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# Weight stigma and diabetes stigma in U.S. adults with type 2 diabetes: Associations with diabetes self-care behaviors and perceptions of health care

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## ABSTRACT

**Aims:** Diabetes stigma and weight stigma have been identified as important but neglected issues that warrant attention among people with type 2 diabetes. This study assessed associations of diabetes stigma and weight stigma with diabetes self-care behaviors and health care in adults with type 2 diabetes.

**Methods:** U.S. adults with type 2 diabetes (N = 1,227) completed self-report questionnaires to assess their experiences of weight stigma, diabetes stigma, diabetes self-management, diabetes-specific distress, healthcare utilization, perceptions of diabetes-specific health care. They also provided sociodemographic information. Linear regressions examined relationships among stigma and diabetes self-care and related health care, controlling for participants' age, education, income, gender, race/ethnicity, and body mass index.

**Results:** Internalized weight stigma and diabetes self-stigma were both significantly associated with higher diabetes-specific distress. Adults who expressed self-stigma for their diabetes reported less diabetes self-management and lower self-efficacy, and those who reported being judged about their weight by a doctor exhibited greater diabetes-specific distress. While a history of experienced weight stigma (in general) did not reduce frequency of seeking health care, lower quality interactions with health care professionals were reported by adults who expressed diabetes self-stigma and those who experienced weight stigma from a doctor.

**Conclusions:** Self-stigma for diabetes and body weight, as well as experiencing judgment about weight from doctors, may have negative implications for diabetes-specific self-care behaviors and perceived quality of health care. Efforts to promote wellbeing in individuals with type 2 diabetes need to consider reducing both diabetes and weight stigma and their potentially harmful consequences.

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## 1. Introduction

The etiology and complications of type 2 diabetes have been well documented [1], as has evidence that the psychological aspects of this condition are considerable and can negatively impact on both health and quality of life [2]. However, there has been substantially less attention given to the societal stigma that people with type 2 diabetes face, and how this stigma may exacerbate their physical and emotional health [3]. In 2013, the International Diabetes Federation identified diabetes stigma as a problem requiring urgent attention and a priority to address [4]. Despite this, there is relatively little research examining diabetes stigma and its implications for self-care among people with type 2 diabetes.

Of the small number of studies in this area, most have been conducted outside North America. Australian research has documented various forms of diabetes stigma reported by adults with type 2 diabetes, including differential treatment because of their diabetes, being stereotyped, blamed and judged by others for their diabetes, and engaging in self-stigma, such as applying these stereotypes to themselves and blaming themselves for their diabetes [5,6]. These reports appear common, as evidenced in an Australian sample of 1,064 adults with type 2 diabetes, in which approximately 1 in 5 adults scored more than one standard deviation above the mean on the Diabetes Stigma Assessment Scale-2 (currently the only comprehensive measure to assess stigmatizing experiences in people with type 2 diabetes) [6]. At the item level on this measure, reports of diabetes stigma were higher (e.g., approximately 1 in 3 adults reported 'there is blame and shame surrounding type 2 diabetes') [6]. Additional Australian evidence found that adults with type 2 diabetes (N = 456) experiencing diabetes stigma reported more negative appraisals of insulin, with implications for timely insulin initiation, even after accounting for other known correlates, such as diabetes-specific distress and diabetes self-efficacy [7]. Initial evidence from Japan also suggests that self-stigma is negatively associated with self-care behaviors in adults with type 2 diabetes, independent of diabetes self-efficacy [8].

In North America, there is scarce research on this topic. In a U.S. survey of 12,000 adults with type 2 diabetes (using a series of single items), 52% perceived that having diabetes was accompanied by social stigma; at least 1 in 5 participants agreed that other people's perceptions of their diabetes had negatively impacted their emotional life and diabetes management [9]. While this initial evidence suggests that diabetes stigma is perceived to be present and problematic among people with type 2 diabetes, many questions remain in this relatively new area of study, such as whether, and to what extent, perceptions/experiences of diabetes-specific stigma may affect diabetes self-care behaviors or health care quality and utilization.

