

The Relationship Between Quality Of Life And Self-Care Management : The Mediating Role Of Emotional Distress , And Social Support Among College Students With Type 2 Diabetes

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ABSTRACT

The aim of the present study is to test a proposed model for the relationship between quality of life and Self-care management as mediated by emotional distress , and social support among college students with type 2 diabetes. This study investigates theoretically proposed relationship between quality of life and Self-care management as mediated by emotional distress , and social support. This is a quantitative correlational , cross-sectional study investigating the strength and direction of relationships among proposed variables. Participants were 230 males (77.1%) and 100 females (22.9%). Bivariate correlations between quality of life ,Self-care management emotional distress , and social support were presented. The endogenous variable of Self-Management was found to be significantly and related to exogenous variables of quality of life and mediator variables of social support and emotional distress . The exogenous variable of Self-Management was also found out to be significantly and positively related to the mediator of social support while negatively related to Diabetes Distress . Besides, the relations among mediators also showed a significant negative relationship between social support and Diabetes Distress. The results of Path analysis showed that all of the hypothesized relationships are supported by the data. The model fit indices also showed that the proposed model perfectly fits the data obtained in the study. This finding of the study is consistent with many other studies.

Keywords: quality of life ,Self-care management ,emotional distress , social support ,college students ,type 2 diabetes

INTRODUCTION

Diabetes is nowadays one of the most prevalent diseases in the whole world, both advanced and developing, and it affects the rich and the poor, young and old, men and women (Ranasinghe et al.,2021). 2% of individuals have diabetes, and many scientific studies have shown that nearly 5 patients do not show symptoms of the disease, and they do not know that they have diabetes (Paulsamy et al.,2021).

The reasons for the great prevalence of this disease may be a change in the type of food, obesity, well-being, anxiety, psychological tension, infection with some viruses and other reasons (John, Pise, Chaudhari, Deshpande,2019). According to WHO(2022),about 422 million people worldwide have diabetes, the majority living in low-and middle-income countries, and 1.5 million deaths are directly attributed to diabetes each year. Both the number of cases and the prevalence of

diabetes have been steadily increasing over the past few decades.

Diabetes is divided into two types: type 1 diabetes, which is dependent on insulin and usually appears at an early age, affecting children and young people alike, and may appear at different ages, especially in the elderly, its appearance is sudden and its development is rapid, resulting when the pancreas is unable to secrete Insulin is not responding to treatment with pills(Huayanay-Espinoza et al.,2021).

And the second type, which is not dependent on insulin, and constitutes 11% of diabetes patients. It results from the body's inability to secrete an adequate amount of insulin or the presence of an ineffective amount, which results in high blood sugar, and its treatment is through oral tablets. By following a certain diet, exercising, quitting smoking...etc(Dehghan et al.,2017).

And given the complications that diabetes causes that affect a large number of parts of the body, such as neuropathy, retinopathy, digestive and circulatory disorders, nephropathy, atherosclerosis, strokes, urinary disorders and also sexual weakness...etc (Hurst, Rakkapao &Hay,2020).

Theoretical Framework

Quality of life of people with type 2 diabetes

Quality of life(QoL) is one of the relatively recent concepts in the Arab countries (AbuAlhommos et al.,2022). The World Health Organization (WHO) defines quality of life as an individual's perception of their position in life in the context of the culture and value systems they live, having to do with their goals, expectations, standards, and concerns(WHO,1998).

The term QoL is still confusing but it is agreed that it composes of four components: The physical component, mental, cognitive component, psychological and social component(Trikkalinou, Papazafiropoulou& Melidonis,2017).It has received wide attention from the health specialist, because of its importance in revealing the patient's coexistence with his disease, how he/she realizes it and how to seek to find solutions in order to improve their living conditions , postpone the complications of the disease and reduce the number of deaths(Roberts-Martínez et al.,2022).

Knowledge of the quality of life of a diabetic patient is a positive trend that is in the interest of the patient and his health care, providing the best health services and seeking to improve his/her life(AbuAlhommos et al.,2022). Diabetic's QoL becomes worse when complications start to develop or comorbidities coexist(Trikkalinou et al.,2017).

