

Factors Predicting Self-Management Behavior among Patients with Uncontrolled Type 2 Diabetes Mellitus in Wenzhou, China*

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Abstract

Purpose: Effective self-management behavior is essential for improving glycemic control and preventing complications in patients with type 2 diabetes mellitus (T2DM). This study aimed to identify key predictors influencing the self-management behavior of patients with uncontrolled T2DM in Wenzhou, China.

Design: A predictive correlational design was used in this study.

Methods: A simple random sampling method was used to enroll 102 patients with T2DM from the First Affiliated Hospital of Wenzhou Medical University, Zhejiang Province, China. The study instruments included the Chinese version of the Diabetes Self-Management Questionnaire, the T2DM Knowledge Questionnaire, the Chinese Self-Efficacy for Diabetes Scale, and the Social Support Rating Scale. Data were analyzed using descriptive statistics, Pearson product moment correlation, and multivariate linear regression analysis.

Main findings: The self-management behavior scores of patients ranged from 10 to 42 ($\bar{X} = 27.34 \pm 6.69$). The average scores for T2DM knowledge, self-efficacy, and social support were 21.76 ± 6.28 , 106.75 ± 26.96 , and 32.27 ± 5.78 , respectively. Multivariate analysis revealed that self-efficacy was the only significant predictor of self-management behaviors among patients with type 2 diabetes mellitus ($\beta = .62$, $p < .001$). The model explained approximately 51% of the variance in self-management behaviors ($R^2 = .51$), and the overall regression model was statistically significant.

Conclusions and recommendations: Self-efficacy was a strong predictor of self-management behavior among patients with uncontrolled T2DM in Wenzhou. Nursing intervention focusing on self-efficacy enhancement with the integration of diabetes knowledge and social support may effectively strengthen self-management behaviors and improve patient outcomes.

Keywords: diabetes knowledge, self-efficacy, self-management behavior, type 2 diabetes mellitus

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ปัจจัยทำนายพฤติกรรมการจัดการตนเองของผู้เป็นเบาหวานที่ควบคุมระดับน้ำตาลในเลือดไม่ได้ เมืองเหวินโจว ประเทศจีน*

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บทคัดย่อ

วัตถุประสงค์: การจัดการตนเองอย่างมีประสิทธิภาพเป็นสิ่งจำเป็นในการควบคุมระดับน้ำตาลในเลือดและการป้องกันภาวะแทรกซ้อนในผู้ป่วยโรคเบาหวานชนิดที่ 2 ซึ่งการศึกษาครั้งนี้มีวัตถุประสงค์เพื่อศึกษาปัจจัยทำนายพฤติกรรมการจัดการตนเองของผู้ป่วยโรคเบาหวานชนิดที่ 2 ที่ควบคุมไม่ได้ ในเมืองเหวินโจว ประเทศจีน

รูปแบบการวิจัย: เป็นการศึกษาความสัมพันธ์เชิงทำนาย

วิธีดำเนินการวิจัย: การศึกษาครั้งนี้ใช้วิธีการสุ่มตัวอย่างเพื่อคัดเลือกผู้ป่วยโรคเบาหวานชนิดที่ 2 จำนวน 102 ราย จากโรงพยาบาล First Affiliated Hospital of Wenzhou Medical University, มณฑลเจ้อเจียง ประเทศจีน เครื่องมือที่ใช้ในการวิจัย ประกอบด้วย แบบสอบถามการจัดการตนเองโรคเบาหวาน แบบสอบถามความรู้เกี่ยวกับโรคเบาหวานชนิดที่ 2 แบบประเมินการรับรู้สมรรถนะของตนเองสำหรับโรคเบาหวาน และแบบประเมินการสนับสนุนทางสังคม วิเคราะห์ข้อมูลด้วยสถิติเชิงพรรณนา สัมประสิทธิ์สหสัมพันธ์ของเพียร์สัน และสถิติถดถอยพหุคูณ

