

## Management and Impact of Diabetes on Quality of Life among the Lebanese Community of Sydney: A Quantitative Study

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### Abstract

**Background:** Diabetes is a global health concern which is known to be more prevalent among certain cultural and ethnic groups. While genetics may be a contributing factor, higher incidence or difficulties in managing the disease may be attributable to cultural habits over generations. The aim of this study is to examine the effects of diabetes, its effective management and its impact on the Lebanese community of Sydney, one of the city's fastest growing ethnic groups.

**Materials and methods:** A quantitative method was used. A total of 200 Lebanese migrants living in the Sydney metropolitan area (SMA) who had been diagnosed with diabetes at least six months prior to the study were recruited purposively from the SMA surgeries primarily serving the Lebanese community. The study used a questionnaire to ascertain background information, health, diagnosis and treatment of diabetes, lifestyle, and quality of life, management of the disease and emotional wellbeing of the participants. Management of diabetes was measured using the Patient Activation Measurement (PAM) scale, while quality of life (QOL) was measured by using the CES-D scale.

**Results:** The results showed the mean age of participants to be 48 years; the majority were male (78%) and married (94%). More than a third had formal education and less than half were employed at the time of the study. Of the components of QOL, over a third of the participants reported impeded mobility, less than half (48.5%) struggled with personal care and hygiene, and 74% experienced difficulties at work. Moreover, diabetes incapacitated 80% of those attempting to do household chores; more than 75% experienced pain and discomfort while 73.5% endured bouts of anxiety and depression due to diabetes. The t-test results indicated that males were more likely to follow a medical plan than their female counterparts, while ANOVA showed that the middle-aged participants were significantly more confident at following their medication plans compared to the young and older cohorts, both results were significant at  $p < 0.05$ .

**Conclusion:** The results of this study suggest that diabetes affects both the physical and emotional health of the participants of the study and that individuals with diabetes may experience considerable anxiety and stress as they attempt to manage their disease. It seems that an effective and focused education tailored to women, as well as to younger and older cohorts is needed to improve their self-care and understanding of treatment regimes, hence enhancing their quality of life through effective management of diabetes.

**Keywords:** Diabetes; Quality of life; Risk factor, Self care; Management; Lebanese community

### Introduction

Diabetes Mellitus is a pandemic that constitutes a major public health problem worldwide, both by the number of people affected and by the socioeconomic implications presented by the management and treatment of the disease and its complications. It is a chronic disease that occurs as a result of high blood glucose for which there is as yet no cure. It is one of the major causes of disease morbidity and mortality in Australia and throughout the world. Although biological factors are important for causes of diabetes however it is important to understand role of behavioural, cultural and lifestyles related factors for self care and management of diabetes and impact of diabetes on quality of life.

In 1985 around 30 million people were affected with diabetes worldwide; over ten years this number increased to 150 million. Diabetes caused 4.6 million deaths in 2011 [1]. The World Health Organization (WHO) warned that an estimated 300 million people would be affected by the disease by 2025 [2]. In regard to its global prevalence, morbidity and mortality, the rapid increase of diabetes is comparable to the 14<sup>th</sup>-century plague [3]. An updated estimate for the incidence of diabetes in 2030 is now a staggering 552 million people (10% of the world's adult population) [4].

Diabetes is ranked in the top 10 leading causes of death in Australia and is listed as the underlying cause of death in almost 3% of all deaths [5]. An estimated 275 Australians develop diabetes every day [5]. According to self-reported data of 2007, around 4.5% of Australians were diagnosed with the disease, almost the twice the number of people diagnosed in 1990. The 2005 Australian AusDiab Follow-up Study showed that 1.7 million Australians had diabetes and that up to half of the cases of Type 2 diabetes remained undiagnosed. It is estimated that by 2025 about 3 million Australians will have Type 2 diabetes [6], with an increase to 3.3 million by 2031 [7].

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Minority population groups, such as Australian residents born overseas and native Australians of lower socioeconomic status who reside in the countryside, are more prone to suffer from the disease. The 2005 Australian AusDiab Follow-up Study showed native Australians living in areas of lower socioeconomic status to be at higher risk of developing diabetes [5]. The rate of diabetes among people of Middle Eastern background was found to be greater than that of mainstream Australians [8]. Middle Eastern men have been shown to be 3.6 times more likely to develop diabetes than their Australian-born counterparts; the corresponding ratio for women is 2.4 [9,10]. Evidence shows significant deficiencies in the dissemination of information on the risk factors, occurrence and prevalence of Type 2 of diabetes in Australia, in particular among ethnic groups.