The patients with complications of diabetes mellitus suffer from a variety of lifestyle problems. In the end, it affects the renal system by causing nephropathy, vision loss, heart problems, erectile dysfunction, and peripheral neuropathies affecting the QoL(Vivek, Raushan, Leelavathi , Shubha,2017).

Self- care management

Self-management is an important focus of diabetes management; where research results indicated that it improves the patient's quality of life. It reduces the severity of long-term complications (Alrahbi, 2014) and is associated with satisfaction with quality of life, as well as with control of metabolism and blood sugar level .Self-management is thus critical to improving both psychological and

physiological outcomes in diabetic patients (Guo ,Dixon, Whittemore & He, 2012).

By strengthening self-management, each patient will develop the ability to identify his problems, make informed decisions about the management of his disease, and set realistic goals and strategies to achieve these goals with a belief in his ability to accomplish these tasks (Thompson, 2010).

Some studies have indicated that health education programs have success rates estimated at only 10.5%. Therefore, effective modern interventions to help these patients, which focus on improving their self-management skills, are seriously needed (Song, Xu & Sun,2014), and therefore the American Association recommends ADA Diabetes states that all disease must learn to self-manage, and the primary objective of this type of education is to train them to make decisions, taking into account the nature of their disease, and such an intervention would improve medical outcomes and health status as well as the patient's quality of life(Grillo et al.,2013) .

Self-management activities, such as glycemic control or adherence to a new diet, may be perceived as mentally and physically exhausting, highly influenced by internal (mood, energy, etc.) and external stressors (economics, family issues, etc.), which are subsequently associated with glucose control impairment(Liang et al.,2015). Paulsamy et al.(2021) found a significant relationship between social support, self-care behaviours, self-efficacy and glycemic management in T2D patients.

Social support

Social support is an important source that a person needs (Arıcı,2021;Elkady,2019). The volume of support and the level of satisfaction with it affect how the individual perceives to solve the various

problems of life, the methods of confronting and dealing with these problems, and the mutual social relations between people may represent the essence of support (Mostafa,2018; Yıldırım& Zeren, Şerife,2021), or the supply of knowledge, information, or behaviors and actions that the individual performs with the aim of helping others in crisis situations or financial contribution, as the support is related to mental health and happiness, and increases the strength of confrontation to confront the problems of life.

Social support is a basic requirement that everyone seeks to obtain, in order to get rid of feelings of tension, instability and insecurity that are presented by psychological disorders (Elkady,2019). A diabetic may need social support from different sources, which may play an important role in helping him and accepting the disease on the part of the patient, especially since this type of disease affects the individual at an early age and suddenly without psychological, physical, cognitive or moral preparation (Tang, Brown,Funnell,&Anderson,2008).

The individual may feel not accepting the disease, and the latter may affect his psychological, health and social course, and he may suffer from various pressures and tensions that may negatively affect his personality and his physical and psychological condition (Chew, Khoo& Chia,2011).

The care provided to a diabetic patient is not from a therapeutic or material aspect only, but requires attention from all sides through social support, which means the total social relations that affect the individual through which he feels that he is an individual who has a place and importance within these relations, and worthy of attention and caring (Paulsamy et al.,2021).

Emotional Distress

Some may be unaware that there are psychological effects that may affect diabetic patients, and affect them as a result of having this disease, and there is a close relationship between people with this disease and the psychological state; Because the factors and behaviors in the individual and in his way of life can be help to prepare this individual for diabetes, such as laziness and addiction to drinking soft drinks, and eating large amounts of starches and ready and fast foods, and there are psychological and emotional factors that can show diabetes if a person is exposed To severe stress or acute emotional outbursts(Ramaj, Kam-beri,& Behrens,2019).

The relationship between diabetes and psychological state is a dual relationship; as the bad psychological state leads to an imbalance in the rate of diabetes from the normal limit, and this leads to a poor psychological state, and since the reactions of the patient differ from one person to another and are represented in his acceptance of the disease and follow-up to treatment (Kalra, Jena & Yeravdekar,2018), or his refusal and lack of acceptance of the disease or treatment, and therefore there are a lot of Pressures on diabetics, and these pressures have a negative psychological impact on the patient and those around him, as represented in the length of the disease period that continues until the end of life, especially if a family member or relative suffers from the complications and effects of the disease, so a bad experience remains in the minds (Delahanty et al.2007).

