

# The Impact of Knowledge and Attitudes on Self-management of People with Type 2 Diabetes Mellitus

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## Abstract

**Background:** The prevalence of diabetes has been widely studied and knowledge, attitudes, and self-management have been shown to relate to each other in particular to the diabetic populations. However, little research has demonstrated the network of associations between knowledge, attitudes, and self-management in people with type 2 diabetes mellitus (T2DM).

**Objective:** The objective of this study was to examine the links between knowledge and attitudes, and its impact on self-management in people with T2DM.

**Methods:** Fifty-five adults of both genders with T2DM, aged 30-70, from the Alfred Hospital, Melbourne completed the Diabetes Knowledge Scales (DKN), to assess knowledge about diabetes; the Diabetes Integration Scale-39 (ATT39), to assess attitudes toward having diabetes; and the Summary of Diabetes Self-Care Activities (SDSCA), to evaluate self-management of diabetes of people with T2DM. This study reports on path model by using AMOS 17.0. We determine the path diagrams based on empirical findings to provide a visual portrayal of relations that are assumed to hold among the variables (i.e., knowledge, attitude, and self-management) under study.

**Results:** The results of this study revealed that attitude was associated with diabetes knowledge ( $p < .05$ ) and diabetes knowledge was associated with self-management ( $p < .05$ ).

**Conclusion:** We should continue to improve the attitudes of people with T2DM toward their illness. Higher level of attitudes could encourage an individual to seek more knowledge about diabetes and thus increase their knowledge in diabetes. Greater understanding of these relationships is important for developing appropriate strategies for care that can be tested through future intervention research.

**Keywords:** Type 2 diabetes; Attitudes; Knowledge; Self-management

## Introduction

The prevalence of diabetes mellitus (predominantly in type 2 diabetes) is increasing globally [1]. In 1995, the prevalence of diabetes in adults aged 20 years and over was estimated as 4%. Now it is projected to rise to 5.4% by the year 2025 [2]. Australia is a multicultural nation with around 1 in 25 Australians has diabetes [3]. Diabetes was also ranked as the sixth leading cause of death in Australia in 2009 [3]. The National Diabetes register reported that 25% of eligible National Diabetes Services Scheme (NDSS) registrants, with derived type 2 diabetes live in the state of Victoria, which is the second highest percentage after New South Wales with 40% [4].

Studies have revealed that the high prevalence and the increasing trend of diabetes are due in large part to lack of knowledge and poor attitudes towards diabetes [5-7]. Tang and colleagues also reported that attitudes influenced self-management in a survey of elderly diabetic patients in Hong Kong [8]. In a study done in a rural clinic in Malaysia, Ambigapathy et al. found attitude score increased with an increase in knowledge [5].

Generally, researchers have looked at the relationship between only two variables in each study, such as relating knowledge to self-care and attitudes to knowledge, and typically in one direction, for example, examining whether knowledge influences self-management [9] or whether attitudes influence self-management [10]. Menard et al. reported

that improving self-management influenced attitudes [11]. Conducting separate regression analyses between pairs of variables would also be likely to ignore intercorrelations among criterion variables (i.e., knowledge, attitudes, self-management). Structural equation modelling (SEM), which has been widely used in health sciences research, specifies a structural model that represents all causal hypotheses in one model, called the path model [12]. From the literature, the direction of relationships that is, whether attitude will contribute to the improvement of self-management and knowledge, or whether self-management influences attitudes or even knowledge still remains unclear. Therefore, the purpose of this study was to examine all possible links based on only a single measure of each theoretical variable, using path model, which represents all causal relations among these three variables.

## Method

### Procedure

The present study was approved by the Human Research Ethics Committee of the Alfred Hospital and Victoria University, Melbourne, Australia. We employed a cross-sectional study and recruited participants via the Alfred Hospital, Melbourne, Australia. People who were diagnosed with T2DM by medical practitioners for at least a year and registered with the Alfred Hospital were invited to participate in the present study. They

also need to have sufficient knowledge in English, able to read, and answer the questionnaires provided to them. We mailed out 100 questionnaires packs via the Alfred Hospital. In return, we received 55 completed questionnaires and 5 incomplete questionnaires.

### Participants

Fifthly-five men and women between 30 and 70 years participated in this study. Participants had Type 2 diabetes mellitus and visited the Alfred Hospital, Melbourne for treatment.