## Background of Lebanese Population in Australia

The Lebanese immigration in Australia has a historical legacy for over 100 years. Although the precise data about the earlier Lebanese migration to Australia is unavailable, but it is apparent that colonial census official appeared to have classified them as Turks what they actually were not [11]. The main reasons for Lebanese migrations to Australia include escaping economic hardship, repeated draughts, plagues, religious and political unrest and persecution [12], in Lebanon that reflected the continued conflicts and disruptions through destruction of property, loss of relatives, interruptions in schooling of children, and many other related events which are consequential to any war anywhere [11].

According to the national Australian census of 2006, around 86,600 Lebanese-born people were living in Sydney, that is 2.36% of the total population of Sydney [13]. The latest ABS Census in 2011 recorded 76 451 Lebanon-born people in Australia, an increase of 2.1 per cent from the 2006 Census (DIAC, n.d). More than half (51.8%) of the Lebanese people had less than year 12 years of schooling followed by 21.4% year 12 or equivalent education. 34.2 per cent of the Lebanon-born aged 15 years and over had some form of higher non-school qualifications compared to 55.9 percent of the Australian population [14]. It is evident from this study that those with no formal education were less confident in preventing and reducing further health problems associated with diabetes than their educated counterparts as well as understanding recommended health regimes and understanding their role and responsibility.

Further it is evident that the Lebanese population in Australia is very heterogeneous, which include the affluent, socially placed, successful people to unskilled workers with consistently high unemployment and associated illiteracy [15]. In 2011 among Lebanon-born people aged 15 years and over, the participation rate in the labour force was 43.6 per cent and the unemployment rate was 9.1 per cent. The corresponding rates in the total Australian population were 65 per cent and 5.6 per cent respectively [14].

Over 90% of the Lebanese use their native language at home, this indicates a high level of language maintenance, and this has definitely been fostered by the significant proportion of kin and other friends of ethnic origin present in the neighborhood. This presents the link to reinforcements of ethnic identity, but also poses to be a barrier in healthcare communication and limiting access to information and health services. It has been observed also that the Lebanese communities do not adopt the diet and foods of the host society population [16].

The ABS 2001 National Health Survey indicated that the ratio of

diabetes among Lebanese migrants in Australia was nearly 3.3% [17]. However, studies in Lebanon show Type 2 diabetes to affect almost 11.5% of the Lebanese population, increasing with age. The implications of all these results for Lebanese ethnic groups living elsewhere are of immense concern particularly in light of the increasing tendency among Lebanese to migrate and to urbanize, and the rising occurrence of obesity and physical idleness among this cultural group [18]. While the Lebanese in Sydney face many similar effects of Type 2 diabetes to those of any other community, there is a paucity of knowledge about the specific factors contributing to the management of diabetes and the effects of diabetes on quality of life among the Lebanese community of Australia; this research is an attempt to fill this gap.

## Literature Review

It is well known that many of the culturally diverse migrant groups of people in Australia exhibit a higher prevalence of diabetes than Australian-born citizens. It is thought that the degree of difference in occurrence and risk by place of birth could be due to a combination of biological, environmental, genetic and behavioural risk factors.

### Diabetes mellitus

Diabetes is a disease characterised by high levels of blood glucose and is the leading cause of kidney failure and lower-limb amputations globally. Diagnosis of diabetes is usually made as a result of urine and blood tests as many people with Type 2 diabetes exhibit no symptoms at all [19]. Given that public health expenditure on diabetes is expected to rise to \$US 595 billion in 2030, the disease can be considered a risk for world business [5]. Fortunately, there are steps that can be taken to control the disease and lower the risks of complications [2]. However, to do so it is important to understand the diagnosis of diabetes and the diabetes-related physical and emotional health issues among overseas-born adults who are diagnosed with the disease.

### Importance of diabetes education

While knowledge about the disease does not necessarily result in better self-care, it is considered a potentially important adjunct to behaviour change since diabetes education reduces the risk of patient complications, an aspect considered the mainstay of treatment. Studies in Australia and other countries show that well structured care can improve patient outcomes [20,21].

Educational processes are key preventive interventions for patients, particularly those who have developed a relationship in which their health professional shares his/her knowledge and the patient changes from a passive to an active and responsible participant in their own health care. Educating patients involves developing the knowledge, skills, motivation and emotional resources that allow them to cope with the demands of diabetes treatment with autonomy and responsibility. For example, a clearer understanding of the disease progress and implications might serve as a motivating factor to institute life-changing or life-saving practices. In a sample of insulin-requiring diabetics, younger individuals were found to be more knowledgeable about the disease than among older individuals, possibly because the latter might not have received the same depth of information when diagnosed [22]. Older individuals, however, had significantly better diabetes self-care management, suggesting that over time they may have developed greater self-care management skills [22].

Knowledge about the disease, attitude towards prevention, and familiarity of the healthcare professionals with the experience of the

target groups are important determinants of diabetes promotional programmes and their success. These three factors may indeed lead to a thorough understanding of the problems from the perspectives of the target population [23].

