The Effect of Depression on Diabetes Self-management Behaviors in Older Adults with Type 2 Diabetes Mellitus:

An Empirical Test of the Information-Motivation-Behavioral Skills Model

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The prevalence of diabetes over age 65 in Korea has increased from 16.6 to 22.7% during the past 10 years.
Introduction

Diabetes Self-management
1. Healthy eating
2. Being active
3. Monitoring
4. Medication
5. Reducing risks
6. Problem solving
7. Psychosocial adaptation

Determinants
- Information
- Motivation
- Behavioral Skills

Theory
- Behavioral Change Theory
- Fisher & Fisher (1992)
- IMB Model
Problem statement

- It is necessary to investigate the factors which affect diabetes self-management.
- No study has examined the utility of the IMB model in diabetes self-management for older adults.
- There is limited knowledge about how depression affect self-management in older adults with type 2 diabetes mellitus.
Purpose

To empirically **test the Information-Motivation-Behavioral Skills (IMB) model** to predict diabetes self-management.

To examine **the effect of depression on diabetes self-management behaviors** in older adults with type 2 diabetes mellitus.
Theoretical Substruction

- **Constructs**
  - Concepts
  - Variables
  - Empirical indices

- **Determinants**
  - Depression
  - Information
  - Motivation

- **Outcomes**
  - Behavioral skills

- **Behaviors**

**Variables**
- Depression
- Diabetes knowledge
- Diabetes attitude
- Diabetes social support

**Empirical indices**
- GDS-5
- DKT
- DAS-3
- DFBC-II

**DSM* skills confidence**
- D-SMART Skills confidence
- D-SMART Current behaviors

*DSM, Diabetes self-management
Method

Design
A descriptive and cross-sectional study

Subjects
A total of 247 community-dwelling older adults with type 2 diabetes mellitus from a senior center in Seoul, Korea

Data collection
Using a structured questionnaire through one-on-one interviews
Method

Data analysis

Structural equation modeling

- To evaluate model fit and interrelationship between the IMB model constructs.
- To compare the IMB model with modified IMB model adding depression as an external variable to the IMB model (IMBD model).
## Result

### Characteristics of the Subjects (N=247)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories</th>
<th>n (%)</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td>76.3 (5.2)</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>175 (70.9)</td>
<td></td>
</tr>
<tr>
<td>Education level</td>
<td>≤ 6</td>
<td>106 (42.9)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7-12</td>
<td>109 (44.1)</td>
<td></td>
</tr>
<tr>
<td>Duration since diabetes diagnosis</td>
<td></td>
<td></td>
<td>10.6 (9.5)</td>
</tr>
<tr>
<td>Comorbidity</td>
<td>3-5</td>
<td>118 (47.8)</td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>≥ 2</td>
<td>74 (30.0)</td>
<td></td>
</tr>
</tbody>
</table>
The **IMBD model** provided better fit, explanatory power, and paths significance than IMB model.
### Model fit for the IMB and IMBD model

<table>
<thead>
<tr>
<th>Index</th>
<th>$\chi^2$ ($P$)</th>
<th>AGFI</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criteria</td>
<td>$p &gt; .01$</td>
<td>&gt;.90</td>
<td>&gt;.90</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>IMB Model</td>
<td>17.857 (.085)</td>
<td>.947</td>
<td>.913</td>
<td>.050</td>
</tr>
<tr>
<td>IMBD Model</td>
<td>18.448 (.187)</td>
<td>.952</td>
<td>.957</td>
<td>.036</td>
</tr>
</tbody>
</table>
Explanatory power

The **IMB model** constructs accounted for 24% of the variability in diabetes self-management behaviors.

