



## A Predictive Model of Health Outcomes for Young People with Type 2 Diabetes



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### SUMMARY

**Purpose:** This study was conducted to develop and test a hypothetical model to predict health outcomes in young people with type 2 diabetes.

**Methods:** Data were collected from 190 adults aged 23–45 with type 2 diabetes mellitus who visited the endocrinology outpatient department of the two university hospitals in South Korea from November 2, 2012 to March 7, 2013. Data collection used the structured questionnaires and patient medical records. The descriptive and correlation statistics were analyzed using PASW 18.0 and structural equation modeling procedure was performed using the AMOS 18.0 program.

**Results:** The fit of the hypothetical model was appropriate with the ratio of the chi-square statistic to degrees of freedom at 17.00, goodness-of-fit index at .975, adjusted goodness-of-fit index at .930, root mean square error of approximation at .061, normed fit index at .926, Tucker-Lewis index at .929, comparative fit index at .966. Behavioral skills were a critical factor that directly affects self-management behaviors. Through behavioral skills, motivation had a statistically significant indirect effect on self-management behavior. Self-management behavior had a statistically significant direct effect on health outcome. Through self-management behavior, behavioral skills had a statistically significant indirect effect on health outcome. These variables explained 17.9% of the total variance for the health outcome in young people with type 2 diabetes.

**Conclusions:** The results suggest that self-management behavior could be improved through nursing interventions promoting personal motivation (positive attitude), social motivation (social support), and behavioral skills (self efficacy), which can result in better health outcomes for young people with type 2 diabetes.

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### Introduction

According to the International Diabetes Federation, the global population suffering from diabetes will increase by 51.1%, from 366 million in 2011 to 552 million people in 2030 [1]. Even in Korea, the prevalence of diabetes is estimated to rise to 61.6%, from 3.2 million in 2010 to 5.17 million people in 2030 [2]. In the past, type 2 diabetes, accounting for 90–95% of diabetes mellitus cases, has been regarded as a chronic disease occurring in people after their 40s.

However, as the onset age of the type 2 diabetes has been lowered steadily, the prevalence of the type 2 diabetes has been increasing in young people and even children [3]. This increase is associated with poor health habits of young people, such as western dietary patterns, more intakes of trans fats, decreasing physical activity, heightened stress, alcohol consumption, and smoking.

Furthermore, the early onset type 2 diabetes has distinctive clinical characteristics compared with diabetes in an older population. Specifically, the young people with type 2 diabetes has an even higher level of hemoglobin A1c and treatment with more insulin is frequently required at the time of initial diagnosis. In addition, the typical symptoms, such as polydipsia, polyuria, and decreases in weight, are displayed more obviously [3,4]. It is also reported that recovery time after the insulin treatment for patients

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who contracted diabetes before the age of 45 is slower than it is for patients who contracted diabetes after age 45 [5]. The patients who contracted diabetes before the age of 45 are also reported to be at an even higher risk for complications because they will be exposed to the disease for a longer time [5]. In other words, the lower onset age of type 2 diabetes has serious symptoms and a worse prognosis. Therefore, the patients suffering from type 2 diabetes at a younger age should put a consistent effort into managing their disease. However, it has been reported that blood glucose of young patients with diabetes was not controlled well. According to the Korea Health Statistics 2010, the rate of patients who have been diagnosed by doctors among those with diabetes was lower in younger group than in older age group: 80.5% of people over 65 years of age and 48.1–56.1% of those in their 30s and 40s [2]. In addition, it was reported that the young patients tend to control blood glucose, which maintains less than 6.5% of the level of hemoglobin A1c, more poorly than do older individuals: 34.5% of people over 65 years of age and 22.4–26.1% of those in their 30s and 40s [2]. This result may be explained by the developmental and social characteristics of the younger age group.