### Diabetes self-management

The treatment of diabetes involves medicines, diet, and exercise to control blood sugar and prevent symptoms [24]. The goals of diabetes treatment are to achieve metabolic control, minimize diabetic complications, control co-morbidities and achieve good quality of life [25]. All these are largely dependent on self-management of the disease.

It has been suggested that education on self-management may play a pivotal role in tackling beliefs about health and so improve metabolic control, concordance with drug decisions, risk factors, and quality of life [26-28]. Diabetes self-management is composed of four main components: medication, diet, exercise and self-monitoring of blood glucose [29], whereby diet and physical exercise are important lifestyle modifications to control the disease [30].

With respect to utilization of services for diabetics, Girgis and Ward [31] showed that the Arabic-speaking Australian population was less inclined to access diabetes-related specialist services. Despite the availability of specialist diabetic clinics, only one fourth of Arabic-speaking diabetics from communities attend these. Regarding information sharing and health education via written information, participation among Arabic-speaking diabetics was found to be less than optimal. Poorer participation could be a result of the fact that the service was less culturally specific than desired and that health professionals had little understanding of the ethnic culture [16].

### Impact of diabetes on quality of life

Diabetes can affect the life of those who suffer from it in many ways: emotionally, physically, financially and socially. Recent studies suggest that diabetes is often associated with a range of psychological problems and mental disorders, which not only cause pain but also affect the treatment and course of the disease. The psychosocial impact of diabetes and its treatment can cause psychological problems and mental disorders that require psychiatric consultation for the recognition and treatment of its clinical manifestations [17]. Very typical emotional responses to the disease situation are a sense of danger, of loss of vital social role performance, and of the loss of opportunities. The condition can cause aggression, defensive reactions appearing as excessive anger, irritability, suspicion, and abnegation; it can also result in timid, shy and insecure behaviour or maliciousness and suspiciousness.

Diabetes affects the mental functioning of patients, but not in a uniform manner. It has been proved that certain psychosocial factors, such as health beliefs, social support, coping style, stress and personality traits, can have a direct or indirect effect on quality of life [32]. Social dispositions may be more significant for lower quality of life than the presence of coexisting diseases implication. Patients generally characterized as depressive experience a lower quality of life than patients without depression [33]. Conversely, diabetics with an optimistic outlook on life and a strong belief in self-efficacy, as well as those who use active, solutions-oriented problem solving strategies for coping with stress often enjoy a good quality of life [33].

Girgis and Ward [31] draw attention to the compromised quality of life in the Arabic-speaking Australian population and suggest that the main impediment to understanding this group is paucity of data,

especially in terms of health service planning. In an earlier study, Colagiuri et al. [34] noted a deficiency in diabetes-related preventive services aimed at ethnic minority communities in Australia. The fact that the Lebanese-born population has a higher death rate from diabetes than the mainstream Australian population suggests that the actions taken to prevent higher prevalence and to control risk factors have been inadequate. It is generally acknowledged that measures to reduce obesity and high-fat content in diets and to improve physical activity could favourably impact both the incidence of diabetes and its complications.

In a recent study on immigrant health in Australia, people diagnosed with diabetes were found to be more likely to suffer from depression than the general population [35]. This has been correlated to the impact of diabetes in their daily lives and psychological impact of the diagnosis. The quality of people's social lives has also been reported to be jeopardized by diabetes. While the physical effects of diabetes are known to be overwhelming to the individual, there may also be pragmatic constraints on lifestyle, especially those imposed by diet, which can cause many individuals to feel disconnected [36]. The impact of these constraints may overwhelm migrants in a community which is already alienated from the mainstream. Fatigue, exhaustion, the need to go to bed early, fear of losing their job and loss of interest, may all contribute to lost opportunities for social interaction and compromise the quality and frequency of them [16]. Many diabetics experience memory lapses which, frequently exacerbated by irritation and stress, and may affect their ability to converse [37].

### Materials and Methods

A quantitative method using standard tools was used to measure the effect of diabetes on health and wellbeing among 200 Lebanese men and women living in the Sydney metropolitan area (SMA) who had been diagnosed with diabetes for at least six months prior. A power analysis using Cohen's formula (1988) indicated that a sample size of 200 would give an 80% chance of detecting correlations  $\pm 0.223$  at 0.01 levels.

The participants of the study were aged 40-55 years, the age group most commonly diagnosed with diabetes. Due to the small number of potential candidates aged 56+, no one above the age of 55 was included. A snowball technique was used to recruit eligible participants on the basis of inclusion and exclusion criteria as they became available. The research was advertised in the Lebanese newspaper, radio and on websites dedicated to Lebanese people. Some of the participants were drawn from local surgeries with a high concentration of Lebanese patients. The surgeries were contacted prior in order to select eligible participants of the study.

