related to poor physical health (Pascoe & Smart Richman, 2009) and objective clinical indicators of disease processes (e.g., blood pressure in cardiovascular disease; Williams & Mohammed, 2009). Extending this, we found that the attribution of perceived discrimination to weight is related to higher HbA1c levels. Although overweight/obesity is a major contributor to the increase in prevalence of type 2 diabetes and comorbidities (e.g., cardiovascular disease; Wilding, 2014), we present novel results demonstrating that the *attribution* of self-reported discrimination due to weight, above and beyond the effect of actual weight (as indexed by BMI), is related to elevated HbA1c. Similarly, these results remained when controlling for other common sources of discrimination (i.e., age, gender, race), and the total amount of reported discrimination (for any reason). Taken together, the results from this study indicate that feeling discriminated against due to one's weight is associated with broadly worse disease status in individuals with type 2 diabetes, and that this association may not be due simply to the person being overweight or the amount of discrimination experienced.

Our work indicates that the attribution of self-reported discrimination to weight is related to patients' diabetes-related distress even when controlling for their BMI and total amount of self-reported discrimination (due to any reason). By controlling for important health- and discrimination-related correlates, these findings expand on prior work among patients with type 2 diabetes linking perceived discrimination with distress, shame, hopelessness, low self-worth, and low self-confidence (Browne et al., 2013), demonstrating the independent

relationship between self-reported discrimination attributed to weight and psychological distress. Importantly, the intrusiveness of diabetes management (i.e., adherence to daily regimens and lifestyle changes) is a contributing factor to these psychological states as well as poor self-care among some patients with type 2 diabetes (Brooks & Roxburgh, 1999; Cosansu & Erdogan, 2014). Our measure of diabetes-related distress (PAID) evaluates affective states related to management of diabetes (such as feeling depressed, worried, or angry about living with type 2 diabetes) – as a long history of prior studies show a relationship between dysphoric affective states and physical health outcomes (see Watson & Pennebaker, 1989), future work should examine psychological states, notably dysphoria, as potential mediators of the relationship between discrimination and diabetes outcomes.

Participation in self-care behaviors is associated with improved type 2 diabetes outcomes (Hernandez et al., 2014), yet many patients report difficulty with adherence to self-care behaviors and lifestyle changes vital to successful disease management (Cosansu & Erdogan, 2014). We found that the attribution of self-reported discrimination to weight was related to worse general dietary behaviors, physical exercise, and appropriate glucose monitoring. This finding is consistent with prior work showing that, in otherwise healthy individuals, weight stigma may be demotivating and may encourage worse health behaviors (e.g., avoidance of physical activity and poor dietary choices; Vartanian & Smyth, 2013). Our work is novel because it suggests that the attribution of discrimination to weight may similarly encourage non-adherence to behaviors essential for successful disease management in overweight/obese patients with type 2 diabetes. Other work on the relationship between discrimination and self-care has shown mixed results. Yet these differences may be attributable to the source of discrimination assessed (e.g., racial versus weight discrimination; Peek et al., 2011), which may be differently related to diabetes self-care behaviors. Furthermore, results from this study show that the attribution of discrimination to weight was associated with some, but not all, self-care behaviors. However, the poor psychometric properties of the foot care and specific diet SDSCA subscales may explain why we found no relationship with these behaviors.

Limitations

Our study has limitations that may help inform future research. First, due to the cross-sectional nature of this study, we cannot determine the direction of the relationship between the attribution of self-reported discrimination to weight and diabetes outcomes. For instance, the possibility exists that unmeasured individual characteristics (e.g., self-esteem, neuroticism) may have contributed to the poor health of our sample via reduced health-enhancing behaviors, thus making them more likely to self-report discrimination due to weight. Second, because a large majority of our sample was White/Caucasian, we were unable to explore differences in experiences of self-reported discrimination attributed to weight across racial groups. Prior work suggests that Black and White/Caucasian women have comparable rates of eating disorders, yet Black women report less body dissatisfaction (Stojek & Fischer, 2013) and may have less issues with body image than White/Caucasian women (Grabe & Hyde, 2006). Cultural differences may account for this phenomenon, such that Black women may experience less pressure to be thin as a result of having a larger ideal body size (Grabe & Hyde, 2006). Moreover, given that individuals who belong to more than