In addition to facing stigma due to their diabetes status, people with type 2 diabetes may be vulnerable to weight stigma, which includes stereotypes, blame, prejudice, and unfair treatment, due to their higher body weight or larger body size [10]. Many individuals with type 2 diabetes have comorbid obesity [11]. Compared to those with a body mass

index (BMI) of 19–25 kg/m<sup>2</sup>, the relative risk of developing type 2 diabetes is seven times higher for individuals with obesity [12]. While there is consensus on the importance of addressing obesity in diabetes care, there has been little acknowledgement of the vulnerability to weight stigma among people with type 2 diabetes [13,14], despite evidence that weight stigma is common among people with obesity and undermines cardiometabolic health. For example, in the U.S. general population studies, as many as 40% of adults report that they have experienced some form of weight stigma [15], and prevalence rates of weight discrimination range from 19 to 41% among people with obesity, with higher prevalence among those with higher BMI [16]. Exposure to weight stigma has been linked to a range of cardiometabolic risk factors that promote development of type 2 diabetes, including elevated oxidative stress [17], physiological reactivity [18], high triglycerides [19], C-reactive protein [20], increased risk of metabolic syndrome [21], weight gain [22], and elevated blood glucose (HbA1c) [22]. Furthermore, considerable evidence has documented weight stigma in the health care setting, where people with obesity perceive stigma and blame from their health care professionals, which can in turn reduce quality of health care [23,24].

Of the amassing evidence on weight stigma, very little of this research has been conducted among people with type 2 diabetes, although initial evidence suggests that adults with type 2 diabetes who report weight discrimination have worse diabetes outcomes, including higher HbA1c, increased diabetes-specific distress, and worse diabetes self-care behaviors, even after controlling for BMI, overall discrimination, depressive symptoms and demographic characteristics [14]. Recognition of the prevalence and harms of weight stigma more broadly have led to concerns that it may pose a barrier to effective management and clinical care of type 2 diabetes [13,25].

Together, diabetes stigma and weight stigma are important but neglected issues that warrant increased attention among US adults with type 2 diabetes. With recognition of the importance of improving psychosocial wellbeing of individuals with type 2 diabetes [26], the scattered and relatively sparse research on these forms of stigma in this population has led to recent calls in both the diabetes and obesity fields for increased attention to stigma in the clinical management of diabetes [25,26] and as a research priority [3,27]. To begin addressing this gap, the present study examined both weight stigma and diabetes stigma in a sample of U.S. adults with type 2 diabetes. As little is known about the implications of these forms of stigma for diabetes self-management or health care experiences, the current study aimed specifically to examine the associations of both diabetes stigma and weight stigma with diabetes self-care behaviors and perceptions of health care.

## 2. Methods

### 2.1. Participants and procedure

This study was approved by the Institutional Review Board at the University of Connecticut. Participants with type 2 dia-

betes were recruited from Interviewing Services of America (ISA), a national market research company specializing in health care research. ISA's Internet survey panel includes over 2 million participants and can target over 150 medically diagnosed conditions. ISA uses a variety of recruitment methods including telephone, referral, online intercept, media publishers and other affiliate partners. Panelists are 18 years or older, provide consent to join the ISA panel, and provide validated geographic and demographic information. ISA rewards panelists with points that can be exchanged for a variety of incentives, including 80+ national retail and service gift certificates and charitable donations upon survey completion. Within their panel reach, approximately 200,000 participants have a diagnosis of type 2 diabetes. Eligible participants were at least 18 years old, residing in the United States, and self-reported a diagnosis of type 2 diabetes. The target sample size was  $N = 1,200$  participants.

Participants recruited for this study were invited to complete an anonymous, online survey hosted on the Qualtrics platform ([www.qualtrics.com](http://www.qualtrics.com)). The survey contained a battery of self-report questionnaires to assess experiences of weight stigma, internalized weight stigma, diabetes stigma, diabetes self-management practices, diabetes-specific distress, health care utilization, perceptions of diabetes-related health care, and sociodemographic information. A total of 1,458 individuals entered the survey. Of those, 164 were excluded for not completing at least 50% of the survey questions; an additional 67 were excluded for not providing the basic demographics (sex, race/ethnicity, height, weight) used as covariates in the analyses. The final sample consisted of 1,227 individuals.

## 2.2. Measures

**Demographics and Anthropometrics.** Participants answered questions about their current age, gender identity, race/ethnicity, education, income, height, and weight. BMI was calculated using, and categorized according to, CDC guidelines [28]. Participants indicated how long they had been diagnosed with type 2 diabetes.