ผลการวิจัย: คะแนนเฉลี่ยพฤติกรรมการจัดการตนเอง 27.34 (SD = 6.69) คะแนนเฉลี่ยของความรู้เกี่ยวกับโรคเบาหวานชนิดที่ 2 การรับรู้ความสามารถของตนเอง และการสนับสนุนทางสังคม เท่ากับ 21.76 (SD = 6.28), 106.75 (SD = 26.96) และ 32.27 (SD = 5.78) ตามลำดับ การวิเคราะห์แบบพหุตัวแปรพบว่า การรับรู้ความสามารถของตนเองเป็นตัวทำนายที่พฤติกรรมการจัดการตนเองในผู้ป่วยโรคเบาหวานชนิดที่ 2 ($\beta = .62, p < .001$) ตัวแปรทุกตัวสามารถร่วมกันอธิบายความผันแปรของพฤติกรรมการจัดการตนเองได้ร้อยละ 51 ($R^2 = .51$)

สรุปและข้อเสนอแนะ: การรับรู้ความสามารถเป็นปัจจัยทำนายพฤติกรรมการจัดการตนเองในผู้ป่วยเบาหวานชนิดที่ 2 ที่ควบคุมระดับน้ำตาลในเลือดไม่ได้ กิจกรรมการพยาบาลที่มุ่งเน้นการเสริมสร้างการรับรู้ความสามารถของตนเอง ร่วมกับการบูรณาการความรู้เกี่ยวกับโรคเบาหวานและการสนับสนุนทางสังคม อาจช่วยเสริมสร้างพฤติกรรมการจัดการตนเองและปรับปรุงผลลัพธ์ของผู้ป่วยได้อย่างมีประสิทธิภาพ

คำสำคัญ: ความรู้โรคเบาหวาน การรับรู้ความสามารถตนเอง พฤติกรรมการจัดการตนเอง เบาหวานชนิดที่ 2

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Background and Significance

Diabetes mellitus (DM) is a chronic metabolic disorder, with type 2 diabetes mellitus (T2DM) accounting for over 95% of all diabetes cases. It is characterized by persistent hyperglycemia, insulin resistance, and relative insulin deficiency, often presenting with symptoms such as polyphagia, excessive urination, unexplained weight loss, and fatigue. Globally, The number of patients with diabetes is expected to rise to 578 million (10.2%) by 2030 and 700 million (10.9%) by 2045.¹

Among the key risk factors for T2DM, lifestyle-related variables such as diet, sedentary behavior, and poor health habits play a major role. The increasing incidence of T2DM in younger adults has been linked to high-energy diets, physical inactivity, and other behavioral factors.² Diabetes self-management behavior including diet, exercise, medication, and stress management. Studies indicate that uncontrolled T2DM is often the result of poor adherence to self-management behaviors, leading to fluctuations in blood glucose levels and persistent DM symptoms. Effective self-management is a cornerstone of T2DM treatment, as it helps regulate blood sugar levels and minimize complications.³ The factors predicting self-management behavior have gained more attention as the key strategies for control blood glucose level. Huang, et al.⁴ conducted a survey of 200 patients with T2DM and

found that the improvement of diabetes knowledge had a positive effect on behavioral mastery. A person's level of self-efficacy could promote individual health behaviors. Indelicato, et al.⁵ had shown that self-efficacy had an effect on reducing depression and anxiety, which could possibly influence the therapeutic compliance.

Despite growing awareness, T2DM self-management in China remains an area in need of further investigation and improvement. Current research on self-management practices in China has largely been adapted from international models and questionnaires, lacking context-specific adaptations.⁶ Furthermore, existing studies primarily focus on conceptual discussions and current practices, rather than an in-depth analysis of the predictive factors influencing self-management. Additionally, factors such as geographic and demographic differences, disparities in healthcare access, and variations in health education outreach further contribute to challenges in self-management promotion. Given the regional disparities in China, public awareness and community-based services remain insufficient, leading to gaps in knowledge dissemination and self-care practices.

