# THE SELF-MANAGEMENT ACTIVITIES, HEALTH LITERACY AND HEALTH-RELATED QUALITY OF LIFE OF PATIENTS WITH TYPE 2 DIABETES: A STRUCTURAL EQUATION MODELLING IN VIET NAM

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### INTRODUCTION

- T2D ranks among the top ten leading causes of mortality, exerting substantial effects on patients' quality of life and imposing a substantial burden on healthcare systems and society at large.
- Vietnam is facing a rapid increase in the prevalence of diabetes, which is similar to other developing countries. The number of individuals with diabetes has significantly risen from 2.5% in 2007 to 6.1% in 2021 (approximately 3.994 million people).
- People with diabetes encounter various challenges in their daily lives, such as engaging in physical activities, and adhering to lifelong medication regimens, while also facing the risk of complications if not well-managed
- The American Diabetes Association has also emphasized HRQOL as one of the primary treatment goals alongside preventing complications
- Understanding the predictive factors and identifying risk factors affecting HRQOL is essential for developing comprehensive intervention and treatment strategies for patients with diabetes.

### **OBJECTIVES**

Utilizing Structural Equation Modeling (SEM) to determine the relationships among socio-demographics, health literacy, self-efficacy, self-care activities, and health-related quality of life (HRQOL) in patients with type 2 diabetes (T2D)

### METHODS

### **STUDY DESIGN**

We conducted a cross-sectional single-center study based on data collected directly from patients with T2D receiving outpatient treatment at Thong Nhat Hospital (Ho Chi Minh City) from May 15th, 2023, to May 26th, 2023.

### **STUDY POPULATION AND DATA COLLECTION**

The sample size was calculated based on the consensus that for Structural Equation Modeling (SEM) analysis, the sample size should be 5-10 times the number of estimated parameters. As the study involved estimating 35 parameters, a minimum of 165 participants was deemed necessary. To accommodate potential dropouts, 200 participants were invited to participate in the survey. Participants who (1) had psychiatric disorders, (2) were pregnant, (3) were unable to respond, did not consent to participate were excluded.

- HRQOL was evaluated with the EQ-5D-5L questionnaire, which consists of two parts. Part 1 comprises five questions assessing Mobility (MO), Self Care (SC), Usual Activities (UA), Pain/Discomfort (PD), and Anxiety/Depression (AD). Part 2 involves EQ-VAS visual analogue scale, where patients rate their health from 0 (worst) to 100 (best).
- Diabetes self-care activities were assessed using the Summary of Diabetes Self-Care Activities (SDSCA), which measures the frequency of six aspects over the past 7 days: general diet, specific diet, exercise, blood glucose testing, foot care, and smorking. Respondents score their adherence to the self-care activities within the past week, ranging from 0 to 7 days.
- Diabetes management self-efficacy was gauged using The Diabetes Management Self-Efficacy Scale (DMSES), consisting of 20 items across four dimensions: Specific nutrition and Weight control, General nutrition and Medical control, Physical activity, Blood glucose control. Respondents are rated on a 5 point scale ranging from 'can't do at all' to 'certain can do'. DMSES higher scores equate with higher personal expectations of his/her ability to initiate and comply with diabetic self-management.
- Health literacy was evaluated using the Health Literacy Scale, which includes 14 items across Functional health literacy, Communicative health literacy, Critical health literacy. Respondent's options have been changed from a 4-point scale that indicates how often the item happens to them ('never' to 'often').

### STRUCTURAL EQUATION MODELLING

The SEM analysis utilized the maximum likelihood estimation method to evaluate the goodness of fit of the hypothesized model against multiple criteria, including the chi-square (c<sup>2</sup>) test, goodness-of-fit index (GFI) greater than .90, comparative-fit index (CFI) greater than .90, normed-fit index (NFI) greater than .90, standardized root mean square residual (SRMR) less than .08, and root mean square error of approximation (RMSEA) less than 0.05. The structural relationships among constructs in the final SEM model were examined through regression weights. Variables with a p-value less than 0.05 were excluded from the model. Additionally, standardized regression weights were employed, retaining variables with factor loadings equal to or greater than 0.5. **DATA ANALYSIS** 

### The statistical analysis of the patient-reported measurements were performed using SPSS software version 20. Additionally, AMOS software version 24 was employed to construct SEM determine the relationships between various factors and HRQOL.

