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Health locus of control and quality of life in diabetes mellitus: A cross-sectional study

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Abstract
Background: Diabetes mellitus (DM) is an important global health problem. The aim of this study was to assess the impact of self-efficacy, health locus of control, demographic and clinical predictors on the level of quality of life among patients with type 2 DM as well as to explore the association between these variables.
Methods: A community sample of 50 DM out clinic patients completed the Greek versions of the Missoula VITAS Quality of Life Index, the General Self-Efficacy Scale, the Multidimensional Health Locus of Control Scale and a questionnaire with demographic and clinical characteristics. Statistical analysis was performed using IBM SPSS Statistics version 20. The statistical significance level was set up at 0.05.
Results: There was a statistically significant correlation between self-efficacy and total quality of life score ($r=0.34$, $p<0.05$) and its dimensions "Interpersonal" ($r=0.391$, $p<0.01$) and "Transcendent" ($r=0.362$, $p<0.01$). There was no statistically significant correlation between the Health Locus of Control and quality of life. Significant but moderate correlations were found between the total score of quality of life and education ($r=0.307$, $p<0.05$), the total score of quality of life and height ($r=0.34$, $p<0.05$).
Conclusions: Self-efficacy and type of treatment were among the predictors of quality of life. The more the self-efficacy increases, the more the quality of life and some of its dimensions increase. Health Locus of Control may not be associated with quality of life.

Keywords: Diabetes mellitus, self-efficacy, health locus of control, quality of life

1. Introduction
Daily living of patients with diabetes mellitus (DM) can be quite tough and demanding. For all patients with DM daily measurement of blood glucose level, treatment via pills and/or insulin injections, dietary restrictions and exercise program are required. Regular medical tests including hemoglobin A1c (HbA1c) test, which measures blood glucose levels over a period in the past, are necessary [1].
Taking the above into consideration, DM patients not only face the risk of premature death but also experience relatively poor quality of life (QoL) compared to healthy individuals. A survey [2] of medical expenditure for a period of 10 years (2002-2011) in the US revealed that for patients with diabetes, the improvement of the patients' physical and mental QoL not only positively affected the individual's life but also created significant savings for the whole health care system.
Predictors of QoL can be demographic, clinical or psycho-social. Examining the role of demographic variables, researchers reported that gender can be a key predictor of QoL [3]. Females' results were significantly worse compared to males and this was true not only among patients with diabetes but also for the general population. Their finding is supported by the outcome from ENTRED study [4] in France among 2832 patients, and also from surveys in the US [5] and in Greece [3]. As far as the age of the patients is concerned, results varied by QoL dimension examined. Researchers found decreased QoL scores among older respondents [3] while others reported significantly lower QoL only for those patients aged 80 or more [5]. DM patients who were not married or of lower educational and socioeconomic status had reduced QoL [3-5].
Research findings on the negative effect of DM complications on patients' QoL are consistent, especially when two or more complications are present.

DM complications were included in the most important predictors of QoL [3]. Microvascular complications (vision impairment, foot ulcer, kidney disease or dialysis and amputation) were associated with decreased QoL levels [4]. Patients with comorbidities such as hypertension or hyperlipidemia have reduced health status scores and impaired QoL compared to the rest [3, 6] while patients with cardiovascular disease and DM had poorer QoL compared to the patients with cardiovascular disease only [7].

Treatment of type 2 diabetes with insulin was found to be a determinant of QoL in France [4]. However, researchers reported that they observed some indication of worse QoL when patients switched from diet only, to oral agents and insulin [8].