Ethical clearance for the study was obtained from the Human Research Ethics Committee of the University of Sydney. Consent and confidentiality were considered a significant issue and a sincere effort was made to communicate the aims and objectives of the study to the participants through the covering letter accompanying the questionnaires in both English and Arabic. Participants were assured that participation was voluntary and that they might withdraw from the study at any time without prejudice and that their status and treatment as patients would be unaffected. Data was collected using a questionnaire which comprised of structured as well as open-ended questions, scale-type questions and checklists [38], to identify risk factors and effects of diabetes; effective management of diabetes; self-efficacy of diabetes management and barriers; and to assess the impact

of diabetes on the psychosocial wellbeing of the Lebanese-background population.

Quantitative information was collected on participants' background information, health, diagnosis and treatment of diabetes, lifestyle, self-care, quality of life, and management and emotional wellbeing. The Perceived Diabetes Self-Management Scale (PDSMS) developed by Wallston et al. [39] was used. This scale was adapted from the Perceived Health Competence Scale (PHCS) [40], an instrument shown to be reliable and valid in numerous investigations. The responses for the PDSMS items range from 1='strongly disagree' to 5='strongly agree'. To assess participants' self-care, the Diabetes Self-Care Activities Scale (DSCAS) [41] was used. Diabetes self-care assessment covers a range of activities, e.g., self-monitoring of blood glucose, eating a low-saturated-fat diet, checking one's feet, and smoking. Impacts of diabetes on participants' psycho-social wellbeing was measured using the Diabetes Self-Efficacy Scale [42] which uses a series of 20 opposite adjectives (e.g. angry vs. calm) to measure adult wellbeing according to emotional stability, self-esteem/self-confidence, joviality, and happiness. Quality of life (CES-D scale) was measured on the basis of the following items: mobility, personal care, usual activities (work, study, housework, family and leisure activities), pain/discomfort, and anxiety/depression. Scale-type questions were asked to determine ability to perform particular tasks with three possible answers: 'no problem', 'some problem' or 'unable to do'.

The Statistical Package for Social Sciences (SPSS) software Version 17 was used to analyse the data according to: a) Descriptive analysis e.g., mean and SD, and b) Bivariate analyses including chi-square tests, t-tests and ANOVAs used to identify trends and examine possible associations between both independent (background variables) and dependent variables (management of diabetes and quality of life). For analysis purposes, some of the dependent variables were treated as independent variables.

## Results

### Study participants and background

A total of 200 participants completed and returned the questionnaires. The results show that the mean age of the participants was 48 years. An overwhelming majority of the participants (86.5%) were born in Lebanon; a great majority were male (78.5%) and nearly all participants were married (92.5%). More than 85% spoke Arabic at home, with more than a third (35.5%) having no formal education and less than a third (27%) having completed year 10-12. Less than half (45%) were employed at the time of the study and more than half (52%) had an annual income of between \$20,001 and \$40,000.

Participants were asked questions concerning their general health and their diabetes experience. The results (Table 1) show that the majority reported to be in good health (74.5%). Most of them were diagnosed with non-insulin- dependent Type 2 diabetes (95.5%), had a family history of diabetes (89.5%), and were diagnosed with diabetes between 40 and 50 years of age (70%). The results also show that more than 68% had been educated about diabetes and that for a little over half of the participants, this had occurred via their general practitioner (GP). Most of them (82%) had not experienced hypoglycaemia in the past month.

### Diabetes self-care

Participants were asked questions relating to their performing

Characteristics	Description	N	%
Health status	Good	149	74.5
	Fair	28	14.0
	Poor	23	11.5
Diabetes type	Type 2 non-insulin dependant	191	95.5
	Type 2 insulin dependant	9	4.5
Family history of diabetes	No	179	89.5
	Yes	21	10.5
Diagnosis age of diabetes	<40	19	9.5
	40-50	139	70.0
	50+	42	20.5
Diabetic education	Yes	136	68.0
	No	64	32.0
From where	GP	113	56.5
	Diabetic specialist	23	11.5
Experienced hypoglycaemia in the past month	0 times	164	82.0
	1-2 times	25	12.5
	3-4 times	11	5.5

Table 1: General health and diabetes history of patients.

of blood tests, following the recommended diet and taking diabetic medication by days per week. The results, Table 2 show that little over half of the participants (51.5%) performed blood tests two to three days per week. A similar number (52.2%) followed the recommended diet once a week only. However, a great majority (82.2%) were taking medication seven days a week.

No significant association between self-care and background variables including gender, language, diabetes education and age of participants could be detected (Table 3). However, further research is warranted with a larger sample.