one stigmatized group may experience worse outcomes than their counterparts (Grollman, 2014), these results may not be generalizable to patients with type 2 diabetes who are Black and overweight/obese. Future studies with racially diverse samples should examine differences in self-reported discrimination attributed to weight, as well as the potential impact of cultural differences in acceptance of overweight/obesity (Powell & Kahn, 1995). Third, the health status of individuals in our sample was generally poor; BMI (mean = 37.49) and HbA1c levels (mean = 9.13%) indicate that they were overweight/obese and had poorly controlled type 2 diabetes. As such, these findings may not generalize to individuals with diabetes who are of normal weight or those with better controlled diabetes. Moreover, obesity is related to poor body image, body image distortion, and depression (Friedman & Brownell, 1995). The poor physical health of our sample may have predisposed them to negative psychological states that increased the likelihood that they attributed discrimination to weight. Although we found that, even when controlling for depressive symptoms and other risk factors, attributing discrimination to weight was associated with poor self-care and an objective measure (HbA1c), future experimental and prospective studies should identify individual characteristics (e.g., self-esteem, neuroticism) which may predispose individuals to perceive that they are being treated unfairly and put them at risk for poor self-care. Finally, though our work is novel in that it highlights the importance of perceptions by examining the association between attributing self-reported discrimination to weight and type 2 diabetes outcomes, however future research should separately examine the association between objectively measured experiences of weight discrimination and disease outcomes for patients with chronic diseases, such as type 2 diabetes, who are overweight and obese.

Conclusions

The current study is the first of which we are aware to demonstrate a significant relationship between the attribution of self-reported discrimination to weight and a broad array of diabetes outcomes; importantly, we demonstrated that this relationship existed even after controlling for actual BMI and the total amount of self-reported discrimination reported by the participant. Controlling for BMI and other factors (e.g., gender, race, age, and depressive symptoms) revealed that the relationship between poor diabetes outcomes and weight-related discrimination does not appear to be an artifact of individuals being overweight/obese or experiencing more perceived maltreatment/discrimination in general. Rather, results from this study showed that the attribution of self-reported discrimination being due to weight was associated with higher HbA1c, greater diabetes-related distress, and worse self-care behavior in this sample of overweight/obese individuals with type 2 diabetes.

These results may have implications for understanding weight-related discrimination as it relates to health behavior, illness management, and psychological adjustment in type 2 diabetes and other chronic diseases. This work may encourage interventions for diabetes management to include coping techniques and behavioral strategies to avoid, minimize, or deal with discriminating experiences, and may inform physicians about the importance of sensitivity to patient perceptions of discrimination when providing diabetes care. Interventions to improve physiological, psychological, and behavioral responses to stress may improve coping with discrimination. For example, cognitive reappraisal may encourage

individuals to adopt new strategies to cope with discrimination, such as seeking social support, or attempt to increase meaning-making as to feel more in control of (Foster, 2009; Vartanian et al., 2014). Daily diary and ecological momentary assessment approaches may also be promising methods, as they may capture how discrimination experiences change over time and across contexts, as well as identify sources of discrimination and individual responses. These methods can be utilized to tailor interventions to match coping resources (Foster, 2009; Vartanian et al., 2014). Importantly, diabetes-related distress may be a highly-modifiable correlate of diabetes-related health behaviors. Thus targeting individuals who possibly feel burdened by their diabetes may improve diabetes outcomes. In fact, recent work showed that reduced diabetes-related distress was related to enhanced health-related behaviors such as medication adherence, diet, and physical activity recommendations (Wagner et al., 2015). Further facilitating healthy lifestyle changes (e.g., improved diet, increased exercise) rather than solely focusing on changing actual weight status may benefit patients for whom weight discrimination is a barrier to disease management (Vartanian & Smyth, 2013). Importantly, our findings may bring awareness to highly prevalent health disparities among members of stigmatized groups that may be considered in clinical practice, future research, and interventions aimed at improving the health status of individuals with type 2 diabetes and, perhaps, other chronic diseases.

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Table 1

Description of main study variables and comparison of main study variables in those who attributed perceived discrimination to weight versus not.

