



# Predicting health-promoting self-care behaviors in people with pre-diabetes by applying Bandura social learning theory



Mei-Fang Chen, RN, Ph.D.<sup>a,\*</sup>, Ruey-Hsia Wang, RN, Ph.D.<sup>b</sup>, Shu-Ling Hung, RN, Ph.D.<sup>c</sup>

<sup>a</sup> Department of Nursing, National Tainan Junior College of Nursing, Taiwan

<sup>b</sup> College of Nursing, Kaohsiung Medical University, Taiwan

<sup>c</sup> Department of Nursing, National Tainan Junior College of Nursing, Taiwan

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## ABSTRACT

**Aims:** The aim of this study was to apply Bandura social learning theory in a model for identifying personal and environmental factors that predict health-promoting self-care behaviors in people with pre-diabetes.

**Background:** The theoretical basis of health-promoting self-care behaviors must be examined to obtain evidence-based knowledge that can help improve the effectiveness of pre-diabetes care. However, such behaviors are rarely studied in people with pre-diabetes.

**Methods:** This quantitative, cross-sectional survey study was performed in a convenience sample of two hospitals in southern Taiwan. Two hundred people diagnosed with pre-diabetes at a single health examination center were recruited. A questionnaire survey was performed to collect data regarding personal factors (i.e., participant characteristics, pre-diabetes knowledge, and self-efficacy) and data regarding environmental factors (i.e., social support and perceptions of empowerment process) that may have associations with health-promoting self-care behaviors in people with pre-diabetes.

**Results:** Multiple linear regression showed that the factors that had the largest influence on the practice of health-promoting self-care behaviors were self-efficacy, diabetes history, perceptions of empowerment process, and pre-diabetes knowledge. These factors explained 59.3% of the variance in health-promoting self-care behaviors.

**Conclusions:** To prevent the development of diabetes in people with pre-diabetes, healthcare professionals should consider both the personal and the environmental factors identified in this study when assessing health promoting self-care behaviors in patients with pre-diabetes and when selecting the appropriate interventions.

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## 1. Introduction

Diabetes is an urgent global health issue because of its high rates of prevalence, complications, and mortality and because of its huge associated health care costs (World Health Organization, 2013, August). A major global health concern is reducing the impact of diabetes by improving diabetes prevention. Individuals with pre-diabetes have a high risk of diabetes. For example, a study by de Vegt et al. (2011) found that the cumulative incidence of diabetes in participants with pre-diabetes was 64.5%, which was 14.3 times higher than that in people with normal glucose concentrations (cumulative incidence, 4.5%). Therefore, populations targeted in efforts to prevent the occurrence of diabetes should include people with pre-diabetes.

In 2010, an estimated 79 million adults in the United States were classified as pre-diabetic (Centers for Disease Control & Prevention, 2013). In Taiwan, the number of people with pre-diabetes is approximately two times the number of people with diabetes (Tsai, 2005). The practice of health-promoting self-care behaviors is a major

contributing factor in reducing the risk for diabetes (World Health Organization, 2013, August). Health-promoting self-care behaviors are defined as “acts by individuals to promote and maintain their health and quality of life” (Simmons, 1990). Studies of people with pre-diabetes show that, as they decrease their blood sugar, they improve their health-promoting self-care behaviors, including their nutrition, physical activity, health responsibility, self-actualization, interpersonal relations and stress management (Chen & Huang, 2005). The National Health Council (2008) also indicated that, without prompt improvement in health-promoting self-care behaviors, pre-diabetes evolves into diabetes in an average of seven people per year. In people with pre-diabetes, practicing health-promoting self-care behaviors can help prevent the onset of diabetes by maintaining blood sugar within normal limits. Thus, the health-promoting self-care behaviors and their influencing factors must be clearly understood in people with pre-diabetes.