**Weight Stigma.** Experienced weight stigma was measured using three yes/no items from prior national studies [15] in which participants indicated whether they had ever been teased, treated unfairly, or discriminated against because of their body weight. Participants who indicated 'yes' to any of these questions were coded as '1' (experienced weight stigma) and those who indicated 'no' to all three questions were coded as '0' (never experienced weight stigma). To assess internalized weight stigma, participants completed the 10-item modified version of the Weight Bias Internalization Scale [29], which measures the extent to which a respondent believes that negative weight-based stereotypes apply to oneself and engages in negative self-evaluations due to one's weight. Using a 7-point scale ('strongly disagree' to 'strongly agree'), items assess weight-related stereotype endorsement (e.g., "I am less attractive than most other people because of my weight") and self-devaluation due to weight (e.g., "I hate myself for my weight"). Higher scores indicate higher levels of weight bias internalization ( $\alpha = 0.95$ ). Prior experience of

weight stigma in health care was assessed with a single question: "In the last 12 months, did you ever feel that a doctor judged you because of your weight?" with responses recorded using a 3-point scale (1 = never, 2 = sometimes, 3 = often).

**Diabetes Stigma.** Diabetes stigma was assessed using the 19-item Type 2 Diabetes Stigma Assessment Scale (DSAS-2) [6]. This includes three sub-scales assessing three types of diabetes stigma. The "treated differently" subscale includes six items ( $\alpha = 0.94$ , e.g. "Some people see me as a lesser person because I have type 2 diabetes"); the "blame and judgment" subscale includes 7 items ( $\alpha = 0.92$ , e.g. "I have been told that I brought my type 2 diabetes on myself"), and the "self-stigma subscale" includes six items focused on the application of type 2 diabetes stereotypes to oneself and its emotional consequences ( $\alpha = 0.93$ , e.g. "Having type 2 diabetes makes me feel like a failure"). Participants indicate their agreement with each statement on a 5-point scale ranging from 'strongly disagree' to 'strongly agree'. Items within each subscale are summed, with higher scores reflecting greater diabetes-specific stigma.

**Diabetes Self-Management.** Diabetes self-management was measured using 10 items specific to type 2 diabetes from the Self-Care Inventory-Revised [30]. Participants indicate how often they engage in behaviors like "Record blood glucose results" on a 5-point scale ranging from 'never' to 'always' ( $\alpha = 0.81$ ). Scores are transformed to percentages by subtracting the lowest possible score from the mean raw score, dividing by the range and multiplying by 100; higher scores indicate greater frequency diabetes of self-management behaviors.

**Diabetes Self-Efficacy.** Diabetes self-efficacy was measured using the 20-item Confidence in Diabetes Self-Care Scale [31]; participants indicate how confident they feel in their ability to manage their diabetes. Statements begin with "I believe I can" followed by a behavior (e.g., "plan my meals and snacks according to dietary guidelines"), and participants rate each statement on a 5-point scale ranging from 'No I am sure I cannot' to 'Yes I am sure I can' ( $\alpha = 0.93$ ). Scores are transformed to a percentage score by subtracting the lowest possible score from the mean raw score, dividing by the range and multiplying by 100; higher scores indicate greater self-efficacy for diabetes self-care.

**Diabetes-Specific Distress.** Participants completed the 20-item Problem Areas in Diabetes (PAID) scale [32] which assesses diabetes-specific emotional distress (e.g., "Worrying about the future and the possibility of serious complications"). Participants rate each item on a 5-point scale ranging from 'Not a problem' to 'Serious problem'. Items are summed and multiplied by 1.25 to generate a percentage score ranging from 0 to 100; higher scores indicate greater diabetes-specific distress ( $\alpha = 0.97$ ).

**Clinician-Patient Communication.** Using six items from the Consumer Assessment of Healthcare Providers and Systems Study 2.0 [33], participants indicated how often (using a 4-point scale, 'never' to 'always') their doctor or primary health care provider knew information about their medical history, listened carefully, explained things in a way that was easy to understand, provided information about health questions, showed respect, and spent adequate time with them ( $\alpha = 0.93$ ). Scores are converted to percentages by subtracting the lowest possible score from the mean raw score, dividing

by the range, and multiplying by 100; higher scores indicate better clinician-patient communication.

**Quality of Clinician-patient Collaboration.** Clinician-patient collaboration was assessed using four items from the international DAWN (Diabetes Attitudes, Wishes and Needs) Study, which has examined psychosocial influences on diabetes from 5,000 people with diabetes and 4,000 health care professionals [34]. Using a 5-point scale ('strongly disagree' to 'strongly agree'), participants indicate how much they agree with statements like "I feel that I am fully involved in the treatment decisions." Responses are converted to percentage scores by subtracting the minimum raw value from the mean, multiplying the result by 100, and dividing by the range ( $\alpha = 0.89$ ); higher scores indicate higher quality clinician-patient collaboration.

