



**PSYCHOMETRIC EVALUATION OF THE
DIABETES SELF-MANAGEMENT INSTRUMENT
-SHORT FORM (DSMI-20)**

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DISCLOSURE SLIDE

- Author names

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- Learner objectives

(1) The learners could learn the process of developing and testing an instrument

(2) The learners can utilize the instrument verified in this study to assess the self-management behaviors of people with diabetes

- No conflict of interest

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OUTLINE

- Introduction & Purpose
- Methods
 - Process of Items Reforming
 - Pilot Test
 - Data Collection
 - Psychometric Evaluation
- Results
- Discussion and Conclusion

INTRODUCTION

- Diabetes is a life-long condition that cannot be cured, but can be controlled with medication and/or lifestyle modification
- Because self-management of diabetes is the cornerstone of overall diabetes management, a valid and reliable instrument is required for an accurate assessment of the patient's self-management efforts.

PURPOSE

- To revise and simplify the DSMI-35 in order to enhance its practicality in clinical settings.
- To evaluated the psychometric properties of the revised instrument.

METHODS

The short form instrument (**DSMI-20**) was created by revising our previous longer instrument (**DSMI-35**) through three phases:

Phase 1: Process of items reforming

Phase 2: Pilot Test

Phase 3: Psychometric Evaluation

DSMI-35

- DSMI-35 was composed of 5 factors:
 - Self-integration
 - Self-regulation
 - Interaction with health care providers and significant others
 - Self-monitoring of blood glucose
 - Adherence to the recommended regiment

PHASE 1:

PROCESS OF ITEMS REFORMING

- Small, in-depth group discussions
 - one group was comprised of 3 participants with diabetes who had university education level
 - one group was composed of 3 diabetes educators.

- Expert validity: 8 diabetes experts
 - 3 university professors who expertise in diabetes self-management and instrument development
 - 3 diabetes educators
 - 1 endocrinologist
 - 1 endocrinology nurse specialist

PHASE 2:

PILOT TEST

- A convenience sample of 50 patients with T2DM was recruited
- Inclusion criteria
 - (1) have a diagnosis of T2DM
 - (2) at least 18 years old
 - (3) able to communicate in Mandarin or Taiwanese
 - (4) willing to participate in the study
- On the basis of the item analysis results from the pilot study, 3 items with relevance less than 0.3 were removed.
- 35 items remained in the preliminary revised DSMI were score on a 4-pont Likert scare.

DATA COLLECTION

- Participants were recruited from the outpatient department and inpatient ward of a medical center and one outpatient clinic in southern Taiwan
- 237 patients with T2DM participated in the study

PHASE 3:

PSYCHOMETRIC EVALUATION

○ Validity

- Construct Validity : exploratory factor analysis
- Convergent validity: correlating the DSMI-20 with the diabetes empowerment scale

○ Reliability

- Internal consistency: Cronbach's alpha coefficient
- Test-retest reliability
30 volunteers with T2DM completed the questionnaire again 2 weeks after the first test

Results

PARTICIPANT DEMOGRAPHICS

- Mean age was 59.51 ± 12.55 years
- Mean diabetes duration was 9.10 ± 7.84 years
- 57.4 % were women
- 78.9 % married
- Education level
 - 29.5 % elementary education
 - 22.8 % senior high
 - 19.8 % junior high.
- 59.4 % had a family history of T2DM
- 64.6 % had additional chronic illnesses
- 48.9 % participants did not regularly self-monitor their blood sugar levels

RESULTS OF ITEM ANALYSIS

- 2 items were removed prior to the subsequent construct validity test
 - “Taking medications at the prescribed times”
 - “Taking the prescribed amount of medication”
- Reason for removing
 - had low item discrimination ($SD < 0.75$) and had factor loadings of less than 0.5.