There are psychological symptoms that are directly related to the diabetic patient, the first of which is depression, psychological impact, shock, or adjustment disorder upon hearing the news of the diagnosis with this disease. As for the accompanying

psychological symptoms, they are either high or low blood sugar level, and long-term psychological complications such as anxiety and permanent psychological depression (Virtanen et al.,2014), as well Anxiety appears in the form of palpitations, tremors and coldness in the extremities with dryness in the mouth and blurred vision in the eyes, and perhaps dizziness or headaches with fear of the worst, irritability, permanent nervousness, general pain in the muscles and rapid ejaculation in men (Aikens,2012).

As well as the motor and intellectual activity of a person differs where his appetite is reduced and disturbed His sleep is withdrawn and involves himself with a negative view of the present, remorse over the past and pessimism about the future, and he constantly comes up with thoughts of wishing for death, or perhaps suicide attempts sometimes in some of them (Dennick,Sturt& Speight,2017).

There is also an important thing that must be mentioned, which is that psychiatric patients are also more likely than others to develop diabetes and its complications, and that some psychiatric medications may contribute to an increase in blood sugar, which requires a comprehensive evaluation of any patient and a review of his treatments and various effects on him before dispensing them (Elkady,2019 b)

Patients with type 2 diabetes mellitus may develop distress due to a sense of loss of control in their lives, overwhelming self-care stress, feelings of loneliness, and the fear of disease complications and death(Hughes, Keith , Byars , Wiginton,2012). It has been revealed that it can significantly affect diabetic patients' health outcomes, especially their self-management(Sherbini& Hakim,2014).

Purpose of the Study

The aim of the present study is to test a proposed model for the relationship between quality of life and Self-care management as mediated by emotional distress , and social support among college students with type 2 diabetes.

Problem Statement

Diabetes mellitus is one of the most common chronic diseases, whether in developing or developed countries, which has spread as a result of the rapid development in the pace of life, and the large number of psychological pressures that have led to a change in lifestyle in eating, activity, sleep and others.

Perhaps unhealthy eating behaviors are the most dangerous of fast food saturated with fat and drinks Gaseous, all sugars and do not meet the minimum conditions of hygiene and health, and eating at all times, which causes obesity, which is one of the most important causes of diabetes in addition to the genetic side, as well as the lack of movement or activity (inactivity) as a result of the availability of luxury means of cars, work in offices and long sitting in front of television screens and mobile phones without movement, which posed a great danger to health and the emergence of disease.

Diabetes is defined as a disorder that appears through high blood sugar as a result of a defect that affects the pancreas gland in

the secretion of insulin or its effectiveness, or both, and is associated with complications in the short and long term, such as injury to the eyes, kidneys, heart or blood vessels

Research Question

The research question addressed in this study is;

“To what extent Self-care management is explained by the proposed quality of life model as mediated by emotional distress , and social support among college students with type 2 diabetes?”

Proposed Path Model and Hypotheses

In the proposed path model for Self-care management, the relationship between quality of life and Self-care management as mediated by emotional distress , and social support was tested. In the model, quality of life constitutes the exogenous variable of the study while emotional distress , and social support and Self-care management constitute the endogenous variables. Besides, based on the theoretical grounds, emotional distress was proposed as a predictor for social support in the model. In addition, both emotional distress , and social support were tested for their direct and indirect mediator effects between quality of life and Self-care management.