**Frequency of Diabetes-Specific Health care.** Participants indicate how many times in the last year they have seen a health professional for diabetes, had a health professional check for glycosylated hemoglobin or hemoglobin A1C, and had a health professional examine their feet. Participants responses indicate the number of times in the last year each had occurred (0–50), or 'don't know / unsure'. Higher scores indicate greater frequency of occurrence. Participants also use a 6-point scale to indicate how long it has been since they had an eye health check in which their pupils were dilated; higher scores mean more time has passed (response options: *don't know/unsure, never, 0–1 months, 1–12 months, 1–2 years, and 2 or more years*). These questions were from the Behavioral Risk Factor Surveillance System (BRFSS) for diabetes, and reflect standards of continuing care set forth by the American Diabetes Association [35].

### 2.3. Data preparation and analyses

Linear regressions examined the relationships among weight stigma, diabetes stigma, diabetes self-care (diabetes self-management, diabetes self-efficacy, and diabetes-specific distress), and diabetes related health care (clinician-patient communication, quality of clinician-patient collaboration, frequency of seeing a health care professional for diabetes care, frequency of hemoglobin checks, frequency of health professionals checking their feet, and length of time since last eye health check). Each regression included the following covariates: BMI, age, education, income, gender (reference group: male), and race/ethnicity (reference group: white). Means and standard deviations for each outcome variable are detailed in Table 1.

## 3. Results

### 3.1. Demographic information

On average, participants were 52.04 ( $SD = 14.96$ ) years old and had been diagnosed with type 2 diabetes for 8.96 years ( $SD = 8.03$ ). Participants identified as male ( $n = 594, 48.4\%$ ), female ( $n = 631, 51.4\%$ ), or transgender ( $n = 2, 0.2\%$ ). For race/ethnicity, 75.1% of participants identified as White, 12.4% as Black, 7.3% as Hispanic or Latino, 4.1% as Asian, and 1% as other (e.g., Native American, Multiracial). Parti-

cipants had an average BMI of 31.64 ( $SD = 8.86$ ); the distribution of participants across BMI categories was: obesity (51.3%), overweight (26.6%), healthy weight (19.4%), and underweight (2.8%).

### 3.2. Diabetes-related Distress, Self-efficacy, and Self-Management

Table 2 presents linear regressions examining diabetes self-management, diabetes self-efficacy, and diabetes-specific distress as a function of weight stigma (experienced, internalized, specific to health care), diabetes stigma (treated differently, blame and judgment, self-stigma), and covariates (BMI, age, education, income, gender, and race ethnicity). The models explained 21% of the variance in frequency of diabetes self-management ( $R^2 = 0.21, F(16, 1225) = 20.62, p < .001$ ), 8% of the variance in diabetes self-efficacy ( $R^2 = 0.08, F(16, 1225) = 6.32, p < .001$ ), and 55% of the variance in diabetes-specific distress ( $R^2 = 0.55, F(16, 1225) = 93.48, p < .001$ ).

With respect to weight stigma, weight bias internalization ( $\beta = 0.14, p < .001$ ) and previous experiences of being judged about their weight by their doctor ( $\beta = 0.13, p < .001$ ) were both associated with higher levels of diabetes-specific distress, but were not associated with diabetes self-management or diabetes self-efficacy. A general history of experienced weight stigma was not associated with diabetes self-management, diabetes self-efficacy, or diabetes-specific distress. For diabetes stigma, blame and judgment was associated with greater diabetes self-efficacy ( $\beta = 0.13, p = 0.017$ ), but was not associated with diabetes self-management or diabetes-specific distress. Diabetes self-stigma was associated with lower diabetes self-management ( $\beta = -0.14, p = .005$ ) and diabetes self-efficacy ( $\beta = -0.30, p < .001$ ), and greater diabetes-specific distress ( $\beta = 0.35, p < .001$ ). Being treated differently was associated with higher scores on diabetes self-management ( $\beta = 0.39, p < .001$ ) and diabetes self-efficacy ( $\beta = 0.12, p = .019$ ), and also greater diabetes-specific distress ( $\beta = 0.15, p < .001$ ).