### Quality of life

Quality of life was measured by asking participants whether they experienced any problems with aspects of life such as mobility, personal care, study, house work, family, leisure activities, pain, discomfort and anxiety/depression. Responses were recorded as having problems or no problem. Descriptive statistics of the problems participants experienced in regard to quality of life are shown in Table 4. The results indicate that the majority of participants (65.5%) had no problem with mobility, and that just over half of the participants (51.5%) had no trouble with personal care. However, more than 81.5% of participants reported problems doing housework, 73.5% reported anxiety and depression and 77% experienced pain/discomfort.

Association between gender and quality of life was measured. The results of the independent sample t-test show that male were more likely to report problems with mobility compared to their female counterparts ( $t=1.76$ ,  $p<.001$ ). Similarly, males reported more pain/discomfort than females ( $t=1.68$ ,  $p<.0010$ ), while the reverse was true for anxiety/depression (Table 4).

Analysis of the effects of diabetes education on quality of life demonstrated that those who had received diabetes education reported less problems with mobility compared to those who had not ( $t=.98$ ,  $p=0.04$ ). Diabetes education also significantly affected family and leisure-activity aspects of participants' quality of life (Table 4). Participants who had diabetes education reported significantly fewer problems with leisure activities than their counterparts with no such education ( $t=1.53$ ,  $p=0.05$  respectively).

The language spoken at home was shown to be significantly associated with participants' personal care. Participants who spoke Arabic at home were more likely to report problems with personal

Type of self-care activity	Days per week							
	0	1	2	3	4	5	6	7
Blood test	34(17)	22(11)	24(12)	79(39.5)	8(4)	11(5.5)	5(2.5)	17(8.5)
Recommended Diet	12(6)	105(52.5)	18(9)	14(7)	14(7)	10(5)	21(10.5)	6(3)
Diabetic Medication	0(0)	0(0)	0(0)	8(4)	4(2)	23(11.5)	0(0)	165(82.5)

\*Figures in parenthesis are the percentage of participants

**Table 2:** Participants performing self-care activities by days per week\*.

Variables		N	Self-care Mean	SD	t	F	Sig
Sex	Male	157	14.75	2.98	1.85	-	0.07
	Female	43	13.81	2.77			
Language	English	29	13.97	2.90	- 1.15	-	0.25
	Arabic	171	14.65	2.96			
Diabetes Education	Yes	64	14.48	3.08	.39	-	0.83
	No	136	14.58	2.90			
Age Groups	37-42	45	13.76	2.74	-	2.26	0.11
	43-48	80	14.66	2.93			
	49-54	75	14.91	3.05			
	Total	200	14.55	2.95			

**Table 3:** Effect of patients' gender, language, diabetes education and age on diabetes self-care.

Quality of life Aspects		N	Mean	SD	t	Sig
Gender	Male	157	1.38	.49	1.76	.00
	Female	43	1.23	.43		
Mobility	Male	157	1.54	.50	2.74	.00
	Female	43	1.30	.46		
Family	Male	157	1.80	.40	1.68	.00
	Female	43	1.67	.47		
Pain/Discomfort	Male	157	1.71	.45	-1.32	.00
	Female	43	1.81	.39		
Anxiety/Depression	Yes	64	1.30	.46	-.98	.04
	No	136	1.37	.48		
Diabetes Education	Yes	64	1.59	.50	1.53	.05
	No	136	1.48	.50		
Family	Yes	64	1.77	.43	1.19	.01
	No	136	1.68	.47		
Leisure activities	English	29	1.31	.47	-2.05	.00
	Arabic	171	1.51	.50		
Personal care	English	29	1.73	.45	1.29	.01
	Arabic	171	1.83	.38		
Work	English	29	1.31	.47	-2.05	.00
	Arabic	171	1.51	.50		

**Table 4:** Association between gender, diabetes education and home language and participants' quality of life.

care and work compared to those who spoke English at home. These differences are statistically significant at  $p < .00$  and  $p < .001$ , respectively. However, there was no significant variation between language and any other aspect of quality of life (Table 4).

## Management

Thirteen statement-type questions were asked to assess participants' experiences of managing their own health, the actions taken for management of diabetes, and the impact of these. They were categorized into four groups: Understanding role and responsibility, Understanding the recommended health regime, Confidence in preventing & reducing further health problems, and Adopting new behaviour.

Results of the one-way ANOVA test on the effects of diagnosis age of diabetes on management of diabetes show that age of diagnosis only

influenced participants' confidence in preventing & reducing further health problems. Results show (Table 5) that participants diagnosed at middle age (43-49 years) were significantly better at preventing problems associated with diabetes and reducing further health problems than those diagnosed at a younger age ( $F = 2.97$ ,  $P < 0.05$ ). By contrast, participants diagnosed at younger age showed greater understanding of the recommended health regime than those diagnosed at older age groups. Participants diagnosed between ages 49 and 54 (older age) were less likely to adapt to new behaviour than those diagnosed at a younger age but more responsible in understanding their active role in taking care of their own health; however, these differences were statistically significant (Table 5).