	Total Sample	Weight discrimination	No weight discrimination	Pr > |t|
	(n=145) Mean (SD)	(n=81) Mean (SD)	(n=64) Mean (SD)	
BMI	37.49 (8.28)	41.10 (8.27)	33.65 (7.40)	< .0001
HbA1c	9.13 (1.68)	9.41 (1.87)	8.61 (1.18)	0.004
PAID	31.39 (17.25)	35.60 (16.75)	26.53 (16.22)	0.001
Self-care: General diet	3.80 (2.01)	3.28 (2.14)	4.33 (1.59)	0.002
Self-care: Specific diet	2.54 (1.63)	3.42 (1.82)	3.51 (1.52)	0.75
Self-care: Exercise	2.52 (2.14)	1.99 (2.10)	2.98 (2.12)	0.006
Self-care: Glucose testing	4.05 (2.69)	3.25 (2.72)	4.45 (2.39)	0.006
Self-care: Foot care	4.75 (1.24)	4.68 (1.38)	4.62 (1.08)	0.79
Total discrimination	15.42 (4.67)	16.72 (4.05)	15.59 (4.23)	0.11

Notes. BMI = Body Mass Index. HbA1c = % glycated hemoglobin, mg/dL. PAID = Problem Areas In Diabetes Scale. Self-care = days of self-care.

Table 2

Correlation coefficients.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. BMI	-	-0.02	0.22**	-0.12	-0.03	-0.20**	-0.08	-0.05	0.14
2. HbA1c	-	-	0.23**	-0.32**	-0.19**	-0.11	-0.14	0.16*	0.07
3. PAID	-	-	-	-0.34**	-0.08	-0.15*	-0.06	-0.02	0.38**
4. Self-care: General diet	-	-	-	-	0.47**	0.35**	0.37**	0.14	-0.16*
5. Self-care: Specific diet	-	-	-	-	-	0.15*	0.20**	0.08	-0.08
6. Self-care: Exercise	-	-	-	-	-	-	0.23**	0.13	-0.08
7. Self-care: Glucose testing	-	-	-	-	-	-	-	0.16*	-0.09
8. Self-care: Foot care	-	-	-	-	-	-	-	-	0.03
9. Total discrimination	-	-	-	-	-	-	-	-	-

Notes. BMI = Body Mass Index. HbA1c = % glycated hemoglobin, mg/dL. PAID = Problem Areas In Diabetes Scale. Self-care = days of self-care. Total discrimination = total perceived discrimination.

* $p<.05$;

** $p<.01$

Table 3

Effect of attribution of discrimination to weight on diabetes outcomes.

		df	Type III SS	*F*	*p*	R^2		df	Type III SS	*F*	*p*	R^2
HbA1c	*Model 1*					0.08	*Model 2*					0.11
	BMI	1	5.90	2.29	0.13		BMI	1	7.31	2.83	0.10	
	Total Discr.	1	1.69	0.65	0.42		Total Discr.	1	0.04	0.01	0.90	
	Height	1	0.09	0.04	0.85		Height	1	0.11	0.04	0.84	
	Weight Attrib.	**1**	**26.81**	**10.39**	**0.002**		Gender	1	0.95	0.37	0.55	
							Race	1	1.73	0.67	0.42	
							Age	1	0.28	0.11	0.74	
							Depression	**1**	**10.59**	**4.10**	**0.05**	
							Weight attrib.	**1**	**20.14**	**7.80**	**0.006**	
PAID	*Model 1*					0.20	*Model 2*					0.43
	BMI	1	339.34	0.91	0.34		BMI	1	40.97	0.15	0.70	
	Total Discr.	**1**	**7510.71**	**20.07**	**<0.0001**		**Total Discr.**	**1**	1152.87	4.15	0.04	
	Height	1	117.56	0.31	0.58		Height	1	269.74	0.97	0.33	
	Weight Attrib.	**1**	**1769.92**	**4.73**	**0.03**		Gender	1	309.49	1.12	0.29	
							Race	1	38.30	0.14	0.71	
							Age	1	131.27	0.47	0.49	
							Depression	**1**	**13081.24**	**47.13**	**<0.0001**	
							Weight Attrib.	1	628.36	2.26	0.13	
SC: General diet	*Model 1*					0.11	*Model 2*					0.23
	BMI	1	0.15	0.04	0.84		BMI	1	0.78	0.24	0.63	
	Total Discr.	**1**	**15.97**	**4.38**	**0.04**		Total Discr.	1	3.15	0.96	0.33	
	Height	1	0.43	0.12	0.73		Height	1	2.29	0.70	0.41	
	Weight Attrib.	**1**	**27.29**	**7.48**	**0.01**		Gender	1	0.00	0.00	0.99	
							Race	1	16.19	4.91	0.03	
							Age	1	3.77	1.14	0.29	
							Depression	**1**	**45.13**	**13.69**	**0.0003**	
							Weight Attrib.	**1**	**12.69**	**3.85**	**0.05**	

