Research

Characteristics of men and women with diabetes
Observations during patients' initial visit to a diabetes education centre

Enza Gucciardi MHSc PhD   **Shirley Chi-Tyan Wang**   **Margaret DeMelo** RD CDE
Lina Amaral MSW RSW   **Donna E. Stewart** MD DPsych FRCPC

ABSTRACT

OBJECTIVE To determine whether men and women with type 2 diabetes have different psychosocial, behavioural, and clinical characteristics at the time of their first visit to a diabetes education centre.

DESIGN A questionnaire on psychosocial and behavioural characteristics was administered at participants' first appointments. Clinical and disease-related data were collected from their medical records. Bivariate analyses (χ^2 test, *t* test, and Mann-Whitney test) were conducted to examine differences between men and women on the various characteristics.

SETTING Two diabetes education centres in the greater Toronto area in Ontario.

PARTICIPANTS A total of 275 men and women with type 2 diabetes.

RESULTS Women were more likely to have a family history of diabetes, previous diabetes education, and higher expectations of the benefits of self-management. Women reported higher levels of social support from their diabetes health care team than men did, and had more depressive symptoms, higher body mass, and higher levels of high-density lipoprotein cholesterol than men did.

CONCLUSION The results of this study provide evidence that diabetes prevention, care, and education need to be targeted to men and women differently. Primary care providers should encourage men to attend diabetes self-management education sessions and emphasize the benefits of self-care. Primary care providers should promote regular diabetes screening and primary prevention to women, particularly women with a family history of diabetes or a high body mass index; emphasize the importance of weight management for those with and without diabetes; and screen diabetic women for depressive symptoms.

EDITOR'S KEY POINTS

- Results of this study suggest that men and women with diabetes have different psychosocial, behavioural, and clinical characteristics when they first come to a diabetes education centre. These differences can affect the risk of diabetes, attitudes and behaviour toward self-care, and health outcomes.
- In this study, women were likely to perceive they had more support from their diabetes health care team, and to see self-management as being beneficial. Men had lower expectations of the benefits of self-management.
- It is important that sex and gender differences be considered in screening for, counseling and educating about, and managing diabetes.

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Recherche

Caractéristiques des hommes et des femmes diabétiques

Observations au cours de la visite initiale au centre d'éducation sur le diabète

Enza Gucciardi MHSc PhD   Shirley Chi-Tyan Wang   Margaret DeMelo RD CDE
Lina Amaral MSW RSW   Donna E. Stewart MD DPsych FRCPC

RÉSUMÉ

OBJECTIF Déterminer si les hommes et les femmes qui ont un diabète de type 2 ont des caractéristiques psychosociales, comportementales et cliniques différentes au moment de leur première visite au centre d'éducation sur le diabète.

TYPE D'ÉTUDE Un questionnaire sur les caractéristiques psychosociales et comportementales a été administré aux participants lors de leur premier rendez-vous. Les données cliniques et celles concernant leurs maladies ont été tirées de leur dossier médical. Des analyses bivariées (test de χ^2, test de *t* et test de Mann-Withney) ont été effectuées pour déterminer les différences entre hommes et femmes sur les diverses caractéristiques.

CONTEXTE Deux centres d'éducation sur le diabète du Grand Toronto, en Ontario.

PARTICIPANTS Un total de 275 hommes et femmes présentant un diabète de type 2.

RÉSULTATS Les femmes étaient plus susceptibles d'avoir des antécédents familiaux de diabète, une formation antérieure sur cette maladie et des attentes plus élevées concernant les avantages de prendre en main son propre traitement. Elles disaient recevoir un meilleur soutien social de la part de l'équipe soignante du diabète que les hommes, et avaient davantage de symptômes dépressifs, un poids corporel plus élevé et un taux plus élevé de cholestérol des lipoprotéines de haute densité que les hommes.

CONCLUSION Les résultats de cette étude prouvent que la prévention, le traitement et l'éducation concernant le diabète exigent une approche différente pour les hommes et les femmes. Le personnel soignant de première ligne devrait inciter les hommes à suivre des séances d'éducation sur la prise en main de leur propre traitement et mettre l'accent sur les avantages de cette prise en main. Les intervenants devraient promouvoir le dépistage et la prévention primaire réguliers du diabète chez les femmes, surtout celles qui ont des antécédents familiaux de diabète ou un indice de masse corporelle élevé; faire valoir l'importance du contrôle du poids corporel chez celles qui présentent ou non un diabète; et rechercher les symptômes de dépression chez les femmes diabétiques.