### Measures

Three different questionnaires were used to measure diabetes knowledge, attitude, and self-management.

**Diabetes Knowledge Scales (DKN)** are an objective test with 15 multiple-choice items in each of three parallel forms, A, B and C [13]. The DKN covers five broad issues, which are basic physiology of diabetes, including insulin action, hypoglycaemia, food groups and food substitutions, sick day management and general diabetes care. The total score for each form is the sum of correct answers in a score range of 0 to 15, with higher scores indicating high level of diabetes knowledge. The DKN scales were tested to be reliable and valid in measuring the diabetes knowledge among people with diabetes [13]. In the present study, DKN form A was used in the data collection. The DKN scales were used by researchers in different cultures in measuring the level of diabetes knowledge among people with diabetes [14,15]

**Diabetes Attitudes Scale (ATT39)** is a measure of psychological adjustment and attitudes of diabetic people towards their illness, including perceived levels of stress, adaptation, guilt, alienation, illness conviction, and tolerance [16]. This measure consists of 39 self-report items. Participants rate their agreement or disagreement with each item on a 5-point Likert scale ranging from 1 (I disagree completely) to 5 (I agree completely). The ATT39 has internal reliability of Cronbach's alpha 0.78. [16]. Although ATT39 is developed in 1980s, it is still widely used by researchers in assessing the attitudes toward diabetes among people with diabetes [17, 18]

**Summary of Diabetes Self-Care Activities (SDSCA)** is a brief self-report questionnaire of diabetes self-management that includes items assessing aspects of the diabetes regimen, which are diet, exercise, blood sugar testing, foot care, and smoking [19]. The SDSCA consists of a core of 11 items. The SDSCA is a multidimensional measure of diabetes self-management that has adequate internal and test-retest reliability and evidence of validity and sensitivity to change [19]. Toobert and Glasgow reported that the reliability test based on average inter-item correlations were high and generally exceeded 0.5 [20]. The SDSCA is commonly used by researchers in assessing the self-management aspects among people with diabetes [21-23]

### Analyses

Statistical analysis was conducted using AMOS 17.0 to identify and estimate the associations between diabetes knowledge, attitude, and self-management. The intercorrelations between these variables were examined using path analysis, which allows additional hypotheses to be tested in one model (e.g., correlation between knowledge and attitudes, attitudes and self-management, knowledge and self-management). By using Robust Maximum Likelihood estimation on the data set, the model fit was reported in terms of the Chi-square statistic and its p-value. The Chi-square measures the difference between the sample covariance matrix and the fitted covariance matrix of the model. If the data is a good fit to the model, the Chi-square should be non-significant [12]. The path diagram was developed to provide a visual portrayal of relations that were assumed to hold among the variables (i.e., knowledge, attitude

and self-management) under study. The errors associated with observed variables represent a measurement error, which reflects on their adequacy in measuring the related underlying factors (knowledge and self-management).

### Results

The average (mean  $\pm$  SD) age of participants was  $57 \pm 11.9$ , and 74% were men. Most of the participants were taking either tablets (41.8%) or insulin injection (32.7%). Most of the participants had at least a high school education (83.3%) and most were either unemployed or retired (63.6%). Descriptive statistics showing the mean and standard deviation of diabetes knowledge, attitude, and self-management were  $66.7 \pm 15.78$ ,  $70.5 \pm 7.01$ , and  $63.3 \pm 18.83$  respectively.