		df	Type III SS	*F*	*p*	R^2		df	Type III SS	*F*	*p*	R^2
SC: Specific diet	*Model 1*					0.01	*Model 2*					0.04
	BMI	1	0.74	0.25	0.62		BMI	1	0.05	0.02	0.90	
	Total Discr.	1	2.14	0.74	0.39		Total Discr.	1	1.19	0.41	0.53	
	Height	1	0.02	0.01	0.93		Height	1	1.72	0.59	0.44	
	Weight Attrib.	1	0.001	0.00	0.99		Gender	1	6.21	2.12	0.15	
							Race	1	0.36	0.12	0.73	
							Age	1	4.05	1.38	0.24	
							Depression	1	0.03	0.01	0.91	
							Weight Attrib.	1	0.22	0.07	0.79	
SC: Exercise	*Model 1*					0.07	*Model 2*					0.11
	BMI	1	3.30	0.73	0.40		BMI	1	4.44	0.97	0.33	
	Total Discr.	1	0.07	0.02	0.90		Total Discr.	1	0.13	0.03	0.87	
	Height	1	0.18	0.04	0.84		Height	1	0.40	0.09	0.77	
	Weight Attrib.	**1**	**22.95**	**5.06**	**0.03**		Gender	1	0.04	0.01	0.93	
							Race	1	9.65	2.11	0.15	
							Age	1	3.83	0.84	0.36	
							Depression	1	11.36	2.48	0.12	
							Weight Attrib.	**1**	**20.45**	**4.46**	**0.04**	
SC: Foot care	*Model 1*					0.01	*Model 2*					0.07
	BMI	1	0.63	0.39	0.53		BMI	1	0.66	0.42	0.52	
	Total Discr.	1	0.52	0.32	0.57		Total Discr.	1	0.33	0.21	0.65	
	Height	1	0.01	0.01	0.93		Height	1	0.63	0.40	0.53	
	Weight Attrib.	1	0.34	0.21	0.65		Gender	1	2.40	1.53	0.22	
							Race	1	7.31	4.65	0.03	
							Age	1	4.61	2.94	0.09	
							Depression	1	0.02	0.01	0.92	
							Weight Attrib.	1	0.90	0.51	0.48	
SC: Glc testing	*Model 1*					0.06	*Model 2*					0.11
	BMI	1	0.27	0.04	0.84		BMI	1	4.27	0.65	0.42	
	Total Discr.	1	4.24	0.63	0.43		Total Discr.	1	4.66	0.71	0.40	

		df	Type III SS	*F*	*p*	R^2		df	Type III SS	*F*	*p*	R^2
	Height	1	0.19	0.03	0.87		Height	1	0.84	0.13	0.72	
	Weight Attrib.	**1**	**42.09**	**6.30**	**0.01**		Gender	1	1.24	0.19	0.67	
							Race	1	0.01	0.00	0.97	
							Age	**1**	**47.36**	**7.17**	**0.01**	
							Depression	1	7.44	1.13	0.29	
							Weight Attrib.	**1**	**26.01**	**3.94**	**0.05**	

Notes. Height is in inches. BMI = Body Mass Index. HbA1c = % glycated hemoglobin, mg/dL. PAID = Problem Areas In Diabetes Scale. Self-care (SC) = Days of self-care. Total discr. = total perceived discrimination. Weight attrib = yes/no variable whether participants attributed perceived discrimination to their weight. Gender = male/female. Race = white/non-white. Age = age in years. Depression = Center for Epidemiologic Studies Depression Scale (CES-D) score. Bolded text significant at the p < .05 level.