To address these concerns, this study aims to assess the current state of self-management among patients with T2DM using the Individual and Family Self-Management Theory (IFSMT). The Individual

and Family Self-Management Theory (IFSMT) is one of the theories applied in the field of self-management, it is a self-management theory developed by Irani, et al.⁷ on the basis of the integrated theory of Health Behavior Change, in this theoretical framework, the process dimension contains knowledge and beliefs factors, self-regulation skills and abilities factors, and social facilitation, while self-management behaviors exist in the outcome dimension. In this study, knowledge of diabetes, self-efficacy should be related to knowledge and beliefs factors in the theory, social support should be related to social facilitation in the theory, and diabetes self-management should be related to the outcome dimension in the theory. Therefore, it serves as the theoretical basis for this study and provides insights for developing self-management plans, identifying risks and protective factors for patient self-management. Additionally, the study seeks to analyze and predict key factors influencing self-management behaviors in this population. By identifying relevant predictors, the findings can contribute to enhancing self-management strategies, improving diabetes care, and informing healthcare interventions tailored to the Chinese context.

Objectives

To examine the predictive factors, including knowledge of diabetes, self-efficacy, and social

support of self-management behaviors among patients with uncontrolled T2DM in Wenzhou, China.

Research hypothesis

Knowledge of diabetes, self-efficacy, and social support can predict self-management behaviors among patients with uncontrolled T2DM in Wenzhou, China.

Methodology

The predictive correlational design was used to investigate the self-management behavior and its relationship with diabetes mellitus knowledge, self-efficacy, and social support among patients with uncontrolled T2DM in Wenzhou, China.

Participants and sample

In total, 102 patients with T2DM, who were admitted to the First Affiliated Hospital of the Wenzhou Medical University from December 2022 to February 2023, were enrolled in the study. The study subjects were selected by simple random technique at Endocrinology outpatient department. The inclusion criteria were as follows: aged 30-70 years; patients diagnosed with T2DM for ≥ 1 year; with hemoglobin A1C ≥ 7 ; those without any serious signs and symptoms including diabetic ketoacidosis, hyperosmolar hyperglycemic state, dyspnea, and hypoglycemia; and having oriented in time, place, and person. This study used a multiple regression model to analyze the effects of multiple factors on

the dependent variable. Based on G*Power 3.1 software, the effect size was set as $f^2 = .13$ (medium effect), the significance level $\alpha = .05$, and the test power $1-\beta = .80$. The calculated sample size was 88 cases. Considering comprehensively, the final sample size was determined to be 102 cases to ensure the stability of the model and the test power.

Research instruments

1. *The Diabetes self-management questionnaire in Chinese version*⁸ was used to assess DSM, which was modified from the DSMG developed by Schmitt, et al.⁹

There are five domains with total 16 items, as follows: glucose management, dietary control, physical activity health care use, and overall rating of self-care. Rating scale ranges from 0 (does not apply to me) to 3 (apply to me very much). The overall score was sum of dimensions. A higher score denoting the better self-management behavior level of the patient with T2DM⁸. In this study, the reliability with Cronbach's $\alpha = .83$.

2. *The Type 2 Diabetes Mellitus (T2DM) Knowledge Questionnaire*, developed by Yanyan, Jie and Jincheng¹⁰ consists of 34 items encompassing six domains: basic knowledge, diet, exercise, medication, appropriate behaviors, and complications. Each item assesses a specific aspect of diabetes-related knowledge within its respective domain. This scale demonstrated excellent reliability (Cronbach's $\alpha = .82$).

3. *The Chinese version of self-efficacy for diabetes scale*, translated by Peng, Cui and Li¹¹ from the original developed by Bijl, Poelgeest-Eeltink and Shortridge-Baggett¹². The scale containing 20 items. It assesses the extent to which respondents are confident they can manage their blood glucose diet and level of exercise. Responses are rated on 11-point scale ranging from "can't do at all (0) to certain can do (10). Possible scores range from 0 to 200 points with higher scores means greater self-efficacy. This scale demonstrated Cronbach's $\alpha = .94$.