POINTS DE REPÈRE DU RÉDACTEUR

- Selon les résultats de cette étude, les hommes et les femmes diabétiques présenteraient des caractéristiques psychosociales, comportementales et cliniques différentes à leur première visite au centre d'éducation sur le diabète. Ces différences peuvent influer sur le risque de diabète, les attitudes et les comportements à l'égard de la prise en charge personnelle, et les résultats en matière de santé.
- Dans cette étude, les femmes étaient plus susceptibles que les hommes de croire qu'elles étaient mieux appuyées par leur équipe de suivi et qu'il était avantageux de prendre son propre traitement en main.
- On doit tenir compte des différences entre les sexes quand on fait le dépistage et le traitement du diabète et qu'on prodigue des conseils et de l'information sur cette maladie.

Although women in most developed and developing countries have lower mortality rates than men,[1] they appear to lose this substantial survival advantage when they have diabetes. Studies have shown that the relative risk of cardiovascular disease (CVD),[2,3] both coronary artery disease[4,5] and stroke,[6] is higher among women with diabetes than among men with diabetes.

While the literature suggests women are at higher risk of morbidity and mortality from diabetes complications, there is little research into why—specifically regarding management issues—this is the case. The few studies that have examined diabetes management in both women and men have reported differences by sex. Results indicated that women were more likely than men to view type 2 diabetes as having a negative effect on their lives and to worry about the complications associated with the disease.[7] Men were more likely to be concerned about the limitations that diabetes would impose on their lives[8] and to believe that diabetes is a controllable disease.[9] In a recent study, men reported lower stress levels related to diabetes and a greater sense of well-being than women did.[10]

In general, men and women with diabetes also report different levels of social support.[11] Men reported receiving greater family support in nutritional management than women did,[9] a difference that might be due to traditional roles and the division of household labour.[2] For instance, women are more often involved in the purchase and preparation of food in the household,[12] so it is likely that women cooking for men with diabetes adjust the family's diet in keeping with nutrition recommendations for diabetes, while women with diabetes often prepare separate modified meals for themselves rather than impose changes in diet on the rest of the family.[13] Men view nutrition management as a broader family issue; women view it as a personal concern.[14]

Men and women differ not only biologically, but also in terms of attitudes, expectations, and life experiences within their social environments. Various factors can affect how people with diabetes manage the disease and consequently control the risk of future complications. The objective of this study was to identify differences in psychosocial, behavioural, and clinical measures between men and women with type 2 diabetes at the time of their first visit to a diabetes education centre.

Dr Gucciardi *is an Assistant Professor in the School of Nutrition at Ryerson University in Toronto, Ont, and an Affiliate Scientist at the University Health Network Women's Health Program and the Toronto General Research Institute.* **Ms Wang** *is on staff at the University Health Network Women's Health Program in Toronto, Ont.* **Ms DeMelo** *is a registered dietitian and* **Ms Amaral** *is a social worker at the University Health Network Diabetes Education Centre.* **Dr Stewart** *is Program Director of the University Health Network Women's Health Program and a Professor in the Department of Psychiatry at the University of Toronto.*

METHODS

Setting

The study was conducted at 2 large diabetes education centres located in the Toronto Western Hospital and the Trillium Health Centre in Ontario between October 2003 and October 2005. At the diabetes education centres, teams of dietitians, nurses, pharmacists, physiotherapists, psychologists, and social workers provide individual health assessments, follow-up visits, and group education. The research ethics boards at both institutions approved the study.

Participants

To be eligible for inclusion, participants had to be diagnosed with type 2 diabetes, responsible for managing their diabetes themselves, new to the centre or re-referred to the centre after a 2-year period, free from conditions known to influence participation (such as pregnancy or receiving hemodialysis), 18 years old or older, able to read and write English, not anticipating a change in residence within the next year, able to provide informed consent, and able to answer the questionnaire. Of the 1258 patients approached, 511 were eligible, and 281 consented, giving a participation rate of 55%. Data on 6 patients were excluded from the study analyses owing to unconfirmed diagnosis of type 2 diabetes during the study period, resulting in a total of 275 study participants.