When it comes to the impact of the duration of DM on QoL, there are no - conclusive findings [8]. However, reduced QoL was found for respondents suffering from DM for more than ten years [3, 5]. Assessing the role of body weight, as expressed in relation of height with Body Mass Index (BMI) and HbA1c levels, findings from surveys and reviews of the literature showed that obese patients having BMI = 30 or above, or with high HbA1c levels (above 7,5%) reported worse QoL. Specifically, researchers confirmed that elevated HbA1c had a negative effect on QoL, especially in studies which used a diabetes disease-specific measurement scale for QoL [9, 10]. A negative effect of obesity on QoL is, also, reported by others [3, 4]. Reviewing the role of psycho-social variables including self-efficacy and health locus of control, studies concluded that they can be strong predictors of QoL, even more, powerful than demographic or clinical variables. Regarding self-efficacy, it refers to how confident is an individual in his/her ability to undertake a specific behavior [11]. In a study [12] with 459 patients with type 2 DM in South Korea, an important contribution of self-efficacy to self-care activities affecting QoL of diabetics was found. Also, in Taiwan researchers [13] explored the impact of various predictors on HbA1c levels, as empowerment perceptions, self-care behaviors, self-efficacy, and health literacy. They found that HbA1c was influenced by self-care behaviors and self-efficacy. As far as health locus of control is concerned, it is a multi-dimensional construct developed on 1976 [14-15]. The previous researches improved the initial study [16] according to which the term locus of control (LC) to describe that people learn to expect outcomes to be determined either by internal factors they can control by themselves, by their beliefs or behaviors or by external factors such as luck. This construct of Rotter was unidimensional in a continuum from the internal to the external LC [17]. LC is actually a multi-dimensional construct with internal and external control not correlated with one another; therefore a respondent can score high or low on both dimensions [14-15]. Based on the above, we hypothesized that self-efficacy, locus of control, demographic and clinical characteristics may be strong predictors of QoL among DM patients. In order to test these hypotheses, the aim of this study was to assess the impact of self-efficacy, health locus of control, demographic and clinical characteristics in predicting QoL and the possible relationship between these variables (self-efficacy, health locus of control and QoL) among out clinic adults with type 2 DM patients in Athens, Greece.

2. Materials and methods

This was a cross-sectional survey among adults with type 2 DM either visiting their private doctor in his/her office (not in a hospital) or belonging to organizations of DM patients living in the broad area of Athens, Greece. The study was conducted between June-August 2018.

To conduct the study a participant information letter, a consent form with the questionnaire and a non-transparent envelope were provided to eligible respondents. The information letter presented the subject and the objective of the study and explained that the data will be used for research purposes only. It declared that participation is voluntary and anonymous, the respondents' right to withdraw at any time up to return the questionnaire and provided contact information in case of any questions or ethical issues. Procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2013.

2.1 Participants

The inclusion criteria were: age 18-65 years old; (iii) ability to write and read the Greek language; having DM under treatment for >1 year. Patients with limited self-care or psychiatric disorders were excluded from the survey.

Through direct contact with health care professionals who were aware of adults with type 2 DM, a total number of 100 questionnaires were distributed and 23 questionnaires were returned (23% response rate). Furthermore, due to low response rate, with the valuable help of the Hellenic Diabetes Federation (http://www.elodi.org/) and Pan-Hellenic Federation of Associations of People with Diabetes Mellitus (http://glikos-planitis.gr/), an additional number of 50 questionnaires were distributed to their members and 29 completed questionnaires were returned. Overall, out of 150 questionnaires which were distributed, 52 were collected, a response rate of 35%. After data editing and checking of all questionnaires, two questionnaires were rejected (4%) due to missing data in the majority of HLC and MVQoLI-15 statements. A final set of 50 responses was used in the analysis of results.

2.2 Instruments

To measure self-efficacy, the General Self-Efficacy Scale (GSE) was used. It consists of 10 statements (numbered from 1 to 10) assessing the level of truth as judged by the respondent. Scores for each statement range from 1 ("not at all true") to 4 ("absolutely true"). The higher the score, the higher the level of self-efficacy. The minimum score is 10 and the maximum score is 40. The scale has been translated and validated for Greek patients [18].

