Longitudinal testing of the Information-Motivation-Behavioral Skills model of self-care among adults with type 2 diabetes

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A R T I C L E   I N F O

A B S T R A C T

Objective: The study's aim was to test prospective associations between information, motivation, and behavioral skills (IMB model) and self-care behaviors (diet, exercise, and blood glucose testing) among patients with type 2 diabetes.
Methods: 295 participants were surveyed one (T1), six (T2), and 12 (T3) months after a diabetes course. Cross-lagged panel analyses were performed to test unidirectional and bidirectional relationships between IMB model variables and self-care behaviors.
Results: Blood-glucose testing at T1 was positively related to information at T2, which in turn was positively related to blood-glucose testing at T3. Controlled motivation at T1 was positively related to exercise at T2. Autonomous motivation at T2 was positively associated with exercise at T3. There was a positive bidirectional relationship across time between behavioral skills and general diet.
Conclusion: Patterns of prospective associations between IMB model variables and diabetes self-care depend on the self-care behavior considered. This model offers an interesting framework for examining how diabetes self-care behaviors evolve.
Practice implications: Diabetes education programs should provide information about current health status and promote experiential learning to help patients realize the impact of their behaviors on glycemic control; should foster autonomous motivation for long-term change; and should build on patients' strengths and skills.

1. Introduction

Type 2 diabetes is a prevalent chronic disease. In 2010, approximately 285 million adults were diagnosed with diabetes worldwide, and this number is projected to double by 2030 [1]. Type 2 diabetes is the most frequent form of diabetes, affecting 90% of people with the illness [2]. Patients with type 2 diabetes need to adopt several self-care behaviors, including healthy diet, regular exercise, monitoring of blood sugar levels, and medication taking [3]. Self-care behaviors have been positively linked to glycemic control [4–6] and to reduced diabetes complications and mortality

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[7,8]. However, patient adherence to recommended self-care behaviors is sometimes low, especially in the long term [7].

Various models have inspired interventions attempting to enhance self-care behaviors among patients with type 2 diabetes or other chronic conditions [9,10]. The Information-Motivation-Behavioral Skills (IMB) model identifies three main determinants of health behaviors: information, motivation, and behavioral skills [11]. Information relates to knowledge about the medical condition and its regimen. Motivation consists of two factors: personal motivation, defined as a positive attitude toward self-care behaviors and a belief that those behaviors will be helpful, and social motivation, which includes perceived social support and social norms toward engaging in self-care behaviors. Finally, behavioral skills represent perceived capability and self-efficacy in performing self-care behaviors [6,11]. At the intervention level, the model serves to identify patients' deficits and assets in terms of information, motivation and behavioral skills, and then to intervene to reduce deficits and mobilize assets [12].

Initially developed to promote health behaviors of patients with AIDS [11,13], the IMB model has recently been used in cross-sectional studies on self-care behaviors of patients with type 2 diabetes [4,6,14,15]. In these studies, behavioral skills emerged as one of the most important determinants of self-care behaviors, with which they were consistently positively associated [4,6,14,15]. These results are consistent with cross-sectional and longitudinal studies positively relating self-efficacy to diabetes self-care behaviors [16–19], as well as with the influential Social Learning Theory (SLT) [20,21], which posits that perceived self-efficacy affects health habits.

As for information, cross-sectional studies using the IMB model have found that patient-physician communication and diabetes knowledge were positively associated with self-care behaviors [4,14]. These results are consistent with other studies linking diabetes knowledge and provider–patient communication with diabetes self-care [22,23].

Finally, cross-sectional studies using the IMB model have also found that motivation is associated with diabetes self-care behaviors [4,6,14]. This can be interpreted in light of the Self-Determination Theory (SDT) [24], which describes two types of motivation: autonomous motivation (related to personal motivation, i.e. doing something because it fits into one's value system), and controlled motivation (related to social motivation, i.e. doing something because of a demand from an external agent or to avoid negative emotions such as shame). Several empirical studies referring to this theory suggest that autonomous motivation is positively associated with self-care and thus with better glycemic control [16,25,26]. In contrast, results on controlled motivation are not consistent: it emerged variously as not related [25], positively related, or negatively related to self-care [6,26].