Design

In this cross-sectional study, a questionnaire was administered to patients immediately after their appointments at the diabetes education centres. A glycosylated hemoglobin A_{1c} (HbA_{1c}) test was performed (if the most recent test results were not provided by patients' referring physicians) to measure glycemic control following patients' first visits. We also collected disease-related variables from patients' medical charts.

Descriptive variables

The descriptive variables obtained from questionnaires and medical charts were sociodemographic, psychosocial, behavioural, clinical, and disease-related characteristics. Sociodemographic variables included age, education level, and household income (**Table 1**). Psychosocial variables included self-efficacy, outcome expectations, intention to use education services or adhere to recommended self-management activities, depressive symptoms, diabetes-specific and general social support, various aspects of satisfaction with diabetes education centre

Table 1. Sociodemographic characteristics of the study population: *Mean age of all respondents was 54.4 years (standard deviation [SD] 11.8), of men was 53.86 years (SD 13.1), and of women was 55.7 years (SD 10.4) (P = .362). Some percentages do not add to 100 owing to missing data.*

SOCIODEMOGRAPHIC VARIABLES	OVERALL (N = 275) % (N)	MEN (N = 132) % (N)	WOMEN (N = 143) % (N)	P VALUE
Marital status				.007
• Single, widowed, or divorced	44.7 (123)	36.4 (48)	52.4 (75)	
• Married or common-law	55.3 (152)	63.6 (84)	47.6 (68)	
Living arrangements				.178
• Alone	23.3 (64)	19.7 (26)	26.6 (38)	
• With partner, children, family members, or friends	76.7 (211)	80.3 (106)	73.4 (105)	
Country of birth				
• North America	59.1 (162)	53.4 (70)	64.3 (92)	
• Europe	18.6 (51)	19.8 (26)	17.5 (25)	
• Asia	13.1 (36)	19.1 (25)	7.7 (11)	
• South America	6.6 (18)	3.8 (5)	9.1 (13)	
• Africa	2.6 (7)	3.8 (5)	1.4 (2)	
Education				.169
• Some high school or less	42.9 (118)	38.6 (51)	46.9 (67)	
• Some college, university, or more	57.1 (157)	61.4 (81)	53.1 (76)	
Employment status				.225
• Full- or part-time	48.7 (134)	53.8 (71)	44.1 (63)	
• Unemployed	20.0 (55)	16.7 (22)	23.1 (33)	
• Retired	31.3 (86)	29.5 (39)	32.9 (47)	
Household income ($)				.133
• < 39 000	46.2 (72)	37.5 (27)	53.6 (45)	
• 40 000-79 000	31.4 (49)	36.1 (26)	27.4 (23)	
• > 80 000	22.4 (35)	26.4 (19)	19.0 (16)	

services, and intention to use further services (**Table 2**). Self-care activities included diet, exercise, foot care, and blood sugar testing during the previous 7 days (**Table 3**). Disease-related variables included number of months living with diabetes, family history of diabetes, previous diabetes education, knowledge about diabetes, total number of diabetes-related symptoms, total number of diabetes-related health conditions, smoking status, and type of diabetes management (**Table 4**). Clinical variables included body mass index (BMI), HbA_{1c} and high-density lipoprotein cholesterol (HDL-C) levels, total cholesterol to HDL-C ratios, triglyceride and low-density lipoprotein cholesterol levels, and blood pressure (**Table 5**).

Measures

Knowledge about diabetes was assessed using the Diabetes Knowledge Questionnaire.[15] The General Practice Assessment Questionnaire was used to examine several domains of satisfaction with health services.[16] The Diabetes Education Self-Efficacy Scale was employed to assess self-efficacy in using diabetes self-management education and in discussing self-management issues with health care providers. The Diabetes Education Outcome Expectations Scale was used to measure the helpfulness of diabetes self-management education. The

Diabetes Education Intention Scale was used to measure intention to use diabetes education resources. The 21-item Beck Depression Inventory-II was used to measure symptoms of depression experienced during the previous 2 weeks.[17,18] The Medical Outcomes Study Social Support Survey was used to measure general social support.[19] The Perceived Social Support component of the Diabetes Care Profile[20] was used to measure diabetes-specific social support. All scales have good validity and reliability.