4. *Social support rating scale (SSRS)*. This tool was developed by Xiao.¹³ The scale consists of 10 items across the following three dimensions: objective support, subjective support, and utilization of support, with the overall score of all items ranging between 11 and 66. A higher value indicated a higher level of social support.¹⁰ This scale demonstrated Cronbach's $\alpha = .75$.

Ethical considerations

This study was ethically reviewed and approved by the Institutional Review Board (IRB) of the University of Burapha in Thailand (IRB3-077/2565) and the First Affiliated Hospital of Wenzhou Medical University (KY2022-132). The contribution of living arrangements, social social support, and self-efficacy to self-management behaviors among individuals with heart failure: a path analysis. During the process, the patients' rights were respected and confidentiality

was ensured. After completing the entire thesis process, the completed questionnaires were destroyed.

Data collection

After passing the IRB and ethics applications of Burapha University and the First Affiliated Hospital of Wenzhou Medical University, as well as the approval of the outpatient data application, the author consulted outpatient cases and randomly selected and screened eligible patients based on the research sample. The patient underwent a survey in the outpatient health education room, signed an information consent form, and filled out a questionnaire. Five samples were provided daily, five days a week, to check the completeness and accuracy of the questionnaire, and to promptly supplement and record any tasks. All surveys and records were completed by researchers.

Data analysis

The data were imported into SPSS statistical software and analyzed, and the alpha (α) level was

set to .05. The data analysis methods were as follows:

1. Descriptive statistics, including mean, standard deviation, frequency and percentage, were used to describe demographic characteristics of the subjects and the study variables.

2. Multiple regression analysis was used to analyze the factors predicting self-management of patients with T2DM. Assumptions for the use of multiple regression analysis were met.

Findings

Demographic characteristics and medical condition history

In this study, 102 patients with uncontrolled T2DM were investigated, 59.8% were male; 45.1% were aged 60-69; 96.2% were married; 33.3% completed primary school level; 48% were self-employed; 54.9% had Farmers' health insurance; 38.2% earned \geq CNY5000 per month; 68.6% were living in rural areas; 64.7% had no religion, as shown in Table 1.

Table 1: Demographic characteristics of patients with uncontrolled T2DM (N = 102)

Characteristic	Number	Percentage
Sex		
Man	61	59.8
Woman	41	40.2
Age		
30-39	4	3.9
40-49	27	26.5
50-59	25	24.5
60-69	46	45.1

Table 1: (cont.)

Characteristic	Number	Percentage
Marital status		
Married	98	96.2
Single	2	1.9
Widowed	2	1.9
Educational level		
No school attainment	14	13.7
Primary school	34	33.3
Junior high school	25	24.5
High school / Technical secondary school	18	17.7
Junior college	4	3.9
Bachelor degree or above	7	6.9
Occupation		
Teacher	4	3.9
Civil servants	3	2.9
Workers	18	17.7
Farmers	13	12.8
Non-government organization	15	14.7
Self-employed	49	48.0
Medical expenses		
At his own expense	8	7.8
At public expense	3	2.9
Medical insurance for urban residents	21	20.6
Medical insurance for urban workers	14	13.8
Farmers' health insurance	56	54.9
Average household income (earning CNY per month of years)		
≤ 1000	11	10.8
1000-3000	21	20.6
3000-5000	31	30.4
≥ 5000	39	38.2
Home residence		
Rural areas	70	68.6
Urban town	32	31.4
Religion		
Yes	36	35.3
No	66	64.7

Medical conditions and disease-related data of the patients in this study included the number of complications, number of hospitalizations, and source of diabetes related knowledge. The majority of the study patients with T2DM had no complications

(78.5%); half of them had T2DM from 1 to 5 years; slightly more than half was never hospitalized due to diabetes (55.9%); More than half of the patients learned about diabetes through medical staff (59.8%). Details were shown in Table 2.