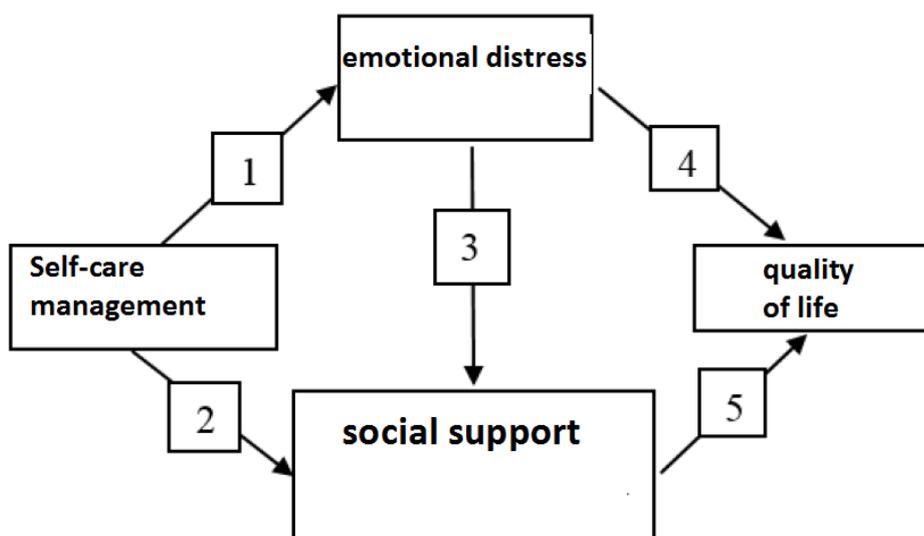


Figure 1.1. Hypothesized Path Model of Self-care management

The following hypotheses will be tested in the present study:

Hypothesis 1: quality of life will be related to;

(a) emotional distress (Path 1)

(b) social support (Path 2)

Hypothesis 2: (a) emotional distress will be related to (b) social support (Path 3).

Hypothesis 3: Self-care management will be related to;

(a) emotional distress (Path 4).

(b) social support (Path 5)

Hypothesis 4: quality of life will be related to Self-care management indirectly;

(a) through emotional distress (Path 1 and Path 4)

(b) social support (Path 2 and Path 5)

(c) through emotional distress , and social support (Path 1, Path 3 and Path 5)

Research Design

This study investigates theoretically proposed relationship between quality of life and Self-care management as mediated by emotional distress , and social support. This is a quantitative correlational , cross-sectional study investigating the strength and direction of relationships among proposed variables.

Participants

A convenience sampling method was used to recruit the participants. They were from Unit of diabetes and endocrine in department of Internal Medicine Buraidah Central Hospital, Qassim University Medical City, and University medical clinics. The sample was composed of 340 patients students. They aged 19 and 21 years with a mean of 20.4 and a standard

deviation of 5.12. In order to be included in this study, patients should meet the following criteria: (i) 40 years and above; (ii) diabetes diagnosis of 12 months, and (iii) insulin non-dependent. The instruments were delivered to the unit staff (doctors and nurses) in order to be administered. They were 230 males (77.1%) and 100 females (22.9%).

Data collection Instruments

Diabetes quality of life Questionnaire (Al-Qerem, Al-Maayah & Ling, 2022). The questionnaire is composed of 29 items divided into 3 factors: satisfaction (10 items), impact (10 items) and worries (9 items divided into social/vocational and diabetes-related). The satisfaction and impact questions included a 5-point Likert scale [very satisfied (1 point), quite satisfied, satisfied, little satisfied, and very dissatisfied (5 points)]. The communalities ranged between 0.45 and 0.95 and the loadings from 0.65 to 0.98. Cronbach's α indicated good internal consistency in all 3 factors. Test-retest reliability was tested by using Pearson's correlations and all the items had a correlation > 0.8 , which indicated good test-retest reliability.

Diabetes Self-Management Questionnaire (DSMQ, Schmitt et al., 2016). It is a 16 items four-point Likert scale (3- 'applies to me very much' to 0- 'does not apply to me'). Item scores are transformed so that higher scores indicate more desirable self-management behaviour (requiring reverse-scoring of negatively-keyed items) and summed/transformed to five scale scores with ranges from 0 to 10 (Schmitt, Gahr et al., 2013). The scales reflect patients' dietary control (4 items), medication adherence (2 items), blood glucose monitoring (3 items), physical activity (3 items) and physician contact (3 items). Reliability coefficients were observed as follows: dietary adherence 0.82; medication adherence 0.79; blood glucose

monitoring 0.85; physical activity 0.81; appointment adherence 0.79. For convergent validity of Diabetes Self-Management Questionnaire, correlation with Arabic Version of the Diabetes Self-Management Questionnaire (Kaddech et al., 2022) was significant ($r = 0.66, p < .01$).