Level of HbA_{1c} was used as a reliable indicator of glycemic control during the preceding 3 to 4 months.[21] All assays were conducted in laboratories certified as traceable to the Diabetes Control and Complications Trial reference method.[22]

Statistical analysis

For each descriptive variable, the mean, standard deviation, frequency, and proportion of the total study population with that variable were calculated. For the number of months people lived with diabetes, we calculated the median and interquartile range because of the skewed nature of the variable. To examine variables by sex, categorical variables were analyzed using the χ^2 test, continuous variables were analyzed using the *t* test, and

continuous variables with skewed distributions were analyzed using the Mann-Whitney test. A significance level of .05 was used in all analyses.

RESULTS

About 75% of participants had been referred to the diabetes education centre by their primary care physicians. The study population was an average of 54.4 years old and had lived a median of 4 months with diabetes. Their mean BMI was 31.52, an indicator of obesity, and their mean HbA$_{1c}$ level (7.96%) was above the recommended target of 7.0%, suggesting poor glycemic control. Their total cholesterol

to HDL-C ratio (4.43 mmol/L) was also greater than the recommended target of 4.0 mmol/L, showing inadequate management of lipids. Participants had an average blood pressure of 127.67/77.43 mm Hg, however, which is below the target level of 130/80 mm Hg.

As shown in **Tables 1** to **5**, significant differences between men and women were found in certain variables. Women were significantly more likely to have a family history of diabetes, previous diabetes education, higher expectations of the outcome of self-management activities, and higher perceived levels of support from professional health care teams. Mean BMI, HDL-C levels, and number of depressive symptoms were significantly higher among women than among men.

Table 2. Psychosocial characteristics of the study population: *Some percentages do not add to 100 owing to missing data.*

A)

PSYCHOSOCIAL VARIABLES (POSSIBLE RANGE OF VALUES)	OVERALL (N = 275) MEAN (SD)	MEN (N = 132) MEAN (SD)	WOMEN (N = 143) MEAN (SD)	P VALUE
Self-efficacy in self-management (1-5)	4.00 (0.6)	4.01 (0.62)	3.99 (0.7)	.744
Expectations of self-management (1-10)	9.69 (0.6)	9.61 (0.6)	9.77 (0.5)	.017
Self-efficacy in overcoming barriers to using services (1-10)	8.21 (1.9)	8.16 (1.9)	8.26 (1.8)	.666
Self-efficacy in discussing management issues (1-10)	9.25 (1.1)	9.26 (0.9)	9.24 (1.2)	.902
Expectations of the benefits of using services (1-10)	8.52 (1.4)	8.38 (1.4)	8.65 (1.5)	.125
Intention to self-manage as recommended (1-9)	8.39 (0.8)	8.33 (0.9)	8.44 (0.8)	.3
Depressive symptoms (0-63)	9.38 (9.6)	8.00 (9.3)	10.68 (9.8)	.022
Overall support for diabetes (1-5)	4.41 (0.6)	4.42 (0.6)	4.40 (0.6)	.705
• Family support for diabetes (1-5)	4.34 (0.6)	4.37 (0.6)	4.31 (0.6)	.424
• Professional health care team support for diabetes (1-5)	4.72 (0.5)	4.65 (0.6)	4.79 (0.5)	.031
Intention to use diabetes education centre after first visit (1-9)	8.28 (1.1)	8.21 (1.1)	8.34 (1.0)	.312
Intention to use resources outside the diabetes education centre (1-9)	7.68 (2.0)	7.69 (2.0)	7.67 (2.0)	.91

SD—standard deviation.

B)