Results of the one-way ANOVA test on the effects of participants' actual age on management of diabetes (Table 6) show that age only influenced participants' confidence in preventing and reducing further

health problems. Results show that middle age group were significantly better than younger and older age groups at preventing problems associated with diabetes and reducing further health problems ( $F=3.33$ ,  $P<0.04$ ). Moreover, the findings indicated that younger age groups had a greater understanding of the recommended health regime than older age groups. The older participants (aged between 45 and 55) were less likely to adapt to new behaviour than the younger age group but were also more understanding of their active role in and responsibility for taking care of their own health; again, however, none of these differences were statistically significant (Table 6).

Associations between gender and aspects of disease management were measured with independent t-tests. The findings, presented in Table 7, suggest that patients' gender does influence their management of aspects of diabetes. Associations were found between gender and participants' understanding of their role and responsibility regarding the disease, their confidence in preventing further health problems, and their adoption of new behaviour to manage diabetes. The results of the independent sample t-test showed males to be more likely to understand their role and responsibility compared to their female

counterparts ( $t=1.74$ ,  $p<.00$ ). On average males were also more confident in preventing and reducing further problems due to diabetes than females ( $t=2.97$ ,  $p=.00$ ). By contrast, females were shown to be more likely to understand the recommended health regime and to adopt new behaviour (Table 7). These differences were statistically significant at  $p<.00$  and  $p<.001$ , respectively. However, are far more male than female in this data set, this might affect the statistical results.

Results of the one-way ANOVA test of the effect of patients' education on management of diabetes are presented in Table 8. It is evident that those with no formal education were less confident in preventing and reducing further health problems associated with diabetes than their educated counterparts ( $F=2.73$ ,  $P<0.04$ ). A similar pattern was exhibited with regard to understanding recommended health regimes and understanding their role and responsibility. However, these differences were not statistically significant (Table 8).

The independent sample t-tests were carried out on language spoken at home of participant and components of management of diabetes and the results show that English speaking participants are

Management of diabetes Aspects	Diagnosis Age	N	Mean	SD	F Sig	
Understanding role & responsibility	37-42	45	4.42	.89	.15	.86
	43-48	80	4.33	1.03		
	49-54	75	4.37	.94		
Understanding recommended health regime	37-42	45	5.33	1.00	1.48	.23
	43-48	80	5.54	1.23		
	49-54	75	5.71	1.16		
Confidence in preventing & reducing further health problem	37-42	45	8.67	1.24	2.97	.05
	43-48	80	8.76	1.62		
	49-54	75	8.21	1.41		
Adopting new behaviour	37-42	45	8.27	1.54	.90	.41
	43-48	80	8.56	1.25		
	49-54	75	8.59	1.35		

Table 5: Effects of diagnosis age on management of diabetes.

Management of diabetes Aspects	Age	N	Mean	SD	F Sig	
Understanding role & responsibility	40-44	19	4.37	.76	.01	.99
	45-49	82	4.38	1.05		
	50-55	99	4.35	.93		
Understanding recommended health regimes	40-44	19	5.32	.89	.46	.63
	45-49	82	5.56	1.24		
	50-55	99	5.60	1.14		
Confidence in preventing & reducing further health problem	40-44	19	8.37	1.12	3.33	.04
	45-49	82	8.85	1.57		
	50-55	99	8.30	1.42		
Adopting new behaviour	40-44	19	8.74	.99	.31	.74
	45-49	82	8.49	1.47		
	50-55	99	8.47	1.33		

Table 6: Effect of participants' age on management of diabetes.

Management of diabetes	Sex	N	Mean	SD	t	Sig
Understanding role & responsibility	Male	157	4.43	1.03	1.74	.00
	Female	43	4.14	.60		
Understanding recommended health regime	Male	157	5.52	1.21	-1.03	.04
	Female	43	5.70	.96		
Confidence in preventing & reducing further health problems	Male	157	8.69	1.52	3.47	.00
	Female	43	7.95	1.15		
Adopting new behaviour	Male	157	8.45	1.43	-1.28	.01
	Female	43	8.70	1.01		

Table 7: Management of diabetes by gender.