### RESULTS

Characteristics	N (%) or mean (SD)
Age (years), mean (SD)	65.23 (10.923)
Gender (male), n (%)	116 (53.2%)
BMI (kg/m <sup>2</sup> ), mean (SD)	23.66 (2.71)
< 25	151 (69.3%)
Education status	
Below high school	47 (21.6%)
High school	59 (27.1%)
Vocational school	12 (5.5%)
College	10 (4.6%)
University	88 (40.4%)
Postgraduate	2 (0.9%)
Employment status	
Unemployed/Dependent family/Retired	177 (81.2%)
Manual labor	26 (11.9%)
Intellectual work	15 (6.9%)
Health insurance	
None	2 (0.9%)
80%	72 (33.0%)
95%	58 (26.6%)
100%	86 (39.4%)
Marital status (married)	201 (92.2%)
Living situation	
Alone	15 (6.9%)
With a supportive family	177 (81.2%)
Without a supportive family	26 (11.9%)
Family history of diabetes	61 (28.0%)
Duration of diabetes (years), mean (SD)	10.94 (8.36)
Emergency department visits in the	
preceding 12 months	25 (11.5%)
Comorbidities	194 (89.0%)
Complications	163 (74.8%)
Insulin injection	47 (21.6%)
HbA1c < 7%	85 (39.0%)

#### STRUCTURAL EQUATION MODELLING



Figure.1 Structural equation modeling with standardized parameter estimates

### CONCLUSION

The study analyzed factors related to the HRQOL of T2D patients at Thong Nhat Hospital through the structural equation modelling. These factors include general characteristics of the patient, pathological characteristics, or behavioral attitudes in lifestyle. There are controllable factors such as physical exercise, diet, weight, and complications. There are effortfully or unalterable factors such as age, gender, education level, marriage, and living situation. Therefore, elderly patients, females, those with low education levels, singles, and lacking support need more attention when implementing T2D management.