Diabetes Emotional Distress Scale (Schmitt et al., 2016). A 17-item, 6-point Likert scale. It has four sub-dimensions with 17 items: five items for emotional burden, four items for physician distress, five items for regimen distress, and three items for inter-personal distress. For each item, scores range from 1 to 6 (1 not a problem, 2 a slight problem, 3 a moderate problem, 4 a somewhat serious problem, 5 a serious problem, or 6 a very serious problem). Each sub-scale was scored separately by averaging the total score of the sub-scale, while the total score is generated by averaging all item responses. The Cronbach's α coefficient of the Arabic version of the Scale ranged from 0.82 to 0.89.

Data Collection Procedure

Before data collection procedure of the study, all participants provided written informed consent prior to enrolment in the study. Ethical code of Qassim University in KSA was followed. Then, the researcher contacted to school principals and psychological counselors of the target schools and informed them about the purpose and procedure of data collection of the study. The researcher asked to be allowed to attend classes to administer of the scales. Parents filled in the consent form and their children returned in the administration day. A voluntary participation form was also obtained from the students. Students were requested not to write their names, IDs or any other personal information on the survey package provided to them to guarantee confidentiality of the provided information.

The main data for the study (n =340) was collected.

Data Analyses

After completing the data collection process, initially, data screening procedures for normality were examined. In order to test the model fit indices and path coefficients of the proposed model for the relationship between quality of life and Self-care management as mediated by emotional distress, and social support, path analysis through AMOS 18 software was used.

Results

Assumptions of the Path Analysis

There are assumptions for path analysis should be checked first : adequate sample

size and univariate normality, . First, For the appropriate sample size in path analysis, Kline (2015) proposes that minimum number of 200 cases should be reached to conduct path analysis with model testing. There are adequate number of cases (N=340) in the current study ensuring this assumption. In order to check univariate normality for variables, Skewness and Kurtosis values for each scale were calculated. Skewness and Kurtosis values between ± 3 are recommended acceptable ranges for normality assumption. In Table 1. Skewness and Kurtosis values of the each measure are presented. accordingly, it can be proposed that univariate normality indicators for each scale fall between the suggested ± 3 ranges confirming the assumption of normality.

Table 4.1. Skewness and Kurtosis Values of the Variables of Study

Variable	Skewness	Kurtosis
Health –related quality of life scale	-.24	.09
Diabetes Self-Management Questionnaire	-.12	-.04
Diabetes Distress Scale	-.28	-.24
Social Support Scale	-.55	.29

Descriptive Statistics

Descriptive statistics of means and standard deviations for each variable were computed. The results for descriptive statistics are presented in Table 2. As shown, the mean score for quality of life

was found 37.27with a standard deviation of 6.3. The mean score for Self-Management was found 28.01 with a standard deviation of 8.6. ,for Diabetes Distress was 63.21with a standard deviation of 7.2, and for Social Support was 56.25 with a standard deviation of 8.7.

Table 2. Means and Standard Deviations for Variables

Variable	M	SD
quality of life	37.27	6.3
Self-Management	28.01	8.6
Diabetes Distress	63.21	7.2
Social Support	56.25	8.7

Correlations

Inter-correlations among the exogenous variable of quality of life, mediator variables of emotional distress, and social support and endogenous variable of Self-Management were examined through Pearson product-moment correlation coefficients. The results for correlation analyses are presented in Table 3. As shown, bivariate correlations between quality of life, Self-care management, emotional distress, and social support were presented. The endogenous variable of Self-Management was found to be Table 3. Inter-correlations between Variables

Variable	1	2	3	4
1. Self-care Management				
2. social support	.40**			
3. Diabetes Distress	-.60**	-.66*		
4. quality of life	.43**	.44**	-.42**	

significantly and related to exogenous variables of quality of life ($r = .43, p < .001$) and mediator variables of social support ($r = .44, p < .001$) and emotional distress ($r = -.42, p < .001$). The exogenous variable of Self-Management was also found out to be significantly and positively related to the mediator of social support ($r = .40, p < .001$) while negatively related to Diabetes Distress ($r = -.60, p < .001$). Besides, the relations among mediators also showed a significant negative relationship between social support and Diabetes Distress ($r = -.66, p < .001$).