Health locus of control (HLC) was evaluated using the Multi-dimensional Health Locus of Control Scale,14 as translated and adapted to the Greek language [19, 20]. The instrument contains 18 items assessing four dimensions; "Internal HLC" (6 items) "Chance" (6 items), "Doctors" (3 items) and "Important Others" (3 items). Scores for each statement range from 1 ("strongly disagree") to 6 ("strongly agree"). The higher the score, the higher the level of LC in the dimension where the statement belongs. For "Internal" LC and "Chance" sub-scales the minimum score is 6 and the maximum score is 36. For "Doctors" and "Important Others" dimensions, the minimum score is 3 and the maximum score is 18 [20].

QoL was assessed using the revised version of Missoula Vitas Quality of life Index-15 (MVQoLI-15) [21], as

translated and adapted for Greek patients [22]. The scale contains 16 items; the first item is used for evaluation of the overall Quality of life level (global score) using a 5-point Likert scale from 1 ("Very Poor" QoL) up to 5 ("Very Good" QoL). Remaining 15 items cover the five domains with three items per domain and for all items, the rating is provided using a 5-point Likert scale. The domains are Symptoms, Function, Well-Being, Interpersonal and Transcendence. The first item on each domain covers an assessment of the domain with scores from -2 to +2. The second item of the domain evaluates the level of satisfaction with actual status for the specific domain, and scores range from -4 to +4. The third statement of each domain assesses the importance of the domain to the respondent with scores from 1 to 5. Quality of life rating for each domain is obtained by adding the scores of the first two items (Assessment+Satisfaction) and multiplying by the score given in the third item (importance). The higher the result, the better the QoL level in the specific domain. Minimum score for a domain's QoL is -30: ((-2) + (-4)) x 5, and maximum score is 30: ((+2) + (+4)) x 5. The total weighted QoL score of the scale is the sum of the five sub-scores of the domains divided by 10 and then adding 15. (QoL total) = (QoL1+QoL2+QoL3+QoL4+QoL5)/10 + 15 with values ranging from 0 (minimum) up to 30 (maximum). Psychometric properties of the Greek version were tested among Greek hemodialysis patients [23].

In addition to the aforementioned scales, demographic (gender, age, education, and marital status) and clinical characteristics (body weight, height, number of years with DM, type of treatment, blood glucose level, HbA1c, presence of comorbidities/complications and estimated time spent per week on physical activities) were, also, included.

2.3 Data analysis

To describe the quantitative variables, the mean values, and standard deviations were used. To describe the qualitative variables absolute (N) and relative (%) frequencies were used. Spearman's (r) correlational tests were used on the study variables to explore patterns of correlations. As a first step, a correlations' matrix for all demographic and clinical variables, self-efficacy, health locus of control dimensions and quality of life was produced and used in the screening and selection of the final set of predictors to be considered in the main analysis. Assessment of the strength of selected predictors was performed using hierarchical multiple linear regression. Statistical analysis was performed using IBM SPSS Statistics version 20. The statistical significance level was set up at 0.05.

3. Results

The demographic and clinical characteristics of the participants are presented in Table 1. Mean scores and standard deviations of Quality of Life, Self-efficacy and Health Locus of Control are presented in Table 2.

Before evaluating the strength of all variables in the prediction of QoL, a correlation matrix of all possible predictors' variables was produced in SPSS in order to identify pairs of variables with very strong significant correlation (above 0.70) and make necessary actions to reduce the risk of multicollinearity. Results did not identify any predictors very strongly correlated with each other with the exception of BMI with weight which was removed and BMI was retained.

Gender, as a categorical predictor with two levels, was treated as a dummy variable, and those predictors with more than two levels, specifically, marital status and type of treatment, were converted to dummy variables as recommended [24]. After the changes mentioned above, a table with the correlation coefficients of the revised list of predictors (including dummy variables) with the QoL scores was prepared. Table 3 shows the correlations found.

Significant but moderate correlations were found among education and QoL Total Score, height and QoL Total. Moderate correlations but not significant were found between age and total QoL, HbA1c value and total QoL, treatment using pills and insulin vs. insulin only with Total QoL. No significant correlations of any predictor were found with the QoL global score.