PSYCHOSOCIAL VARIABLES	OVERALL (N = 275) % (N)	MEN (N = 132) % (N)	WOMEN (N = 143) % (N)	P VALUE
Depressive symptoms				
• Minimal symptoms	76.5 (205)	83.1 (108)	70.3 (97)	.025
• Mild symptoms	10.4 (28)	9.2 (12)	11.6 (16)	
• Moderate symptoms	13.1 (35)	7.7 (10)	18.1 (25)	
Had general social support	78.58 (21.5)	78.33 (21.8)	78.81 (21.3)	.854
Had emotional and informational support	79.00 (21.95)	77.98 (22.7)	79.96 (21.3)	.46
Had tangible support	72.95 (26.6)	75.03 (25.8)	71.04 (27.2)	.215
Had affectionate support	80.54 (24.4)	81.17 (23.7)	79.96 (25.0)	.682
Had interaction support	79.70 (24.1)	79.52 (24.9)	79.88 (23.3)	.902
Use of diabetes education centre				
• Totally satisfied with services	87.93 (14.6)	86.87 (15.0)	88.91 (14.2)	.247
• Totally satisfied with patient-provider communication	86.92 (12.8)	85.72 (13.9)	88.05 (11.6)	.136
• Totally satisfied with feeling enabled	77.25 (25.8)	75.88 (25.6)	78.52 (26.1)	.399
Had access to patient services	62.22 (18.9)	60.55 (18.4)	63.73 (19.3)	.167
Had continual access to services	77.2 (22.2)	75.0 (23.9)	79.2 (20.4)	.12

DISCUSSION

Our findings showed that more women had family histories of diabetes and higher BMIs than men had upon arrival at a diabetes education centre. More than half the female participants (57.4%) fell within the obese category; fewer than half the men (48.1%) were obese. Both family history of diabetes and a high BMI are known risk factors for diabetes in men and women,[23] and combination of the 2 further increases the risk of diabetes.[24] Independent of family history, even a modest weight gain increases the risk of diabetes among middle-aged women.[25] Obesity increases the risk of developing not only type 2 diabetes, but also hypertension, dyslipidemia, CVD, stroke, osteoarthritis, and some forms of cancer.[26] With diabetes and obesity reaching epidemic proportions, it is incumbent on primary care providers

Table 3. Self-care activities of the study population: *Some percentages do not add to 100 owing to missing data.*

A)

SELF-CARE ACTIVITIES	OVERALL (N=275) % (N)	MEN (N=132) % (N)	WOMEN (N=143) % (N)	P VALUE
Advised to test blood sugars				.534
• Yes	81.5 (221)	83.1 (108)	80.1 (113)	
• No	18.5 (50)	16.9 (22)	19.9 (28)	

B)

SELF-CARE ACTIVITIES	OVERALL (N=275) MEAN (SD)	MEN (N=132) MEAN (SD)	WOMEN (N=143) MEAN (SD)	P VALUE
No. of days following diet (out of 7)	4.39 (1.3)	4.36 (1.4)	4.41 (1.2)	.718
No. of days exercising (out of 7)	2.26 (1.8)	2.27 (1.8)	2.26 (1.8)	.976
No. of days doing foot care (out of 7)	3.73 (2.9)	3.39 (2.9)	4.05 (2.9)	.065
No. of days testing blood sugar* (out of 7)	4.72 (2.6)	4.48 (2.7)	4.94 (2.6)	.211

SD—standard deviation.
*Patients who either did not test their blood sugars or were not advised to do so were removed from this item.

Table 4. Disease-related variables of the study population: *Some percentages do not add to 100 owing to missing data.*

A)

DISEASE-RELATED VARIABLES	OVERALL (N=275) MEAN (SD)	MEN (N=132) MEAN (SD)	WOMEN (N=143) MEAN (SD)	P VALUE
Months living with diabetes*	4.00 (3.00-58.50)	5.00 (3.00-60.50)	4.00 (2.50-55.50)	.916
Total number of symptoms	1.41 (0.8)	1.33 (0.8)	1.50 (0.9)	.135
Total number of diabetes-related health conditions	3.63 (2.6)	3.93 (2.9)	3.35 (2.4)	.07
Had knowledge about diabetes (possible score 1-24)	16.19 (4.1)	15.97 (4.2)	16.39 (3.9)	.392

SD—standard deviation.
*Mean and interquartile range.