RESULTS OF CONSTRUCT VALIDITY

- After the EFA, the final version of the revised DSMI consist of 20 items
- Covering 4 factors
 - communication with HCPs
 - self-integration
 - self-monitoring of blood glucose
 - problem-solving
- Explained 57.1103% of the total variance

RESULTS OF CONVERGENT VALIDITY

- Convergent validity
 - The correlation of the DSMI-20 with the diabetes empowerment scale was 0.552 ($p = .001$)

RESULTS OF RELIABILITY

- The internal consistency (Cronbach's α) was 0.925 for the total instrument ranged between 0.838 and 0.892 for the 4 factors
- The test-retest reliability with 2-week interval was $r = 0.790$ ($p = 0.001$)

EFA RESULTS AND CRONBACH'S ALPHA

Factor/ <i>Cronbach's alpha</i>	Factor loading
Factor 1: <i>Communication with HCPs</i> /<i>Cronbach's alpha</i>=0.892	
^b Comfortable telling HCPs about my struggles in managing diabetes	0.824
Comfortable discussing degree of flexibility in treatment plan with HCPs	0.786
Collaborating with HCPs to identify reasons for poor control	0.727
Comfortable asking HCPs questions	0.709
Comfortable discussing the modification treatment plan to fit lifestyle with HCPs	0.675
Comfortable asking HCPs about diabetes care resources	0.547
Factor 2: <i>Self-integration</i> /<i>Cronbach's alpha</i>=0.874	
Considering effect on blood sugar when making food choices	0.907
Managing food portions and choices when eating out	0.886
Managing food choices to control blood sugar	0.769
Managing diabetes and participating in social activity	0.737
Factor 3: <i>Self-monitoring of blood glucose</i> /<i>Cronbach's alpha</i>=0.858	
Monitoring A1c. to reach goals	0.750
Monitoring blood sugar levels to reach goals	0.714
^b Regularly testing my blood sugar levels	0.628
^b Set goals for my blood sugar control	0.567
Comparing differences between current and target blood sugar level	0.560
Factor 4: <i>Problem-solving</i> /<i>Cronbach's alpha</i>=0.838	
Acting in response to symptoms	-0.727
Testing blood sugar when feeling sick	-0.691
^b Increase the frequency of blood sugar tests when sick or under great stress	-0.678
Making decisions based on experience	-0.637
Recognize which signs and symptoms of high or low blood sugar	-0.535

^a Total scale: variance(%) 57.110%; *Cronbach's alpha* coefficients 0.925.

^b Represents new items developed in the study.

Discussion and Conclusion

DSMI-35 v.s. DSMI-20

DSMI-35 (original version)	DSMI-20 (short form)
Self-integration	Self-integration
Interaction with health professionals and significant others	Communication with HCPs
Self-monitoring blood glucose	Self-monitoring blood glucose
Adherence to recommended regimen	
Self-regulation	Problem solving

DISCUSSION

- In the DSMI-20, the factors of “communication with HCPs”, “self-integration”, and “self-monitoring of blood glucose” were retained, but the factor of “adherence to the recommended regiment” was deleted according to the results of factor analysis.
- The structures in the DSMI-20 verified by the EFA are same as those in the original DSMI-35 except one factor named “problem-solving” that actually was a result of “self-regulation” (Caltabiano, 2012) in the original DSMI-35.

DISCUSSION

- The revised DSMI consist of 20 items, thus reducing the original DSMI-35 by 43%.
- Based on our clinical testing, people with primary education level only spent 5 minutes to complete the instrument without requiring additional clarification.
- The mean score of difficulty of the instrument on a 10-point scale (1 = very difficult and 10 = very easy) was 8.02 ± 2.21 .

CONCLUSION

- The DSMI-20 is a valid and reliable instrument that is feasible for clinician adopting it to assess the self-management behavior of patient with diabetes.
- EFA is a data-oriented analysis.
Confirmatory factor analysis (CFA) is theory-oriented analysis and can truly explore the possible underlying factor structure of a hypothesized measurement model
- Next step:
Utilize CFA to examine the construct validity of the DSMI-20 further.

Thank you for listening