In table 4 all correlations among the dimensions of the scales used in this study, Self-Efficacy, Health Locus of Control (4 dimensions) and MVQoLI-15 (5 dimensions, Global Score, and Total Score) are presented. There was a statistically significant correlation between self-efficacy and total QoL Score, "Interpersonal" and "Transcendent". Therefore, the more the self-efficacy increases, the more Total QoL Score, "Interpersonal" and "Transcendent" dimensions increase. There was no statistically significant correlation between the total score or dimensions of QoL and Health Locus of Control score.

Hierarchical multiple linear regression analyses with 2 blocks, was carried out to predict total Quality of Life scores, based on our initial hypotheses, the findings from the literature review and the strongest correlations found in this study. In the first block, age, height, and education level were introduced together, then in the second block, self-efficacy, HbA1c and the dummy variable of treatment with pills and insulin vs. insulin only, were added. Due to the relatively small sample size, only a few predictors (5-6 for large effect size [24]) could be tested in order to avoid reducing the power of the study and take the risk to experience type II error.

The overall model for predicting quality of life was significant, ($F [6,43] = 2.92$, $p = 0.018$), explaining 29% of the variance in total QoL Scores ($R2 = 0.29$; Adjusted $R2 = 0.19$). On block 1, with age, height and education variables, the model was not significant, ($F [3,46] = 2.42$, $p = 0.078$), $R2 = 0.14$; Adjusted $R2 = 0.08$ and none of the variables used was significant. On block 2, the result after adding self-efficacy, HbA1c and type of treatment "with pills and insulin vs. insulin only", the model was significant, ($F [3,43] = 3.09$, $p = 0.037$), R2 change = 0.15 and among the predictors used, one was found to be significant: treatment with pills and insulin compared to insulin only, ($B = -0.284$, $t = -2.05$, $p = 0.046$) indicating that total QoL scores by the patients who are treated only with insulin were relatively higher compared to diabetics who are treated with pills and insulin. A summary of results is presented in Table 5.

4. Discussion

The key objective of this study was to evaluate the impact of self-efficacy, locus of control, demographic and clinical variables in predicting QoL level among adults outpatients with type 2 DM in Greece in the region of Attiki.

The mean scores of the MVQoLI-15 in each domain show that the dimensions of "Interpersonal" & "Transcendence" received the higher scores, with patients rating very high the importance of having close relationships and to the

"Meaning of life". In the opposite direction, the lower scores produced in Well-being, Symptoms, and Function. Diabetes symptoms' burden has a clear negative affect among patients bringing pain, limitations in functionality and deterioration of well-being. In these domains, negative scores (dissatisfaction) in the second statement that were multiplied by the strong importance (third statement), attributed to the domain by patients, have created very low, or even negative mean domain scores. Relief from symptoms and improving functionality will have a positive effect on patients and will improve scores.

Self-efficacy had a strong positive correlation with the total QoL score and was among the predictors used in the hierarchical regression model. The construct of self-efficacy and its proven strong correlation with QoL can be helpful for vulnerable patients with DM. In our aging population, older patients will require more support and care to manage life with DM. Strengthening of patients' self-efficacy was shown that acts positive also on self-care activities [12, 25].

The higher level of education also positively correlated with total QoL score and confirmed findings from other studies on the negative effect of low education and socioeconomic status on QoL [5, 26, 27].

The significant correlation of height with QoL came as a surprise since the focus was on weight and BMI. Logically, it could make sense since the taller a person, the lower the calculated BMI for the same weight.

Examining the findings from the use of the multidimensional health locus of control scales there was no significant correlation of the internal locus of control dimension with total QoL score. On the contrary, internal health locus of control was the only significant predictor of QoL among HIV-patients [28]. In general, findings during the development of health locus of control scales were not so optimistic compared to the predictive strength of the construct of self-efficacy attributing their relatively lower expectations to the lack of control in the value of health from the respondents which was not evaluated by the tool.