B)

DISEASE-RELATED VARIABLES	OVERALL (N=275) % (N)	MEN (N=132) % (N)	WOMEN (N=143) % (N)	P VALUE
Management of diabetes				.354
• Using diet only	32.0 (88)	28.8 (38)	35.0 (50)	
• Using oral agents	60.0 (165)	64.4 (85)	55.9 (80)	
• Using insulin	8.0 (22)	6.8 (9)	9.1 (13)	
Family history of diabetes				.003
• Yes	71.6 (189)	61.9 (78)	80.4 (111)	
• No	23.1 (61)	30.2 (38)	16.7 (23)	
• Don't know	5.3 (14)	7.9 (10)	2.9 (4)	
Had previous education on diabetes				.037
• Yes	35.0 (96)	28.8 (38)	40.8 (58)	
• No	65.0 (178)	71.2 (94)	59.2 (84)	
Smoker				.338
• Yes	14.5 (40)	16.7 (22)	12.6 (18)	
• No	23.1 (61)	30.2 (38)	16.7 (23)	
• Don't know	5.3 (14)	7.9 (10)	2.9 (4)	

Table 5. Clinical characteristics of the study population: *Some percentages do not add to 100 owing to missing data.*

CLINICAL CHARACTERISTICS	OVERALL (N = 275) MEAN (SD)	MEN (N = 132) MEAN (SD)	WOMEN (N = 143) MEAN (SD)	P VALUE
Body mass index, kg/m² (≥25 is overweight)	31.52 (6.8)	30.42 (6.3)	32.53 (7.1)	.011
HbA$_{1c}$ level, % (target level ≤7.0)	7.96 (1.9)	8.0 (2.0)	7.92 (1.9)	.74
High-density lipoprotein cholesterol level, mmol/L	1.21 (0.3)	1.12 (.3)	1.30 (.3)	0
Total cholesterol to high-density lipoprotein ratio, mmol/L (target ≤4.0)	4.43 (1.4)	4.56 (1.4)	4.32 (1.4)	.175
Triglyceride level, mmol/L	2.36 (2.0)	2.52 (2.4)	2.21 (1.5)	.202
Low-density lipoprotein cholesterol level, mmol/L (target <2.0)	2.94 (1.0)	2.85 (1.0)	3.02 (1.0)	.211
Systolic blood pressure, mm Hg (target ≤130)	127.67 (15.2)	126.36 (14.7)	128.84 (15.6)	.188
Diastolic blood pressure, mm Hg (target ≤80)	77.43 (9.3)	77.81 (9.5)	77.10 (9.2)	.54

SD—standard deviation.

to be vigilant about weight gain and the onset of diabetes in women.

According to clinical practice guidelines, screening patients as young as 40 in family physicians' offices has proved useful for detecting unrecognized diabetes.[27] While fasting plasma glucose is the recommended screening test, a 2-hour plasma glucose test in a 75-g oral glucose tolerance test might be indicated when fasting plasma glucose is 5.7 to 6.9 mmol/L[28] and the likelihood of diabetes or impaired glucose tolerance is high (eg, among women with a history of gestational diabetes or who have given birth to babies weighing more than 4 kg; people with risk factors such as a first-degree relative with diabetes; and those who are overweight).[29]

Women with diabetes have a significantly higher risk of coronary artery disease and a higher mortality rate from CVD than men with diabetes do.[30] Heart disease remains the leading cause of mortality among people with diabetes.[31] Given the findings of our study, care providers should not only regularly screen women who have a family history of diabetes or who are overweight (BMI ≥25) for diabetes, but should also screen those already diagnosed with diabetes for CVD. Canadian clinical practice guidelines for management of obesity and for prevention and management of diabetes emphasize the need to engage patients actively in lifestyle and diet modifications to manage their weight and reduce their risk of complications.[26,29]

Women in our study had sought education on diabetes in the past more often than men had. They also appeared to have higher expectations of the benefits of self-management to their overall health. Studies largely from industrialized western countries show that women report more frequent use of preventive and therapeutic health care services for acute and chronic conditions than men do.[32,33] The literature also suggests that women suffer more morbidity, report illness more often, and have a greater propensity to seek health care overall.[33-35] Our study did not find any differences by sex

in intention to continue using diabetes education centre services or other diabetes-related resources in the future. These findings, however, raise some interesting questions. For instance, given women's greater use of diabetes education services in the past, why are women at higher risk of diabetes-related complications? And are diabetes education and management strategies effective in preventing and reducing risk of complications for both men and women equally? Further research is needed to better understand how people use diabetes education services and how these services affect health outcomes in women and men.