In general, type 2 diabetes cannot be controlled by medication alone. Change of lifestyle and health related behaviors, such as diet, exercise, self-monitoring of blood glucose and coping, foot care, and stress management, are required. Carrying out such self-management requires the patient's active participation and assertive coping. However, young patients are occupied with various developmental tasks, such as marriage, childbirth, parenting, and employment. Throughout these tasks, they experience changing roles in society and are focused on socioeconomic activities to establish a stable base [6]. On the other hand, they tend to neglect healthy life habits and decrease their interest in health because they are busy without the currently subjective symptoms [7]. Even some of the most conscientious patients, when faced with the competing life demands of the young adult period, will have difficulty giving their diabetes self-management a high priority [8]. In addition, young people with type 2 diabetes tend to spend a lot of time at work and must self-manage their illness within multiple social situations [9]. Excessive work and stress can have physical burdens, including tiredness, irregular life patterns, and a shortage of time, all of which can lead to the formation of poor health habits [10,11]. Furthermore, they have difficulty with dietary control because of the wide range of social activities structured around food, such as dining with work colleagues and get-togethers with friends [12]. Given these characteristics, young people with type 2 diabetes might find it hard to control their blood glucose on their own. In addition, the interests and demands of young patients would be different from those of the elderly [13]. Hence, to successfully manage health in young people with type 2 diabetes, it is necessary to understand their characteristics and needs, and to provide them with opportunities to learn self-management skills appropriate for their age [14].

Therefore, the purpose of this study was to provide the foundation for developing nursing interventions to improve the health of young people with type 2 diabetes through constructing and examining a hypothetical model to predict their health outcomes.

### *Theoretical framework*

This study constructed a hypothetical model based on the Information–Motivation–Behavioral Skills (IMB) model [15], which includes the necessary core determinants of health behavior change [16,17]. The IMB model suggests three prerequisite conditions for the initiation and maintenance of health behaviors: information, personal and social motivation, and behavioral skills [15,18,19]. The first prerequisite, information, refers to personal

knowledge about health behavior that includes accurate knowledge about specific self-management performance required or recommended. It also includes heuristic and implicit knowledge about diabetes self-management [19]. The second prerequisite, motivation, is composed of personal and social motivation. Personal motivation is an individual's attitudes and evaluations about the consequences of behavior change. In other words, it refers to the belief that the disease can be controlled by self-management behaviors. Social motivation is the perception of the social norms related to behavior change. It also refers to perceived social support from significant others with regard to performing specific self-management behaviors [15,19]. The third prerequisite, behavioral skills, refers to objective and perceived abilities for performing the complex health behavior and a sense of self-efficacy for doing so (i.e. one's confidence in implementing the behavior in a variety of settings) [19].

According to the IMB model, information is an essential ingredient as a behavioral guideline for the enactment of behavior change. However, information is not enough to initiate and maintain behavior change. In addition, motivation is needed to activate behavior change. Information and motivation interact because knowledge results in a change in attitudes toward the consequences of behavior, and, at the same time, the change of attitudes leads to the pursuit of knowledge. Simple behavior not requiring complex skills can be performed by using information about the behavior or the intention to perform without specific behavioral skills. The information and motivation in simple behavior can directly affect behavior change without behavioral skills. However, although a person has sufficient information and is motivated, specific behavioral skills are needed for performing complex behavior. The information and motivation of the individual are manifested as actual behavior through behavior skills. The IMB model identifies behavioral skills as a critical core determinant of complex health behaviors. Finally, health behavior change affects an individual's objective and subjective health outcome [17,19,20] (Figure 1). Therefore, this study constructed the paths on which information and motivation about diabetes self-management interact; they affect self-management behavior directly or indirectly through behavioral skills, and self-management behavior affects health outcome directly (Figure 2).

### **Methods**

#### *Study design*

This study used a cross-sectional design and structural equation modeling (SEM) to analyze the relationships among the variables related to health outcomes of young people with type 2 diabetes.

#### *Setting and samples*

This study was conducted at the outpatient department of endocrinology in two university hospitals in Korea. A convenience sample of 190 patients with type 2 diabetes was chosen from the patients who met the inclusion criteria, understood the purpose of this study, and consented to participate in this study. The specific inclusion criteria for the study were the following: (a) 23–45 years of age, (b) diagnosed with type 2 diabetes less than 5 years prior to the study, (c) no severe diabetes-related complications or other diseases (e.g., mental diseases, dementia), (d) no surgeries or hospitalizations within the past month, and (e) understood the purpose of this study and agreed to participate.

According to Levinson [21], early adulthood includes the ages between 17 and 45. However, the initial 5 years from 17 to 22 is

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