Respondents rated internal locus of control very high and this was also the case with the Doctors dimension. In fact, those two dimensions were significantly correlated. This can be explained by the important role of the doctor for a patient with diabetes [29]. Especially, older populations seek advice and support from the doctor who can monitor medical tests and suggest treatment type and frequency for better control of glucose and HbA1c. Therefore, despite the high scores on the internal dimension, patients cannot manage their living without the important guidance of their doctor. In support to our finding, the authors [14] who developed the multidimensional health locus of control instrument during the phase where the external dimensions of doctors and important others were considered as one dimension "powerful others", they have examined the results of a study assessing medication adherence. Commenting on the existence of high scores both on internal dimension and on the dimension of powerful others, they have stated that "patients with chronic conditions, such as DM, might be most compliant if they entered on to a partnership with their health care providers, a partnership which combines internal health locus of control beliefs with belief in control by powerful others".

It was hypothesized that gender, the presence of diabetes' complications, type of treatment, self-efficacy, and internal locus of control would be the strongest predictors of quality of life. The hypothesis that gender significantly predicts QoL was not supported. This was not expected based on the findings of other studies [7, 30]. However, not only the sample size is relatively small for detecting small differences but also, the MVQoLI-15 is a purely subjective instrument where actually the respondent defines what is important or not for her/him and this rating on each of the five domains is a multiplier giving increased weight to the total rating of the domain. Furthermore, in a major study in Greece using the Greek version of a diabetes-specific QoL tool for the first time, it was, also, found no difference in QoL by gender.[31] The researcher argued that one possible explanation may be that males in recent years tend to express their feelings and possible worries, also addressing concerns for the quality of life more open than in the past.

Results fully confirmed our hypothesis on the type of treatment, specifically, with insulin only, compared to the combination of pills and insulin, as a significant predictor of total QoL score. On the other hand, there was no evidence for gender, internal health locus of control and presence of complications as predictors of QoL.

Among the key limitations of the study is the relatively small size of the sample that reduced the number of the predictors to be used in the hierarchical regression model. Patients with type II diabetes are quite older than the average population (in this study mean age was 61 years, almost 20 years higher than the average population).

Another limitation is the paper form of the research questionnaire and the self-completion method. Although the specific method was selected to enable older patients, especially those aged above 75, without access or experience with the internet, to participate in the study, there were issues with delays in the completion and return of the questionnaires.

5. Tables

Table 1: Demographic and clinical characteristics of the total sample (N=50).

		Frequency	%	Mean (SD)
Gender	Male	22	44	
	Female	28	56	
Age (Years)				61.3 (13.8)
Education	Secondary	5	10	
	Lyceum	17	34	
	College	6	12	
	Technological Education	7	14	
	University	8	16	
	Post Graduate	7	14	
Marital Status	Single	10	20	
	Married without Children	1	2	
	Married with Children	28	56	
	Divorced/ Widowed	11	22	

Treatment	Pills Only	24	48	
	Insulin Only	14	28	
	Pills+Insulin	12	24	
Comorbidities	None	22	44	
	Hypertension	13	26	
	CaD	6	12	
	CaD+Hypertension	9	18	
Complications	None	29	58	
	Foot	7	14	
	Eyes	5	10	
	More than one	6	12	
	More than two	3		
Weight (Kg)				81 (8.1)
Height (Cm)				168 (7.9)
BMI				28.7 (3.1)
Glucose Level (mg/dL)				145.14 (21.2)
HbA1c (%)				7.0 (1.7)
Duration of Diabetes Mellitus (Years)				14 (11.3)
SD= Standard Deviation, CaD=Cardiovascular Disease, BMI=Body Mass Index				

Table 2: Mean scores and standard deviations of Quality of Life, Self-efficacy and Health Locus of Control in the total sample (N= 50)

	Mean score	SD
MVQoLI-15 Global score (Global QoL)	3.60	0.76
Symptoms	3.02	8.95
Function	.50	10.09
Interpersonal	10.68	13.99
Well-being	-5.34	12.27
Transcendent	8.92	11.20
Total score (Total QoL)	16.78	3.34
Self-efficacy	29.48	5.98
MHLC - Internal locus	27.26	5.97
MHLC – Chance	16.56	6.55
MHLC – Doctors	15.36	3.13
MHLC – Important others	10.44	2.87