Although no differences were observed in diabetes-specific, family, or general social support between men and women, women perceived they had higher levels of social support from their professional health care teams than men did. In general, women reported less family support than men did,[9,36-38] and this support declined as women aged.[39] Although there were no differences in living arrangements between men and women in our study population, we did find that more women than men were single, widowed, or divorced. It is plausible that women with diabetes felt the need to seek support from their health care teams owing to the lack of family or social support they need and were more receptive to the support they received from these teams. Because family and friends provide the necessary physical and emotional support for people with diabetes on an intimate and day-to-day basis, care providers should draw on this natural support resource by educating and counseling not only patients but also those close to patients.

Women in our study, as in other studies, were on average more likely to have depressive symptoms than men were.[40-42] Although on average both men and women scored in the minimal depressive symptom category (total score between 0 and 13), more women than men were in the mild (14 to 19), moderate (20 to 29), and severe (29 to 63) categories. Women in the general population are approximately twice as likely as men to have

major depression,[43] and those with either type 1 or type 2 diabetes are twice as likely as people in the general population to be clinically depressed.[44] Yet depression often goes undiagnosed among those with diabetes.[45] The combination of depression and diabetes is especially dangerous and demands special attention because it is associated with substantially increased risk of all-cause mortality.[46] Depression also has an adverse effect on sense of self-efficacy and personal interactions[47] and reduces satisfaction with care,[48] which predicts poor adherence to medical regimens.[49]

Diabetes-specific studies also demonstrate that depression is linked to poor health practices,[50] such as missing diabetes-related medical appointments,[51] paying less attention to diabetes self-care activities,[52-54] having poor glycemic control, and, therefore, increasing risk of diabetic complications.[52,55,56] Findings from both current and past studies suggest that diabetes health care services should screen patients, particularly women, for depressive symptoms, and provide timely, effective interventions. Patients at physicians' offices and at diabetes education centres should undergo brief psychosocial screening as part of their initial assessment. Patients who score over a threshold level for depression should be evaluated by their family physicians and, if appropriate, be treated with antidepressants or psychotherapy. If necessary, patients can be referred to psychiatrists or clinical psychologists for more thorough mental-health assessment and appropriate treatment.

Limitations

Potential limitations of our study include the fact that some of the data collected were based on self-report, making them prone to recall bias and overestimation of actual behaviour to provide socially desirable responses.[57,58] Studies have shown, however, that self-reported data on diabetes, chronic diseases, and several cardiovascular risk factors are reliable.[59-61] In addition, study participants were all users of the diabetes education centre and, as such, do not reflect all people with diabetes. Last, the cross-sectional nature of our study allowed us to observe differences by sex only at a single point in time. Future research should investigate the development of differences between men and women living with diabetes over time to assess if and when these differences alter over the course of the disease and whether they influence health outcomes.

Conclusion

It appears that there are psychosocial, behavioural, and clinical differences between men and women with diabetes that might affect their risk of getting diabetes, their attitudes and behaviour toward self-care for diabetes, and consequently their health outcomes. It is important that physicians consider the differences between men and women's attitudes to diabetes management when they are counseling, educating, and caring for them. Primary care providers should focus on promoting the benefits of diabetes self-management to men, and should regularly screen those at higher risk of developing diabetes, particularly women with a family history of diabetes or a high BMI (≥ 25). Men and women with and without diabetes need to be counseled on weight management in order to reduce both BMI and the risk of developing diabetes or future diabetes-related complications. Finally, primary care providers should be encouraged to screen for depressive symptoms, particularly among women with diabetes. ❧

Contributors

Dr Gucciardi *was involved in concept and design of the study, coordinated the acquisition of data, analyzed and interpreted the data, and drafted and revised the manuscript.* **Ms Wang** *was involved in analysis and interpretation of data and contributed to drafting, reviewing, and revising the manuscript.* **Ms DeMelo** *was involved in concept and design of the study, acquisition and interpretation of data, and reviewing and revising the manuscript.* **Ms Amaral** *was involved in concept and design of the study, provided guidance in the interpretation of data, and reviewed and revised the manuscript.* **Dr Stewart** *was involved in concept and design of the study and reviewed and revised the manuscript.*

Competing interests
None declared

Correspondence to: **Dr Enza Gucciardi,** *School of Nutrition, Ryerson University, 350 Victoria St, Toronto, ON M5B 2K3; telephone 416 979-5000, extension 2728; fax 416 979-5204; e-mail* **egucciar@ryerson.ca**

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