### 3.3. Diabetes health care

Table 3 presents linear regressions examining the frequency of clinician-patient communication, quality of clinician-patient collaboration, and the frequency of various types of diabetes care (seeing a health professional for diabetes care, hemoglobin checks, foot checks), and length of time since their last eye health check as a function of weight stigma (experienced, internalized, specific to health care), diabetes stigma (differential treatment, blame, self-stigma), and covariates (BMI, age, education, income, gender, and race ethnicity). The models explained 13% of the variance in clinician-patient communication ( $R^2 = 0.13, F(16, 1225) = 11.09, p < .001$ ), 11% of the variance in quality of clinician-patient collaboration ( $R^2 = 0.11, F(16, 1225) = 9.04, p < .001$ ), 7% of the variance in frequency of seeing a health professional for diabetes ( $R^2 = 0.07, F(16, 1225) = 5.30, p < .001$ ), 6% of the variance in frequency of hemoglobin checks ( $R^2 = 0.06, F(16, 1225) = 4.510, p < .001$ ), 6% of the variance in frequency of foot checks by a health professional ( $R^2 = 0.06, F(16, 1225) = 4.731, p < .001$ ),

**Table 1 – Descriptive information about diabetes-related self-care and health care.**

	M	SD	$\alpha$
Diabetes-specific self-care			
Diabetes self-management	57.67	19.68	0.81
Diabetes self-efficacy	72.12	19.59	0.93
Diabetes distress	34.93	27.17	0.97
Diabetes-specific health care			
Clinician-patient communication	78.69	22.61	0.92
Quality of clinician-patient collaboration	76.43	19.96	0.89
Frequency of seeing a clinician for diabetes care	4.16	3.67	
Frequency of hemoglobin check	3.51	3.49	
Frequency of health professional checking feet	3.39	3.79	
Length of time since last eye exam	2.35	0.88	

**Table 2 – Associations between stigma and diabetes self-care, diabetes self-efficacy and diabetes distress.**

Variables	Diabetes self-management			Diabetes self-efficacy			Diabetes distress		
	B	$\beta$	p	B	$\beta$	p	B	$\beta$	p
BMI	-0.44	-0.20	<0.001	-0.14	-0.07	0.051	-0.13	-0.04	0.075
Age	-0.08	-0.06	0.076	-0.11	-0.08	0.016	-0.23	-0.13	<0.001
Education	0.76	0.05	0.077	0.02	0.00	0.970	-1.18	-0.06	0.008
Income	1.36	0.12	<0.001	1.60	0.15	<0.001	-0.51	-0.03	0.156
Gender (ref. Male)									
Female	0.71	0.02	0.505	1.99	0.05	0.084	0.33	0.01	0.769
Transgender	-1.59	0.00	0.899	2.44	0.01	0.856	-4.71	-0.01	0.718
Race/Ethnicity (ref. White)									
Black	0.95	0.02	0.549	3.14	0.05	0.067	4.15	0.05	0.012
Asian	-0.72	-0.01	0.783	-1.52	-0.02	0.589	3.35	0.02	0.216
Hispanic/Latino	0.12	0.00	0.954	-0.34	-0.01	0.875	3.23	0.03	0.124
Other	-22.86	-0.06	0.025	-17.26	-0.04	0.117	-18.30	-0.03	0.085
Weight Stigma									
Experienced weight stigma	-0.42	-0.01	0.751	-0.32	-0.01	0.821	0.80	0.02	0.561
In health care	1.17	0.04	0.234	-0.52	-0.02	0.627	5.55	0.13	<0.001
Internalized	-0.84	-0.07	0.090	-0.60	-0.05	0.263	2.24	0.14	<0.001
Diabetes Stigma									
Treated differently	1.13	0.39	<0.001	0.34	0.12	0.019	0.57	0.15	<0.001
Blame and judgment	-0.09	-0.04	0.474	0.34	0.13	0.017	0.03	0.01	0.839
Self-stigma	-0.39	-0.14	0.005	-0.83	-0.30	<0.001	1.33	0.35	<0.001

and 4% of the variance in time since their last eye health check ( $R^2 = 0.04$ ,  $F(16, 1225) = 3.345$ ,  $p < .001$ ).

Weight bias internalization was associated with more frequent clinician-patient communication ( $\beta = 0.10$ ,  $p = .030$ ), and higher quality clinician-patient collaboration ( $\beta = 0.10$ ,  $p = .022$ ); however, it was associated with lower frequency of foot checks by a health professional ( $\beta = -0.13$ ,  $p = .005$ ). Prior experience of being judged about their weight by a doctor was associated with less frequent clinician-patient communication ( $\beta = -0.18$ ,  $p < .001$ ) and lower quality clinician-patient collaboration ( $\beta = -0.19$ ,  $p < .001$ ), but was associated with greater frequency of seeing a health professional for diabetes care ( $\beta = 0.14$ ,  $p < .001$ ), greater frequency of hemoglobin checks ( $\beta = 0.16$ ,  $p < .001$ ), greater frequency of foot checks by a health professional ( $\beta = 0.10$ ,  $p = .004$ ), and a longer period of time since their last eye health check ( $\beta = 0.11$ ,  $p = .003$ ). Previous experiences with weight stigma were not associated with clinician-patient variables (communication, collaboration) or