SD= Standard Deviation, MHLC=Multidimensional Health Locus of Control

Table 3: Statistically significant correlations of predictors with quality of life scores

Predictor Variables	Quality of life total score
Education	0.31*
Height	0.34*
Self-efficacy	0.34*

* Correlation is significant at the 0.05 level (2-tailed)

Table 4: Correlations between the dimensions of QoL, Self-efficacy and Health Locus of Control

		Self-Efficacy	HLC Internal	HLC Chance	HLC Doctor	HLC Important Others	QoL Global	QoL Total	QoL Symptoms	QoL Function	QoL Interpersonal	QoL Well-being	QoL Transcendent
Self- Efficacy	r	1	0.204	0.026	0.096	0.166	0.247	0.340*	0.067	0.086	0.391**	0.030	0.362**
	P		0.155	0.859	0.506	0.249	0.084	0.016	0.642	0.555	0.005	0.834	0.010
HLC Internal	r	0.204	1	0.014	0.552**	0.144	0.195	0.067	0.055	-0.134	-0.022	0.123	0.169
	P	0.155		0.923	0.000	0.320	0.174	0.644	0.705	0.355	0.878	0.394	0.240
HLC Chance	r	0.026	0.014	1	-0.092	0.283*	-0.168	0.054	-0.056	0.055	0.141	0.045	-0.069
	P	0.859	0.923		0.527	0.046	0.243	0.710	0.698	0.705	0.328	0.759	0.634
HLC Doctor	r	0.096	0.552**	-0.092	1	0.018	0.200	0.134	0.198	-0.037	0.000	0.157	0.104
	P	0.506	0.000	0.527		0.899	0.164	0.352	0.167	0.796	0.998	0.278	0.474
HLC Important Others	r	0.166	0.144	0.283*	0.018	1	-0.002	-0.123	0.059	-0.050	0.098	-0.242	-0.226
	P	0.249	0.320	0.046	0.899		0.990	0.394	0.686	0.730	0.499	0.090	0.115
QoL Global	r	0.247	0.195	-0.168	0.200	-0.002	1	0.247	0.333*	-0.091	0.113	0.141	0.256
	P	0.084	0.174	0.243	0.164	0.990		0.084	0.018	0.530	0.434	0.328	0.072
QoL Total	r	0.340*	0.067	0.054	.134	-.123	0.247	1	0.665**	0.415**	0.617**	0.600**	0.649**
	P	0.016	0.644	0.710	0.352	0.394	0.084		0.000	0.003	0.000	0.000	0.000
QoL Symptoms	r	0.067	0.055	-0.056	0.198	0.059	0.333*	0.665**	1	0.126	0.384**	0.211	0.360*
	P	0.642	0.705	0.698	0.167	0.686	0.018	0.000		0.385	0.006	0.141	0.010
QoL Function	r	0.086	-0.134	0.055	-0.037	-0.050	-0.091	0.415**	0.126	1	0.080	0.160	-0.041
	P	0.555	0.355	0.705	0.796	0.730	0.530	0.003	0.385		0.579	0.267	0.778
QoL Interpersonal	r	0.391**	-0.022	0.141	0.000	0.098	0.113	0.617**	0.384**	0.080	1	-0.002	0.212
	P	0.005	0.878	0.328	0.998	0.499	0.434	0.000	0.006	0.579		0.989	0.139
QoL Well being	r	0.030	0.123	0.045	0.157	-0.242	0.141	0.600**	0.211	0.160	-0.002	1	0.382**
	P	0.834	0.394	0.759	0.278	0.090	0.328	0.000	0.141	0.267	0.989		0.006
QoL Transcedent	r	0.362**	0.169	-0.069	0.104	-0.226	0.256	0.649**	0.360*	-0.041	0.212	0.382**	1
	P	0.010	0.240	0.634	0.474	0.115	0.072	0.000	0.010	0.778	0.139	0.006	