Table 2: Medical condition of patients with uncontrolled T2DM (N = 102)

Medical conditions	Number	Percentage (%)
Complication		
None	80	78.5
Retinopathy	3	2.9
Neuropathy	1	1.0
Nephropathy	3	2.9
Hypertension	7	6.9
Cardiovascular diseases and combination	8	7.8
Duration of diabetes		
1-5 Years	51	50.0
5-10 years	24	23.5
10-15 years	12	11.8
15-20 years	12	11.8
> 20 years	3	2.9
Hospitalization due to diabetes		
0 Times	57	55.9
1-2 times	33	32.4
3-5 Times	10	9.8
More than 5 times	2	1.9
Source(s) of DM related information		
Medical staff	61	59.8
Community health personal	13	12.8
Network	2	1.9
Book	1	1.0
Family	23	22.6
Friends	2	1.9

Descriptive analysis of self-management behavior, diabetes knowledge, self-efficacy, and social support status of patients with uncontrolled T2DM

Herein, the scores of self-management behavior in patients with T2DM ranged from 10 to 42 (average score: 27.34 ± 6.69). Notably, the scores of T2DM knowledge in patients ranged from 9 to 31

(average score of items: 21.76 ± 6.28), which was at a moderate level. The self-efficacy scores of patients with T2DM ranged from 52 to 174 (mean score of items: 106.75 ± 26.96), which was at the middle level.

Finally, the SSRS scores of patients with T2DM ranged from 18 to 54 (average score of items: 32.27 ± 5.78), which was at the middle level.

Detailed scores are presented in Table 3.

Table 3: Ranges, means, and standard deviations of the measurement of the study variables (N = 102)

Scale	Possible range	Actual range	\bar{X}	SD
Self-management of DM	0-48	10-42	27.34	6.69
- Blood glucose control	0-15	3-14	9.03	2.62
- Diet control	0-12	2-12	6.99	1.97
- Physical exercise	0-9	0-9	5.75	1.87
- Health care use	0-9	0-7	4.30	1.44
- Comprehensive evaluation	0-3	0-3	1.26	0.78
T2DM knowledge questionnaire	0-34	9-31	21.76	6.28
- Basic knowledge	0-6	2-6	3.13	1.63
- Dietary aspects	0-5	1-5	2.94	1.14
- Sports	0-5	1-5	3.52	1.11
- Drug knowledge	0-7	2-7	3.94	1.72
- Self-monitoring	0-5	1-5	3.80	1.31
- Complications	0-6	2-6	4.43	1.65
Self-efficacy	0-200	52-174	106.75	26.96
- Food and drink	0-100	12-80	44.97	16.36
- Take exercise	0-30	3-30	16.15	5.32
- Self-monitoring	0-40	8-40	23.80	5.54
- Medical treatment	0-30	9-30	21.82	3.75
Social support scores	7-64	18-54	32.27	5.78
- Subjective support	3-32	9-32	17.54	3.41
- Objective support	1-20	3-14	7.46	1.77
- Support utilization	3-12	3-12	7.27	2.12

Correlation analysis of self-management level and influencing factors in patients with T2DM

Pearson product moment correlations analyzed in this study revealed the positive

correlations between self-management behavior among patients with uncontrolled T2DM and diabetes knowledge ($r = .22, p < .01$), self-efficacy ($r = .67, p < .01$), and social support ($r = .29, p < .01$), as seen in Table 4.

Table 4: Correlation coefficients between the study factors and self-management (N = 102)

Variable	Diabetes knowledge	Self-efficacy	Social support	Self-management
Diabetes knowledge	1			
Self-efficacy	.31**	1		
Social support	.32**	.40**	1	
self-management	.22*	.67**	.29**	1

* $p < .05$, ** $p < .01$

Multiple linear regression analysis of factors influencing the self-management behavior of patients with uncontrolled T2DM

The multiple linear regression analysis in Table 5 revealed that self-efficacy was the only significant predictor of self-management

behaviors among patients with uncontrolled T2DM ($\beta = .62, p < .001$). Neither diabetes knowledge ($p = .294$) nor social support ($p = .985$) showed a statistically significant direct influence on self-management behaviors when controlling for the other variables in the model.