frequency of diabetes-specific health care. In contrast, being treated differently (DSAS-2 subscale) was associated with a greater frequency of seeing a health professional for diabetes care ( $\beta = 0.15$ ,  $p = .003$ ), greater frequency of hemoglobin checks ( $\beta = 0.16$ ,  $p = .003$ ), and greater frequency of foot checks by a health professional ( $\beta = 0.23$ ,  $p < .001$ ). Diabetes self-stigma was associated only with lower quality clinician-patient collaboration ( $\beta = -0.16$ ,  $p = .004$ ). Blame and judgment was associated with lower frequency of hemoglobin checks ( $\beta = -0.17$ ,  $p = .002$ ), and a longer time since their last eye health check ( $\beta = 0.13$ ,  $p = .015$ ).

#### 4. Discussion

The present study responds to calls for increased attention to stigma among individuals with type 2 diabetes, and begins to address gaps in this neglected area of study by examining both weight stigma and diabetes stigma in relation to

**Table 3 – Associations between stigma and diabetes-related healthcare utilization and quality.**

Variables	Clinician-patient communication			Quality of clinician-patient collaboration			Frequency of seeing a clinician for diabetes care		
	B	$\beta$	p	B	$\beta$	p	B	$\beta$	p
BMI	0.16	0.06	0.048	-0.10	-0.05	0.165	0.01	0.03	0.454
Age	0.18	0.12	<0.001	0.10	0.08	0.025	0.01	0.02	0.563
Education	0.11	0.01	0.828	0.00	0.00	0.999	0.02	0.01	0.826
Income	1.40	0.11	0.001	1.66	0.15	<0.001	-0.01	-0.01	0.885
Gender (ref. Male)									
Female	-1.06	-0.02	0.410	-0.74	-0.02	0.519	0.06	0.01	0.776
Transgender	19.12	0.03	0.207	24.22	0.05	0.074	0.22	0.00	0.931
Race/Ethnicity (ref. White)									
Black	3.79	0.06	0.049	2.47	0.04	0.150	1.06	0.09	0.001
Asian	-5.04	-0.04	0.110	-0.80	-0.01	0.778	0.07	0.00	0.893
Hispanic/Latino	-0.32	0.00	0.897	3.41	0.05	0.119	1.92	0.14	<0.001
Other	-31.00	-0.07	0.012	-33.02	-0.08	0.003	-1.43	-0.02	0.493
Weight Stigma									
Experienced weight stigma	-0.82	-0.02	0.610	0.84	0.02	0.559	0.18	0.02	0.505
In healthcare	-6.16	-0.18	<0.001	-5.66	-0.19	<0.001	0.81	0.14	<0.001
Internalized	1.31	0.10	0.030	1.23	0.10	0.022	-0.06	-0.03	0.556
Diabetes Stigma									
Treated differently	-0.25	-0.08	0.131	-0.05	-0.02	0.717	0.08	0.15	0.003
Blame and judgment	-0.20	-0.07	0.206	-0.06	-0.02	0.662	-0.03	-0.06	0.298
Self-stigma	-0.17	-0.05	0.305	-0.43	-0.16	0.004	-0.01	-0.02	0.747
	Frequency of hemoglobin checks			Frequency of health professional checking feet			Time since last eye health check		
Variables	B	$\beta$	p	B	$\beta$	p	B	$\beta$	p
BMI	0.00	0.00	0.903	0.01	0.03	0.405	0.01	0.04	0.208
Age	0.01	0.02	0.494	0.01	0.03	0.372	0.01	0.10	0.006
Education	0.18	0.06	0.058	0.05	0.02	0.546	0.01	0.01	0.668
Income	-0.02	-0.01	0.776	0.04	0.02	0.617	-0.01	-0.02	0.559
Gender (ref. Male)									
Female	-0.12	-0.02	0.619	-0.35	-0.05	0.110	0.12	0.05	0.081
Transgender	0.42	0.00	0.880	-1.69	-0.02	0.505	-0.42	-0.01	0.611
Race/Ethnicity (ref. White)									
Black	0.21	0.02	0.555	0.09	0.01	0.790	-0.19	-0.05	0.064
Asian	-0.82	-0.04	0.158	-0.48	-0.03	0.360	-0.23	-0.04	0.182
Hispanic/Latino	1.33	0.09	0.003	1.06	0.08	0.010	0.11	0.02	0.409
Other	-0.39	-0.01	0.865	-2.50	-0.03	0.228	0.72	0.03	0.283
Weight Stigma									
Experienced weight stigma	0.19	0.02	0.511	0.13	0.02	0.625	-0.11	-0.05	0.210
In health care	0.97	0.16	<0.001	0.57	0.10	0.004	0.19	0.11	0.003
Internalized	-0.16	-0.07	0.162	-0.29	-0.13	0.005	0.02	0.03	0.544
Diabetes Stigma									
Treated differently	0.09	0.16	0.003	0.12	0.23	<0.001	-0.02	-0.09	0.096
Blame and judgment	-0.09	-0.17	0.002	-0.04	-0.07	0.177	0.02	0.13	0.015
Self-stigma	0.05	0.08	0.145	0.01	0.02	0.713	-0.01	-0.05	0.395