The **IMBD model** constructs accounted for 51% of the variability in diabetes self-management behaviors.
Path diagram of the IMB model
Result 6

Path diagram of the IMBD model

- x1 \( \rightarrow \) DSM Information (\( \xi_1 \)) \( \overset{.843^{**}}{\rightarrow} \)
- x2 \( \rightarrow \) DSM Information (\( \xi_1 \)) \( \overset{.609^{**}}{\rightarrow} \)
- x3 \( \rightarrow \) DSM Information (\( \xi_1 \)) \( \overset{.608^{**}}{\rightarrow} \)
- x4 \( \rightarrow \) DSM Information (\( \xi_1 \)) \( \overset{.569^{**}}{\rightarrow} \)
- x5 \( \rightarrow \) DSM Information (\( \xi_1 \)) \( \overset{.126}{\rightarrow} \)
- x6 \( \rightarrow \) Depression (\( \xi_3 \)) \( \overset{.862^{**}}{\rightarrow} \)

- DSM Information (\( \xi_1 \)) \( \rightarrow \) DSM Motivation (Personal/Social) (\( \xi_2 \)) \( \overset{.367^{**}}{\rightarrow} \)
- DSM Information (\( \xi_1 \)) \( \rightarrow \) DSM Behavioral skills (\( \eta_1 \)) \( \overset{.614^{**}}{\rightarrow} \)
- DSM behavioral skills \( \eta_1 \) \( \rightarrow \) DSM Behaviors \( \eta_2 \) \( \overset{.192^{*}}{\rightarrow} \)

- DSM Motivation (Personal/Social) (\( \xi_2 \)) \( \rightarrow \) DSM Behavioral skills (\( \eta_1 \)) \( \overset{.614^{**}}{\rightarrow} \)
- DSM Motivation (Personal/Social) (\( \xi_2 \)) \( \rightarrow \) DSM Behaviors \( \eta_2 \) \( \overset{.432^{**}}{\rightarrow} \)
- DSM Behavioral skills \( \eta_1 \) \( \rightarrow \) DSM Behaviors \( \eta_2 \) \( \overset{-.206^{**}}{\rightarrow} \)
- DSM Behavioral skills \( \eta_1 \) \( \rightarrow \) DSM Behaviors \( \eta_2 \) \( \overset{.908^{**}}{\rightarrow} \)
- DSM Behavioral skills \( \eta_1 \) \( \rightarrow \) DSM Behaviors \( \eta_2 \) \( \overset{-.432^{**}}{\rightarrow} \)

- Depression (\( \xi_3 \)) \( \rightarrow \) DSM Behavioral skills (\( \eta_1 \)) \( \overset{-.207^{*}}{\rightarrow} \)
- Depression (\( \xi_3 \)) \( \rightarrow \) DSM Behaviors \( \eta_2 \) \( \overset{.853^{**}}{\rightarrow} \)

** \( p < .01 \), * \( p < .05 \)
Significant direct predictors (IMBD model)

Information
- Diabetes knowledge ($\beta = 0.092$, $p = 0.044$)

Behavioral skills
- Diabetes self-management skills confidence ($\beta = 0.432$, $p = 0.001$)

Depression ($\beta = -0.550$, $p < 0.001$)
Significant indirect predictors (IMBD model)

Motivation
- Diabetes attitudes ($\beta = .614, p < .001$)

Depression ($\beta = -.206, p = .009$)
Among the significant predictors, depression had the strongest influence on the diabetes self-management behaviors.
Consistent with the IMB model, having more motivation and having more behavioral skills was associated with performing diabetes self-management behaviors.

Information (diabetes knowledge) was not significantly related to diabetes self-management behaviors or behavioral skills.

It is possible that our measure lacked sufficient sensitivity to detect true information for diabetes self-management behaviors.
Discussion

This study provides evidence to support the modified IMB model (IMBD model).

The IMBD model posits that:
- Depression negatively affect diabetes self-management behaviors and behavioral skills.

Older adults with diabetes and depression should be closely monitored by periods.
The modified IMB model (IMBD model) could be used to predict and explain diabetes self-management behaviors among older adults with type 2 diabetes mellitus in Korea.

Depression impedes the diabetes self-management behaviors directly and indirectly through a decrease in behavioral skills confidence.
Conclusion

Practice implication
Diabetes education program should consider screening and managing depression in older adults to improve self-management behaviors.

Future direction
Future study should be conducted to investigate the longitudinal effects of information, motivation, behavioral skills, and depression on changes in diabetes self-management behaviors.
Thank you for attention!

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