Path Analysis for Self-care management Model

In this study, path analysis was used for testing a model of Self-care management through quality of life as exogenous variable and social support and Diabetes Distress as mediators. Model fit indices of chi-square value (χ^2), normed chi-square index (χ^2/df), root-mean-square error of approximation (RMSEA), the comparative fit index (CFI), Tucker-Lewis index (TLI), and the goodness of fit index (GFI), were used to test the goodness of fit of the proposed model. The goodness of fit indicators emerged for the proposed model

and acceptable ranges for model fit indices used in this study are presented in Table 4. chi-square value was found non-significant ($\chi^2(1) = 2.1, p = .18$) indicating a good fit for the model. normed chi-square value as expected to be lower than 3 was calculated as 2.1, also indicating an acceptable fit over the proposed model. RMSEA value was found .04 as in the acceptable range. Indicators of comparative fit index CFI and Tucker Lewis Index (TLI) values were found to be 1.00 and .99 respectively that also fall above the criterion value of .90 for a good fit. Goodness of fit index (GFI) was calculated 1.00 proposing a perfect fit of the data for the generated model.

Table 4. Model Fit Indices for the Proposed Model

Goodness of Fit Indexes	Model Fit Indices of the Proposed Model
χ^2, df	2.5; 1
χ^2/df	2.5
CFI	1.00

TLI	.99
RMSEA	.04
GFI	1.00

Standardized path coefficients for each path proposed in Figure 1. show that coefficients between the paths range from .33 to -.46. Quality of life has direct effects in social support ($\beta=.47$) and Emotional Distress ($\beta=-.44$). In addition, both Emotional Distress ($\beta=-.35$) and social

support ($\beta=.33$) have direct effects of endogenous variable of Self-care Management. Regarding the direct paths tested in the proposed model, all five paths were found significant in the proposed model.

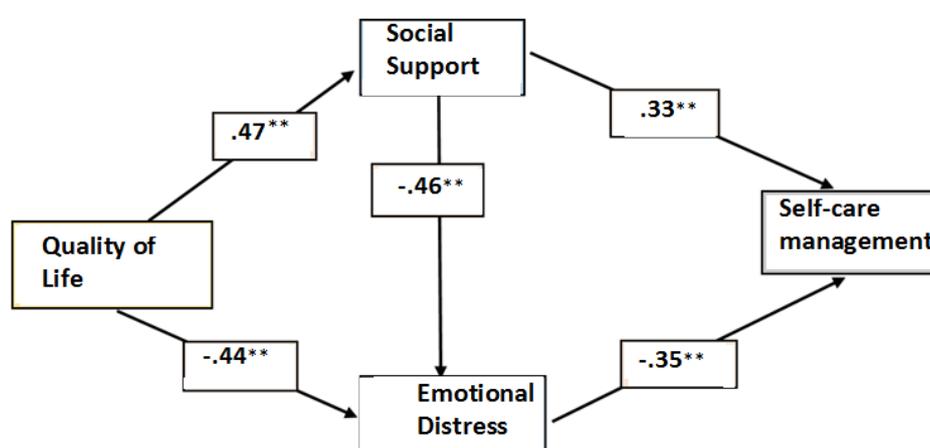


Fig.1. Standardized path coefficients for the proposed model

As shown in table 5., all the direct and indirect paths were significant ($p=.01$ level)

Direct and Indirect Relationships

Table 5. Standardized Total, Direct, and Indirect Estimates of the Proposed Model

Paths	Standardized Estimates (β)
quality of life \longrightarrow Self-care Management	
Indirect (Total)	.34**
Indirect by social support	.20**
Indirect by Emotional Distress	.22**
Indirect by social support and Emotional Distress	.18**
social support \longrightarrow Self-care Management	
Direct	.24**
Emotional Distress \longrightarrow Self-care Management	
Direct	-.31**