Management of diabetes Aspects	Education	N	Mean	SD	F	Sig
Understanding role & responsibility	No formal	71	4.27	.89	.92	.43
	Year 10-12	34	4.52	.95		
	Certificate/ trade University level	62 13	4.31 4.54	1.10 .66		
Understanding recommended health regimes	No formal	71	5.39	1.01	2.25	.08
	Year 10-12	34	5.69	1.02		
	Certificate/ trade University level	62 13	5.74 5.00	1.40 1.00		
Confidence in preventing & reducing further health problem	No formal	71	8.59	1.49	2.73	.04
	Year 10-12	34	8.89	1.50		
	Certificate/ trade University level	62 13	8.32 7.77	1.36 1.54		
Adopting new behaviour	No formal	71	8.68	1.23	.79	.50
	Year 10-12	34	8.48	1.44		
	Certificate/ trade University level	62 13	8.40 8.15	1.48 1.07		

**Table 8:** Effects of education on management of diabetes.

more likely to understand their role and responsibility in managing diabetes compared to Arabic speaking counterparts, however the difference between the groups were not statistically significant.

The results of the Pearson correlation coefficient testing between different aspects of life quality and management of diabetes are summarized below:

The Pearson correlation test indicated positive significant relationships between:

- mobility and personal care ( $r=0.706$ )
- study and housework ( $r=0.642$ )
- housework and: family ( $r=0.465$ ); pain/discomfort ( $r=0.745$ ); and anxiety/depression ( $r=0.793$ )
- leisure activity and: pain/discomfort ( $r=0.672$ ); and anxiety/depression ( $r=0.615$ )
- Family and leisure activity ( $r=0.372$ ), pain/discomfort ( $r=0.349$ ) and anxiety/depression ( $r=0.347$ ): a weak positive relationship.
- Understanding the role & responsibility and confidence in preventing and reducing health problems ( $r=0.184$ ); showing a weak positive relationship.

The findings reveal that there is a strong positive correlation exists between mobility and personal care, meaning those who had problem of mobility also reported difficulty with personal care. A similar strong positive correlation was observed between house work and pain/discomfort; housework and anxiety/depression; between leisure activity and pain/discomfort; and anxiety/depression.

## Discussion

Collectively, the results of this study suggest that demographic characteristics' (age, sex, education and knowledge about diabetes (diabetes education), acculturation variables (language spoken at home) had small effects on some aspects of self-care, management and quality of life among the participants.

### Diabetes self-care

Diabetes self-care activities are behaviours undertaken by individual suffering or people at risk of diabetes in order to manage

the disease on their own [43] to improve their wellbeing. The findings in regards to three activities considered as very useful in managing diabetes were presented in this paper (Table 2). In the present study, no association was found between the age of patients and the level of diabetes self-care, while this observation is in line with the findings of Yekta et al. [44]. Further, our results showed there to be no significant difference between males and females with regard to their diabetes self-care, nor between age groups, level of education and language groups (English vs. Arabic) and self-care. While this apparent homogeneity and low variability with regard to behaviours may be a result of the small sample size, thus warranting further research with a larger cohort, these findings are not peculiar to our study. Similar findings of no significant difference in self-care displayed between male and female diabetic patients were reported by [44]; the lack of significant difference regarding diabetes self-care according to level of education is also in line with the findings of other studies [44-47]. By contrast, the t-test and ANOVA results of a study by Yu-Ling [48] showed that gender, education, income, and religion did influence diabetes self-care. The mean score of self-care was higher in male patients as compared to their female counterparts, and the scores were significantly higher among less educated individuals, higher-income subjects and non-religious patients as compared to educated, low-income and religious patients, respectively. The study further showed that social support and duration of diabetes had significant positive effects on self-care, whereas depression had significant negative effects on the same [48]. In the present study, no association was found between the age of patients and the level of diabetes self-care. While this observation is in line with the findings of Yekta et al. [44], different conclusions have been reached by other investigators [49].

Although the reason(s) for these discrepancies is not clear, the issue of self-care has been shown to greatly depend on cultural and religious factors [50]. Difference in cultural and religious beliefs/practices could, at least in part, explain some of these divergences. The fact that the current investigation did not employ matching techniques in its design or adjustment methods in data analysis as Yu-Ling's [48] study, could also have contributed to the difference in findings.

### Diabetes management

Findings of the present study indicated that diagnosis age of diabetes and patients' actual age were statistically associated with only one aspect of diabetes management, namely, confidence in preventing

& reducing further health problems. The results showed that participants in the middle age group (45-49 years) were significantly more confident in preventing and reducing further health problems compared to their younger (40-44) and older counterparts (50-54). By contrast, Yin Xu [51] found the mean of age and gender of diabetic patients to have no effect on their diabetes management. However, results of Pearson's correlation showed that diabetes duration, provider-patient communication, social support and self efficacy have influence on diabetes self management. The results of structural equation modeling (SEM) in Yin Xu's [51] study showed that belief in treatment effectiveness and diabetes self-efficacy were proximate factors which directly affected diabetes self-management but that knowledge, social support, and provider-patient communication had only an indirect effect on self-management via beliefs and self-efficacy. Our study did not examine proximate factors that might affect diabetes management directly.