diabetes-related self-management, self-efficacy, distress, and perceptions of health care. To our knowledge, this is the first study to examine implications of both weight stigma and diabetes stigma among individuals with type 2 diabetes. The findings are mixed, but suggest the importance of examining multiple facets of both diabetes stigma and weight stigma in this population.

First, the present findings highlight the potentially important role of self-stigma in diabetes-specific distress and self-care. Both weight bias internalization and diabetes self-stigma were significantly associated with higher diabetes-specific distress, suggesting that blaming oneself for one's weight or diabetes may contribute to elevated diabetes-related emotional distress. Furthermore, individuals who expressed self-stigma for their diabetes reported lower diabetes self-management and self-efficacy. While having a history of experiences of weight stigma or diabetes stigma was unrelated to these diabetes self-care indices, adults who reported experiencing weight stigma specifically in the health care setting (e.g., being judged about their weight by a doctor), exhibited higher levels of diabetes-specific distress.

Second, mixed findings emerged regarding links between stigma and participants' reports of their utilization and perceived quality of health care. Neither internalized weight stigma nor diabetes self-stigma appeared to interfere with participants' frequency of seeking diabetes-specific care from a health care professional; nor did a history of experiences of either weight stigma or diabetes stigma. However, adults who expressed self-stigma for diabetes, but not for weight, reported lower quality collaborations with their health care professional(s). Furthermore, those who reported experiencing weight stigma by a doctor also reported lower quality clinician-patient collaborations, less frequent clinician-patient communications, and a longer period of time since their last eye health check. In addition, individuals who reported being blamed for their diabetes by others reported a lower frequency of hemoglobin checks and a longer period since their last eye health check.

In general, these findings suggest that internalization of weight stigma and self-stigma for diabetes may have more negative and direct implications for diabetes-specific self-care behaviors and health care than having a history of experiencing diabetes or weight stigma; however, experiencing weight stigma specifically from a health care professional may have negative implications for the quality of their clinician-patient interactions. These findings align with other evidence about weight stigma in several respects. For example, some studies have found that internalized weight stigma may have negative implications for health and wellbeing independent of experiences of being stigmatized [36]. Additionally, research has documented links between perceived judgment about weight from a health care professional and adverse health care quality and treatment outcomes, such as lower trust in health care professionals [37] and less weight loss among people with obesity [38]. At the same time, the present findings contrast with some recent evidence showing that both general experiences of weight stigma and internalized weight stigma contribute to health care stress and health care avoidance [39]. Thus, additional studies are warranted to clarify the roles and distinct components of both experienced

and internalized weight stigma and diabetes stigma in relation to perceptions and utilization of health care among people with type 2 diabetes.

Several puzzling findings emerged in this study, highlighting potentially conflicting associations between stigma and health care. For example, participants who reported being treated differently because of their diabetes had greater diabetes-specific distress, but also reported more diabetes self-management and greater diabetes self-efficacy. A possible explanation for this finding is that people who feel more confident in their diabetes self-management do more (potentially, in public) to manage their condition (e.g., injecting insulin, making adjustments to meals, checking their glucose levels) and may, consequently, also be more likely to be aware of, perceive, or experience other people treating them differently (e.g., excluding them) because of their diabetes, which in turn could increase diabetes-related distress. Another unexpected finding emerged for participants who experienced weight stigma in health care; while these respondents reported worse clinician-patient communication and collaboration, they nevertheless reported a higher frequency of seeing a doctor for diabetes-related care. It may be that individuals with higher body weight experience less positive interactions with their doctor because of weight stigma, but that their doctor is still thorough with their diabetes care because of their weight category, which could translate into increased frequency of diabetes care. Alternatively, individuals may feel that the importance of seeking regular diabetes care overrides the risk or distress of experiencing weight stigma or negative interactions with clinicians. Thus, a higher frequency of care may not necessarily translate into an absence of stigma or the presence of positive interactions with clinicians. As a third example, although participants who internalized weight stigma reported greater diabetes-specific distress and lower frequency of feet checks by a health professional, they also reported more frequent clinician-patient communication and higher quality clinician-patient collaboration. These higher clinician ratings among individuals with internalized weight stigma could potentially reflect some degree of self-deprecation, in which these individuals view their clinicians positively but themselves poorly. However, the reasons for these counter-intuitive findings is unclear, and it was beyond the scope of our study to assess specific reasons for participants seeking or avoiding health care. Our results suggest the need for additional investigation into the relationships between both weight stigma and diabetes stigma (in all its forms) and reported health care experiences, with attention to specific reasons and/or mechanisms for these associations.