Nevertheless, studies suggest the IMB model is generally useful for understanding and eventually promoting self-care behaviors among patients with type 2 diabetes. The model is both comprehensive and parsimonious (with three main determinants), and its components are clearly defined [12,27]. Although SDT [24] is also useful for explaining self-care behaviors, important components of this model (such as need supportiveness) were not measured in the present study. The IMB model was therefore preferred as a conceptual framework, since its three main components were assessed in the questionnaire.

To date, IMB model variables have only been associated with a global score of self-care behaviors or with specific behaviors, namely medication adherence, diet, and exercise [4,6,14]. Each self-care behavior is complex and can have specific determinants [6]. It is not possible to determine from previous studies how each self-care behavior is differently affected by information, motivation, and behavioral skills. Furthermore, no longitudinal study has

ever tested the IMB model's power in predicting various self-care behaviors among type 2 diabetes patients. Thus, the direction of the relationship between IMB model variables and self-care behaviors is still largely unknown. However, theoretical and empirical knowledge suggests that some IMB model variables could have bidirectional relationships with self-care behaviors. At the theoretical level, SLT [20,21] states that self-efficacy beliefs determine effort and perseverance in adopting a behavior, but also that past accomplishments predict future perceived self-efficacy. At the empirical level, in line with SDT, Austin et al. [16] found a bidirectional relationship between autonomous motivation and dietary self-care in a longitudinal study with adolescents with type 1 diabetes.

There is a clear need for longitudinal studies to clarify the directionality of associations between IMB model variables and various self-care behaviors among patients with type 2 diabetes. The aim of the present study is therefore to test the IMB model of diabetes self-care with a longitudinal design using cross-lagged panel analysis. Analysis results will help identify which variable(s) should be targeted to influence a given self-care behavior in the short- and long-term, guiding interventions aiming at fostering self-care behaviors among type 2 diabetes patients.

2. Method

2.1. Sample

Patients were recruited after completing a diabetes course provided at four hospitals and four health and social services centers in two cities in the province of Quebec, Canada. Inclusion criteria were: 1) having been diagnosed with type 2 diabetes at least three months before; 2) being over 18 years of age; 3) being able to read and speak English or French fluently. Pregnant women were excluded from the study.

The baseline assessment (T1), conducted one month after the diabetes course ended, involved completing a questionnaire administered by a research assistant and measuring HbA1c (glycated hemoglobin level). The same assessment was repeated six (T2) and 12 (T3) months after the course. In a previous paper, we investigated self-care behaviors as determinants of changes in glycemic control, as measured by HbA1c levels [5]. Most notably, increases in healthy eating, medication adherence, and blood-glucose testing were associated with improved HbA1c levels over time. The present paper focuses on determinants of self-care behaviors, using only data from the self-report questionnaire. This research project was approved by accredited ethical review boards. Participants provided signed informed consent.

2.2. Measures

2.2.1. IMB model variables

As we aimed to test the IMB model for diabetes self-care, the three determinant variables (information, motivation, and behavioral skills) of the model were measured using questionnaires relevant in the context of diabetes. Inspired by existing research on IMB model-related variables, we operationalized information as adequate knowledge about diabetes [4], motivation as autonomous and controlled motivation to perform self-care [28], and behavioral skills as self-care self-efficacy [14].

Two subscales of the Revised Illness Perception Questionnaire [IPQ; 29] were chosen to measure information as they directly address participants' knowledge about diabetes, on a five-point Likert scale (1, strongly disagree; 5, strongly agree). Items from the Coherence subscale assessed overall adequate understanding of diabetes (e.g., "I don't understand my diabetes"[reversed]). Items from the Timeline acute/chronic subscale measured participants'