The results of our study did show that the sex of diabetic patients was significant in regard to all four aspects of diabetes management (Table 7), indicating that males are more likely to understand their role and responsibilities, follow the recommended health regime and adopt new behaviour than their female counterparts. In contrast, females are more confident in preventing and reducing further health problem than males. These findings contradict those of Yin Xu and Siguroardottir [51,52] whose studies indicated that the gender of diabetic patients did not have any effect on diabetes management. The controversy of these findings might be explained by the cultural differences of the samples. Cultural background, health beliefs and religious are known to influence diabetes care and management [53]. For instance, Type 2 diabetes has been shown to be four times more prevalent among British individuals originating from the Indian subcontinent (Asians) than in white English Caucasians, while diabetic British Asians have also been reported to have poorer blood glucose control, awareness of diabetes management, and knowledge of complications [53].

The results of our study showed that the education level of diabetic participants was only associated with one aspect of diabetes management, namely, confidence in preventing & reducing further health problems. These findings concur with those of Rahimian Boogar et al. [47] and Siguroardottir [52] who found knowledge, physical skills and emotional factors as well as self-efficacy to influence self-care and metabolic control. Similarly, in the study of Munhoz Santos [54] the results of linear regression analysis showed that diabetes knowledge and resilience reduced the level of blood sugar and assisted diabetes management, whereas anxiety and depression were not statistically associated with diabetes management [54].

### Quality of life and diabetes

Findings of the present study in relation to the effect of diabetes on quality of life by gender showed that there was a significant difference between quality of life among males and females regarding housework, family, pain/discomfort and anxiety/depression. Santiprabhob et al. [55] and Vallis et al. [56] too observed that gender differently affected the quality of life in diabetic patients. In their studies satisfaction, the impact of diabetes on quality of life, and general quality of life were different between males and females [55,56]. Similarly, Miksch et al. [57] found gender-specific differences do exist within the quality of life of patients with diabetes.

Our results of quality of life by diabetes education and gender showed that there is significant difference between the average scores on mobility, family and leisure activity. Similarly, the results of quality

of life by language spoken at home showed that those who spoke English at home experienced significantly less difficulty with personal care and house work compared to those who spoke Arabic at home. In a study conducted by Tankova et al. [58] examining the effect of a 5-day diabetes teaching program for diabetic patients on their quality of life 1 and 2 years afterwards, the results showed a significant increase in overall well-being of patients in 1 ( $P < 0.0001$ ) and 2 years ( $P < 0.001$ ) after the educational program. This was related to a reduction in depression and anxiety and an increase in positive wellbeing compared to the control group [58].

Findings of the present study showed gender differences to significantly affect aspects of quality of life such as house work, family, pain/discomfort and anxiety/depression, in that males were more likely to report problems with house work and experience pain/discomfort compared to their female counterparts. By contrast, female participants reported experiencing anxiety/depression more than male participants. Similar observations were reported by other investigators [55,56,58].

### Limitations

This study had a number of limitations. Since the diabetic patient group studied in this research was a select migrant group, our findings cannot be generalised to other ethnic groups. Further research is needed to understand self-care by including proximate factors as well as physical skills, emotional factors and self-efficacy on a larger cohort. In order to better understand the management of diabetes it is important to conduct further study that includes people with diabetes from other ethnic and cultural groups as well as main-stream Australians with similar socio-economic backgrounds. Since the participants of this study were a homogenous group, insufficient variability existed to warrant further study with a larger cohort and multivariate analysis. Further study with a larger sample may provide a better understanding of the variations in diabetes management and confounding factors. Moreover, as questionnaires were self-administered and translated into English and Arabic, it is possible that the scales may not have been culturally appropriate for all survey participants. Immigrants may underreport health practices or conditions and are often hesitant to provide information or participate in utilizing health services. Additionally, individuals may desire to give socially acceptable answers. Since the survey data were based on self-report and memory recall, the findings may not accurately reflect the actual frequency of diabetes self-care and may include over- or underestimation of their routine on the part of participants.

### Conclusion

In patients with diabetes, one of the most important methods for evaluating treatment and care is to assess their quality of life. The results of the present study suggest that diabetes affected both the physical and emotional health of the participants and those individuals with diabetes may experience considerable anxiety and stress as they attempt to manage their disease. It seems that an effective and focused education tailored to young and older cohorts as well as female diabetic patients is needed to improve their self-care and understanding of treatment regimes, and thereby enhance their quality of life through effective management of diabetes. Additional studies with a larger sample would be useful to determine an effective approach. It would be particularly useful to examine the emotional effects of diabetes on individuals, as the perceived causes of anxiety/depression may not relate entirely to this populations' disease status but relate to their lifestyle and social-economic situation.

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