*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

Table 5: Hierarchical multiple linear regression of Total QoL scores as the criterion variable on to self-efficacy, age, education, height, HbA1c value and treatment with pills and insulin vs. insulin only predictor variables

Block	Predictor Variables	Beta	t	Sig
1	Age	-0.038	-0.217	0.829
	Education	0.143	0.752	0.456
	Height	0.243	1.417	0.163
2	Self-efficacy	0.164	1.151	0.256
	Treatment with pills and insulin vs. insulin only	-0.284	-2.052	0.046
	HbA1c	0.243	-1.815	0.077
R^2 =0 .14, Adjusted R^2 = 0.08, ANOVA: F (3,46)= 2.42, p=0 .078 for Block 1; ΔR^2 = 0.15, ANOVA: F(3,43)= 3.09, p=0 .037 for Block2; R^2 =0.29, Adjusted R^2 = 0.19, ANOVA: F(6,43)= 2.92, p= 0.018 whole model.				

6. Conclusions

Strengthening patients' self-efficacy will enable more vulnerable patients to better control diabetes, reduce the risks of complications and improve their QoL. Health care professionals can offer valuable help in the implementation and evaluations of tailor-made programs for the improvement of self-efficacy and self-care management of patients. Further research in Greece could focus on the developing and testing of new training and communication tools that will educate the citizens and help in the prevention and management of the disease in cooperation with doctors, nurses, the ministry of health and the local communities. In that direction, learning for a multi-national study regarding psychosocial issues in diabetes and patient-centered care for DM can be inspiring.

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8. References

1. Strachey R. Catalogue of the Plants of Kumaon and of the Adjacent Portions of Garhwal Trikkalinou A, Papazafiropoulou AK, Melidonis A. Type 2 diabetes and quality of life. World Journal of Diabetes. 2017; 8(4):120-129.
2. Campbell JA, Bishu KG, Walker RJ *et al*. Trends of medical expenditures and quality of life in US adults with diabetes: the medical expenditure panel survey, 2002-2011. Health and Quality of Life Outcomes. 2017; 15(1):70.
3. Papadopoulos AA, Kontodimopoulos N, Frydas A, Frydas A, Ikonomakis E, Niakas D. Predictors of health-related quality of life in type II diabetic patients in Greece. Bio Med Central Public Health. 2007; 7:186.
4. Bourdel-Marchasson I, Druet C, Helmer C *et al*. Correlates of health-related quality of life in French people with type 2 diabetes. Diabetes Research and Clinical Practice. 2013; 101(2):226-235.
5. Wexler DJ, Grant RW, Wittenberg E, Bosch JL, Cagliero E, Delahanty L *et al*. Correlates of health-related quality of life in type 2 diabetes. Diabetologia. 2006; 49(7):1489-1497.
6. Wermeling PR, Gorter KJ, Van Stel HF, Rutten GE. Both cardiovascular and non-cardiovascular comorbidity are related to health status in well-controlled type 2 diabetes patients: a cross-sectional analysis. Cardiovascular Diabetology. 2012; 11:121.
7. Shah B, Deshpande S. Assessment of effect of diabetes on health-related quality of life in patients with coronary artery disease using the EQ-5D Questionnaire. Value in Health Regional Issues. 2014; 3:67-72.
8. Rubin RR, Peyrot M. Quality of life and diabetes. Diabetes/Metabolism Research and Reviews. 1999; 15(3):205-218.
9. Dogan H, Harman E, Kocoglu H, Sargin G. Can metabolic control variables of diabetic patients predict their quality of life? Journal of the American Society of Hypertension. 2016; 10 (1):81-88.
10. Kamarul Imran M, Ismail AAA, Wan Mohamad WB, Naing L. Type 2 diabetes mellitus patients with poor glycaemic control have lower quality of life scores as measured by the Short Form-36. Singapore Medical Journal. 2010; 51(2):157-62.
11. Bandura A. Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review. 1977; 84(2):191-215.
12. Lee EH, Lee YW, Moon SH. A structural equation model linking health literacy to self-efficacy, self-care activities, and health-related quality of life in patients with type 2 diabetes. Asian Nursing Research. 2016; 10(1):82-7.
13. Lee YJ, Shin SJ, Wang RH, Lin KD, Lee YL, Wang YH. Pathways of empowerment perceptions, health literacy, self-efficacy, and self-care behaviors to glycemic control in patients with type 2 diabetes mellitus. Patient Education and Counseling. 2016; 99(2):287-94.
14. Wallston BS, Wallston KA. The development and validation of the health related locus of control (HLC) scale. Journal of Consulting and Clinical Psychology. 1976; 44(4):580-5.
15. Wallston KA, Wallston BS, DeVellis R. Development of the Multidimensional Health Locus of Control (MHLC) Scales. Health Education Monographs. 1978; 6(2):160-70.
16. Rotter J. Generalized expectancies for internal versus external control of reinforcement. Psychology Monographs. 1966; 80(1):1-28.
17. Albery IP, Munafò M. Key concepts in health psychology. SAGE Publications, London, Ltd, 2008, 125.
18. Glynou E, Schwarzer R, Jerusalem M. Greek adaptation of the Generalized Self-Efficacy Scale. Washington, DC: Hemisphere, 1994. http://userpage.fu-berlin.de/~health/greek.htm, 06/06/2019
19. Theofilou P. Self-esteem in Greek dialysis patients: The contribution of health locus of control. Iranian Journal of Kidney Disease. 2012; 2(6):136-40.
20. Kassianos AP, Symeou M, Ioannou M. The health locus of control concept: Factorial structure, psychometric properties and form equivalence of the Multidimensional Health Locus of Control Scales. Health Psychology Open, 2016, 1-10.