Table 5: Multiple linear regression analysis of factors influencing self-management behavior among patients with uncontrolled T2DM

	B	SE	β	t	p-value
(constant)	10.59	7.14		1.48	.142
Knowledge of Diabetes	.12	.02	.11	1.06	.294
Self-efficacy	.15	.02	.62	6.78	< .001
Social Support	.002	.11	.002	.02	.985

$R = .71, R^2 = .51, AdjR^2 = .41, F = 5.44, p < .01$

The model explained approximately 51% of the variance in self-management behaviors ($R^2 = .51$), and the overall regression model was statistically significant ($F = 5.442$, $p < .01$), indicating that a significant relationship exists between dependent and independent variables.

Discussion

The present study examined the predictive factors of self-management behaviors among individuals with uncontrolled T2DM using the Individual and Family Self-Management Theory (IFSMT) as the guiding framework. The findings revealed that self-efficacy was the strongest and only significant predictor of diabetes self-management behavior ($\beta = .62$, $p < .001$), whereas diabetes knowledge and social support were not significant predictors. The model explained 51% of the variance in self-management behaviors ($R^2 = .51$), emphasizing the central of self-efficacy in influencing diabetes self-management within the IFSMT context.

The strong predictive power of self-efficacy in this study supports the theoretical proposition that individuals who possess greater confidence in their ability to manage diabetes are more likely to perform self-care behaviors effectively and consistently. Self-efficacy influences self-management through self-regulatory processes, including goal setting, problem solving, and perseverance in the face of obstacles.¹⁴

Recent empirical studies reinforce this mechanism. A study by Juarez, et al.¹⁵ demonstrated that diabetes education and professional support improved self-care behaviors primarily through increases in self-efficacy, rather than knowledge alone. Similarly, a randomized controlled trial by Yu, et al.¹⁶ found that a nurse-led structured education program emphasizing mastery experiences and confidence building significantly improved self-efficacy, adherence behaviors, and glycemic control among newly diagnosed T2DM patients. Collectively, these studies and the present results affirm that self-efficacy is not merely an accompanying factor but a driving force in the translation of intention and knowledge into sustained behavior change.

Although both diabetes knowledge ($r = .22$, $p < .05$) and social support ($r = .29$, $p < .01$) were significantly correlated with self-management, neither factor significantly predicted self-management in the regression model. This pattern aligns with the IFSMT, which posits that contextual factors influence health behavior indirectly by shaping process mechanisms such as self-efficacy and self-regulation, rather than exerting direct effects.¹⁷

Knowledge provides the foundation for informed decision-making but it may be insufficient to produce action without accompanying confidence and skills. Patients may know what to do but lack the belief that they can consistently do it in the face

of daily challenges. In addition, Yang, et al.¹⁸ found that diet self-efficacy mediated the relationship between social support and diet self-management among individuals with T2DM, indicating that both knowledge and support translate into behavior primarily when they enhance confidence and self-regulatory capability. Likewise, Wang, et al.¹⁹ demonstrated that social support exerted indirect effects on self-management and quality of life through self-efficacy, underscoring that support's value lies in its ability to bolster internal confidence rather than merely provide external assistance.

Conclusions and Recommendations

The study revealed that confidence in managing diabetes-related tasks is a more critical determinant of effective self-management than mere knowledge acquisition or the availability of external support. Interventions to enhance self-efficacy should be prioritized in diabetes care programs. Strategies could include goal setting, problem-solving training, motivational interviewing, and reinforcement of successful self-management behaviors. For future research should explore other potential psychosocial or behavioral factors influencing self-management and evaluate interventions that simultaneously address knowledge, self-efficacy, and social support to optimize diabetes control.

Limitations

In this study, the age range of participants was relatively broad (30-70 years), encompassing individuals with varying life experiences, health literacy, and self-care capacities. This heterogeneity may have contributed to variability in self-management behaviors. Future studies may consider stratifying participants by age or focusing on specific age cohorts to gain more precise insights into age-related differences in diabetes self-management.

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