Collectively, these study findings indicate the need for future research to examine multiple components of diabetes stigma and weight stigma; not only through assessment of perceived experiences of stigma in daily life, but examination of people's perceptions of stigma specifically in the context of health care and from health care professionals, and the extent to which they engage in internalization and self-stigma for their weight or diabetes status. Each of these aspects of stigma may have unique or overlapping effects on an individual's attitudes, behaviors, outcomes and quality of care, which are yet to be fully understood. Examining these

questions longitudinally in diverse samples of adults with type 2 diabetes will be particularly important to determine the nature and direction of these relationships over time.

Several features of this study strengthen its contribution to the literature. The survey measures used in this research included assessment of both experienced and internalized stigma related to diabetes and body weight, and inclusion of multiple valid and reliable measures of diabetes stigma, distress, self-care and health care experiences. Several limitations must also be considered. Perceived weight stigma in health care was assessed with a single item, and more comprehensive assessment of weight stigma, particularly specific to health care, needs to be prioritized in future research. This could include various types of stigmatizing health care experiences (e.g., stigmatizing communication from professionals and differential treatment in the medical setting), as well as perceptions of stigma from various types of health care professionals (e.g., primary care, nurses, dietitians, endocrinologists). This was beyond the scope of the current study but could provide greater insight into the ways in which diabetes and/or weight stigma may affect health care experiences of individuals with type 2 diabetes. Our measures of self-stigma (the WBIS-M and DSAS-2) assess certain aspects of this construct, but research may be needed to improve understanding and measurement of self-stigma pertaining to body weight and diabetes, including assessment of distinct components of self-stigma, such as awareness of, and agreement with, negative societal stereotypes, as well as application of public stereotypes to oneself. In addition, our study did not include assessments of general self-esteem, which may be an independent predictor of an individual's ratings of their clinicians' quality and communication. This study relied on self-report data, including assessment of frequency of health care visits and height and weight of participants, which may be vulnerable to inaccurate recall. The cross-sectional nature of this data prevent conclusions about causality or the directionality of relationships between weight and/or diabetes stigma and diabetes self-management or health care experiences. Longitudinal work is currently absent on this topic of study, and clearly warranted. Additional research is also needed to determine the nature of these relationships among other racial/ethnic groups, for whom racial stigma may compound vulnerability to adverse outcomes in addition to consequences of stigma stemming from their body weight and/or diabetes status.

Given that obesity is a strong risk factor for type 2 diabetes, that there is substantial evidence documenting the prevalence and consequences of weight stigma, and increasing calls for researchers to examine diabetes stigma, our findings provide novel insights about potential implications of these two forms of stigma for individuals with type 2 diabetes, and build upon the limited research in this area, particularly within the U.S. where this work has been scarce. Our study findings indicate that efforts to promote wellbeing in individuals with type 2 diabetes needs to consider the impact of both diabetes stigma and weight stigma. While there is still much to be learned about the extent and impacts of both of these forms of stigma in this population, our findings shed light on the potential implications of experienced and internalized stigma by individuals with type 2 diabetes for their diabetes

self-care, self-efficacy, distress and perceptions of health care. These issues warrant increased attention not only in research, but also among health care professionals and in broader health communication, highlighting the importance of identifying ways to better support individuals with type 2 diabetes, and to minimize stigma and its potentially harmful consequences.

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## Declaration of Competing Interest

The authors report no potential conflicts of interest relevant to this article.

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JLB and JS developed the DSAS-2, copyright of which is owned by the Australian Centre for Behavioural Research in Diabetes.

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## Author Contributions

RMP conceptualized and designed the study, drafted the initial manuscript, and revised the manuscript. MSH supervised data collection, oversaw statistical analyses, and contributed to writing and revising the manuscript. JLB and JS contributed to the writing and revision of this manuscript. All authors approved the final version for publication.

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