21. Byock IR, Merriman MP. Measuring quality of life for patients with terminal illness: the Missoula-VITAS quality of life index. Palliative Medicine. 1998; 12(4):231-44.
22. Theofilou P, Kapsalis F, Panagiotaki H. Greek version of MVQOLI-15: Translation and cultural adaptation. International Journal of Caring Sciences. 2012; 5(3):289-94.
23. Theofilou P, Aroni A, Ralli M, Gouzou M, Zyga S. Measuring health related quality of life in hemodialysis patients. Psychometric properties of the Missoula-VITAS Quality of Life Index (MVQOLI-15) in Greece. Health Psychology Research. 2013; 1:e17:74-8.
24. Field A. Discovering Statistics using SPSS. 3rd ed. Sage Publications Ltd., London, 2009.
25. Al-Amer R, Ramjan L, Glew P, Randall S, Salamonson Y. Self-Efficacy, depression, and self-care activities in adult Jordanians with type 2 diabetes: The role of illness perception. Issues in Mental Health Nursing. 2016; 37(10):744-55.
26. You J, Wang C, Yeung NCY, Lu Q. Socioeconomic status and quality of life among Chinese American breast cancer survivors: The mediating roles of social support and social constraints. Psycho-oncology. 2018; 27(7):1742-49.
27. Hassan M, Musa N, Abdel Hai R, Fathy A, Ibrahim A. Assessment of health-related quality of life in Egyptian adolescents with type 1 diabetes: DEMPU survey. Journal of Pediatric Endocrinology and Metabolism. 2017; 30(3):277-83.
28. Mostafavian Z, Abbasi Shaye Z, Faraj Pour A, Hosseini G. The data on health locus of control and its relationship with quality of life in HIV-positive patients. Data in Brief. 2018; 18:1967-71.
29. Burke SD, Sherr D, Lipman RD. Partnering with diabetes educators to improve patient outcomes. Diabetes Metabolic Syndrome and Obesity: Targets and Therapy. 2014; 7:45-53.
30. Raghuvansh Kumar, Pawan Krishan, Roopkamal Jhajj. Health-related quality of life and factors affecting it in type-2 diabetic nephropathy patients: a cross sectional observational study. International Journal of Research in Medical Sciences. 2016; 4(5):1511-1517.
31. Pisimisis T. Quality of life of people with diabetes mellitus in Greece. Degree Diss., University of Central Lancashire, London, 2013.