Discussion

The aim of the present study is to test a proposed model for the relationship between quality of life and Self-care management as mediated by emotional distress, and social support among college students with type 2 diabetes. A mediational model was tested to see the direct effects of quality of life on emotional distress, and social support. The interaction of social support to emotional distress was also tested in the proposed model. Moreover, direct relations of social support and emotional distress to Self-care management were also examined. To test the proposed relationships between variables, path analysis was performed to examine the fit of the proposed model as well as the specific relationships hypothesized in the study.

The results of Path analysis showed that all of the hypothesized relationships are supported by the data. The model fit indices also showed that the proposed model perfectly fits the data obtained in the study. This finding of the study is consistent with many other studies. For instance, Ting et al. (2011) demonstrated diabetes distress was significant associated with glycemic control, obesity and quality of life. Zhu, Fish, Li, Liu, Lou (2016) indicated that diabetes distress and self-efficacy were related to HRQoL.

Quality of life is positively and directly related to social support. In other words, as Quality of life levels of participants increase social support also increase and vice versa. This finding of the study is consistent with the literature of the effect of social support on Type 2 diabetes. Many experimental studies have described the effect social support interventions have on the self-management of T2DM patients (Aikens, Rosland, Piette, 2015; individuals who receive such support can obtain advice on means of coping with

related difficulties and can enjoy positive communication concerning diabetes care.

The results are in congruent with those obtained by Liu, Tai, Hung, Hsieh, Wang (2010), who found that emotional distress was the most important explanatory factor of quality of life, accounting for 28.7%-53.8% of total variance. The more severe the emotional distress, the worse quality of life scores were in every domain.

The results are also in congruent with those obtained by Li, Kun, Yan, Qiuli, Dan and Xuemei (2021) who suggest that both higher levels of social support and diet self-efficacy are related to higher levels of diet self-management. The mediating effect that diet self-efficacy has on the relationship between social support and diet self-management was significant.

Studies show that peer and/or professional support can be effective in increasing people's adherence to diet and exercise management in diabetes (oftedal, bru & karlsen, 2011). Several studies have indicated that social support from HCPs, family and friends is considered as a significant factor in diabetes management (Miller & Davis 2005, Paul et al. 2007, Tang et al. 2008).

These findings go in the same line with Elkady (2019) who indicated that there were significant correlations between self-care management, emotional distress, self-efficacy and health-related quality of life. The independent variables (Self-Care Management, Emotional Distress and Self-Efficacy) when put together yielded a coefficient of multiple regression (R) of 0.450 and a multiple correlation square of 0.435.

Conclusion

Diabetes is a complicated illness that requires individual patient to adhere to various recommendations in making day-to-day choices in regard to diet, physical movement, and medications. This study is one of few reported that has investigated the relationship between quality of life and Self-care management as mediated by emotional distress , and social support among college students with type 2 diabetes. The responsibility of clinicians in advancing self-care is imperative and ought to be highlighted. Parental support in disease management leads to an effective change in patients' glycaemic control. Early concerns and active management are imperative for drafting management plans that inclusive of self-management education, dietary follow up, physical activity and behavior alteration to optimize blood glucose and diminish diabetes-related complications.

Strengths And Limitations

The present study has multiple strengths. The study provides a comprehensive framework to elucidate the relationships between quality of life and Self-care management as mediated by emotional distress , and social support among college students with type 2 diabetes. This is the first study to examine the mediation role of emotional distress , and social support on the relationships between quality of life and Self-care management among college students with type 2 diabetes, and verify the indirect and direct effect . Finally, well-validated and specific instruments were used to measure these variables.

This study is not without limitations. First, cross-sectional design data prevents conclusions about the causal mediation . Second, The study sample was from only one geographic area; that is, Buraidah . Thus, the findings may not generalize to

more diverse populations. Third, although we used well-validated and specific instruments, self-report measures may have introduced recall and social desirability bias.

Conflict of interest

No conflict of interest has been declared by the author.

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