PATIENT-REPORTED OUTCOMES										
			Mobility	Self Cai	'e	Usual Activities	Pain/ Discomfort	Anxiety/ Depression		
No problem	Leve	el 1	209 (95,9%)	214(9	8,2%)	213(97,7%)	134(61,5%)	177(81,2%)		
Having problem	Leve	12	6 (2,8%)	3(	(1,4%)	4(1,8%)	49(22,5%)	28(12,8%)		
	Leve	13	1 (0.5%)	0(	0.0%)	0(0.0%)	17(7.8%)	11(5.0%)		
			2 (0.9%)	0(	0.0%	0(0,0%)	15(6.9%)	1(0.5%)		
				1/	(0, 0, 0)	1(0,5%)	2(1,404)	1(0,5%)		
-			0 (0,0%)	I (	0,5%)	1(0,5%)	3(1,4%)	1(0,5%)		
	lota	al	4,1%		1,8%	2,3%	38,5%	18,8%		
			1	Mean (SD)	Μ	ledian (IQR)	Skewness	Kurtosis		
			71			20	0.507	0.102		
FO-5D			/ (	0 9218	1		-3.094	15 278		
SELF-CARE ACTIV	ITIES			0.0210	-		0.001	10.270		
		SDSCA_	_D1 5	.53 (2.817)	•	7.00 (0.00)	-1.448	0.128		
Diet		SDSCA_	_D2 5	.56 (2.791)	•	7.00 (0.00)	-1.479	0.226		
Diet		SDSCA_	_D3 2	.94 (3.396)		0.00 (7.00)	0.335	-1.869		
		SDSCA_	_D4 1	.79 (2.901)		0.00 (5.00)	1.064	-0.779		
Fxercise		SDSCA_	<u>E1 4</u>	.98 (3.068)	•	7.00 (7.00)	-0.932	-1.060		
		SDSCA_	<u> </u>	.92 (3.380)	•	7.00 (7.00)	-0.241	-1.907		
Self-monitoring c	of _	SDSCA_	<u>_S1 1</u>	.44 (1.139)		1.00 (0.00)	3.054	11.375		
blood glucose		SDSCA_	<u>_S2 1</u>	.44 (1.139)		1.00 (0.00)	3.054	11.375		
Foot care	_	SDSCA_	_F1 2	.15 (3.200)		0.00 (7.00)	0.842	-1.281		
	_	SDSCA_	<u>F2 1</u>	.72 (2.988)		0.00 (2.00)	1.189	-0.570		
Smoking		SDSCA_	<u> </u>	.12 (0.330)		0.00 (0.00)	2.300	3.318		
SELF-EFFICACY			ON14 0	47 (4,000)		F 00 (4 00)	0.500	1.040		
	_		<u>_SN13</u>	.47 (1.829)		5.00 (4.00)	-0.509	-1.643		
Specific nutrition			<u>_SINZ 3</u>	.47 (1.829)		5.00 (4.00)	-0.509	-1.643		
control factor	۔ ۱		_3N3 3 SN14 2	<u>.47 (1.829)</u> <u>47 (1.829)</u>		5.00(4.00)	-0.509	-1.043		
Controctactor	_		<u>_3114 3</u> SN5 1	.47 (1.029)		5.00 (4.00)	-0.309	-1.043		
		DMSES	<u>_5115 4</u> GN1 /	. <u></u>		5.00 (0.00)	-2.337	7 328		
		DMSES	<u>-ON1 4</u> GN2 3	93 (1 688)		5 00 (3 00)		-0 734		
	_	DMSFS	<u> </u>	.88 (1.749)		5.00 (4.00)	-0.988	-0.966		
General nutrition	-	DMSES	_ <u></u> GN4 3	.61 (1.866)		5.00 (4.00)	-0.654	-1.543		
factor and Medic	al –	DMSES	GN5 3	.15 (1.960)		5.00 (4.00)	-0.155	-1.960		
control factor		DMSES	GN6 4	.62 (0.953)		5.00 (0.00)	-2.792	7.116		
	_	DMSES	 _GN7  4	.73 (0.827)		5.00 (0.00)	-3.163	8.983		
		DMSES_	_GN8 2	.52 (1.923)		1.00 (4.00)	0.502	-1.744		
	_	DMSES_	_GN9 4	.03 (1.678)		5.00 (1.00)	-1.221	-0.459		
		DMSES_	_P1 4	.06 (1.673)		5.00 (1.00)	-1.277	-0.341		
Physical activity		DMSES_	_P2 1	.88 (1.623)		1.00 (0.00)	1.370	-0.072		
		DMSES_	_P3 3	.52 (1.845)		5.00 (4.00)	-0.536	-1.638		
Blood glucose co	ntrol -	DMSES_	_B1 4	.32 (1.400)		5.00 (0.00)	-1.780	1.409		
factor	-	DMSES	_B2 4	.31 (1.399)		5.00 (0.00)	-1.773	1.392		
	-	DMSES_	<u>_B33</u>	.78 (1.666)		5.00 (3.00)	-0.864	-1.044		
HEALTH LITERACY						4.00.(0.00)	4 00 4	0.050		
Functional health	_	HLS_F1	3	.47 (1.108)		4.00 (0.00)	-1.684	0.956		
	n –		პ 	.41 (1.149)		4.00 (0.00)	-1.510	0.398		
literacy	-	<u>піз_гз</u> ціс ел		.40 (1.100) <u>// (1.121)</u>		4.00 (0.00)	-1.073	0.930		
	_	HIS E5	 	.44 (1.131)		4.00 (0.00)	-1.650	0.876		
			1 2	<u>45 (1.103)</u>		2 00 (3 00)	0.056	_1 961		
	_	$\frac{10000}{1000}$	2 2	.46 (1.462)		2.00 (3.00)	0.051	-1.965		
Communicative	_	$\frac{100}{100}$	<u>-</u> 2 3 2	.46 (1.466)		2.00 (3.00)	0.046	-1.970		
health literacy		HLS Co	4 2	.39 (1.455)		1.00 (3.00)	0.148	-1.941		
	_	HLS Co	5 2	.40 (1.460)		1.00 (3.00)	0.125	-1.952		
Critical health liter		HLS Cri	1 2	.33 (1.469)		1.00 (3.00)	0.223	-1.937		
	_	HLS Cri	2 2	.14 (1.422)		1.00 (3.00)	0.494	-1.720		
	eracy -	HLS_Cri	3 2	.23 (1.454)		1.00 (3.00)	0.357	-1.858		
		HLS_Cri	4 2	.32 (1.462)		1.00 (3.00)	0.233	-1.924		

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