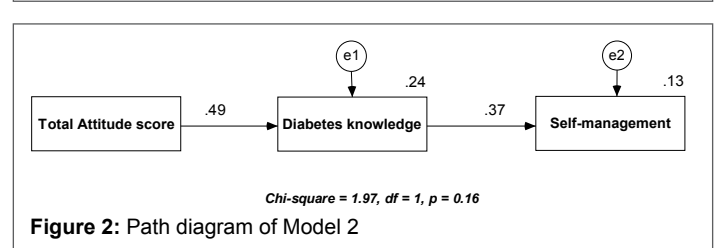
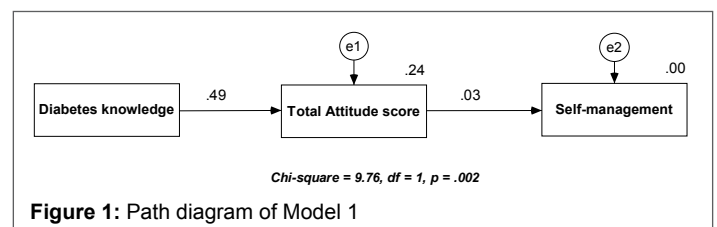
The path models in Figures 1 and 2 displaying standardised estimates were used to calculate the decomposed correlations. Several fit tests were used to examine the fitness of each model. Model 1 was based on previous research which has shown correlations between knowledge and attitudes and between attitudes and self-management. It is depicted in Figure 1. Our hypothesis for Model 1 did not fit well, with a significant chi-square = 9.76 ( $p = 0.002$ ). Model 2, which is depicted in Figure 2, is based on research that showed correlations between attitudes and knowledge, and between knowledge and self-management, Results show that Model 2 fits the data well with Chi-square = 1.97 ( $p = 0.16$ ).

In Model 2, there is a significant association between attitude to having diabetes and diabetes knowledge ( $p < 0.05$ ). This indicates that an increase of positive attitude toward having diabetes led to an increase in knowledge about diabetes. In turn, diabetes knowledge is a significant predictor of self-management ( $p = 0.004$ ). As diabetes knowledge increased among participants, their self-management of diabetes improved.

### Discussion

This study demonstrated that people's attitude to having diabetes were associated with their level of diabetes knowledge. Results indicated that knowledge of diabetes among people with type 2 diabetes was influenced by their attitudes. Ambigapathy et al. also concluded that knowledge of and attitudes toward diabetes among people in their study was significantly correlated [5]. This is consistent with previous study.

Diabetes knowledge was found to be associated with self-management in the present sample of 55 people with type 2 diabetes. Kamel et al. also reported that diabetes practice or preventive measures among the general population were related to level of knowledge and attitudes [6]. Those who scored higher in self-management were more likely to have adequate



knowledge and attitudes compared to those who scored lower on self-management. Several other studies have shown that patients' beliefs about treatment effectiveness for diabetes were associated with self-management [24-27].

In the study by Ambigapathy et al., results showed no significant correlation between participants' attitudes and self-management, although they reported that an increase in knowledge was associated with an increase in positive attitudes and thus improved self-management [5]. This suggests that improving attitudes does not necessarily lead to a corresponding improvement in self-management. The results of the present study also showed that attitudes to having diabetes were not associated with self-management. This might be due to the small sample size in the present study, which reduced the power to identify significant effects.

Attitudes toward diabetes also depend on the disease severity. Lange and Piette concluded that people with moderately severe diabetes strongly believed that treatment is very important in preventing complications [10]. Thus, they endorsed medical advice arguing that because diabetes is a major risk factor for stroke, myocardial infarction, and many other life-threatening complications, it is crucial to create awareness concerning diabetes. Therefore, future research should look at other moderators such as disease severity, which might also influence diabetes knowledge, attitudes, self-management of people with type 2 diabetes.

This study had presented two possible links between knowledge, attitude, and self-management. Model fit test revealed that attitude had direct influence toward knowledge, and knowledge had direct influence toward self-management. It is possible that relationships are bidirectional, for example, greater knowledge improve their attitude and self-management, while higher levels of self-management motivate people to learn more about diabetes. The path model is used to specify the phenomena under study in terms of cause and effect variables. Therefore, it will be used to clarify the bidirectional relationships among these variables in larger samples.

The present findings provide strong support that diabetes knowledge can play an important part in self-management among people with type 2 diabetes. The path model fit well when the direction was changed in such a way that attitudes influenced diabetes knowledge (Figure 2), whereas previous researchers reported that diabetes knowledge influenced attitudes [5]. Because researchers have reported both that knowledge affects attitudes and that attitudes affect knowledge, further research investigating both these causal paths should be undertaken with larger sample sizes.

## Conclusion

We should continue to improve the attitudes of people with T2DM toward their illness. Higher level of attitudes could encourage an individual to seek more knowledge about diabetes and thus increase their knowledge in diabetes. Greater understanding of these relationships is important for developing appropriate strategies for care that can be tested through future intervention research.

## Author Contributions

Authors YCK and MT contributed to the study design and data collection. All authors (YCK, MT, and GK) contributed to the data analysis, results interpretation, and manuscript writing.

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