Past studies have explored self-care behaviors and factors that influence these behaviors in people with diabetes but rarely in people with pre-diabetes. Whereas diabetes care focuses on managing the behaviors of those who already have the disease, pre-diabetes care focuses on prevention, i.e., encouraging people to adopt health-promoting self-care behaviors to prevent diabetes. Since different behaviors may have different influential factors, exploring behaviors in pre-diabetes populations can

\* Corresponding author at: 78, Sec. 2, Minzu Rd., Tainan City 700, Taiwan, R.O.C. Tel.: +886 62110900x280.

E-mail addresses: [38914003@yahoo.com.tw](mailto:38914003@yahoo.com.tw), [meifang0302@gmail.com](mailto:meifang0302@gmail.com) (M.-F. Chen).

provide a useful reference for developing an effective diabetes prevention program. The current study of people with pre-diabetes revealed that the factors that affect the practice of health-promoting self-care behaviors are personal factors, i.e., demographic characteristics, knowledge, and self-efficacy (Chen & Lin, 2010; Zhou & Oh, 2012). Studies of people with diabetes in various countries indicate that social support and perceptions of the empowerment process have the largest effects on self-care behavior. Social support and perceptions of the empowerment process are environmental factors (Chen et al., 2013; Sharon et al., 2006) that affect the practice of health-promoting self-care behaviors in people with pre-diabetes and are rarely investigated. A comprehensive understanding of personal and environmental factors that affect the practice of health-promoting self-care behaviors can improve the effectiveness of pre-diabetes interventions performed by health professionals.

Bandura social learning theory is often applied in studies of individual behavior to elucidate interactions among personal factors, environmental factors and behavior (Bandura, 1977). Researchers have used this theory to explore health behaviors (Sharon et al., 2006). However, the theory is rarely used to investigate health-promoting self-care behaviors in people with pre-diabetes. The theoretical basis of this research can be used to obtain evidence-based knowledge. Therefore, the purpose of this study was to use Bandura social learning theory as a framework for investigating personal and environmental factors in the health-promoting self-care behaviors of people with pre-diabetes. Fig. 1 shows the framework of this study.

## 2. Methods

### 2.1. Study design

A descriptive cross-sectional design was used in this study. Data collection, which was performed from January to August, 2013, included personal characteristics, pre-diabetes knowledge, self-efficacy, social support, perceptions of empowerment process, and health-promoting self-care behaviors.

### 2.2. Subjects and setting

A convenience sample of people with pre-diabetes was recruited from the health examination centers of two hospitals in Kaohsiung, Taiwan. The inclusion criteria were (1) fasting blood sugar between 100 and 125 mg/dl during the previous 6 months (after a minimum of 8 hours NPO); (2) clear mental status and ability to communicate; and (3) age at least 21 years old. Patients diagnosed with type 1 diabetes, type 2 diabetes, or mental disease were excluded.

The required sample size was estimated using the procedure recommended by Lin (1993), who indicated that the number of samples used in linear regression should be 6–10 times the total number of independent variables. Since this study analyzed 16 independent variables

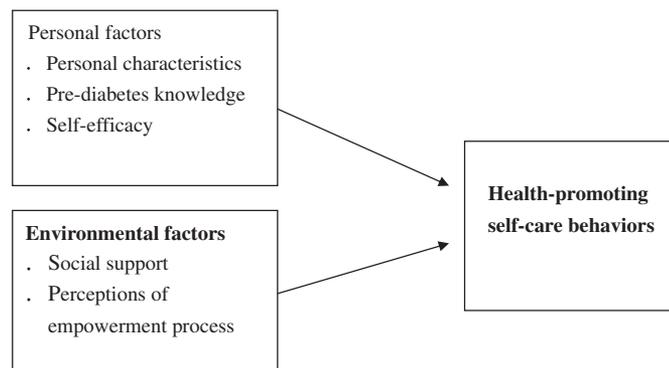


Fig. 1. Analytical framework for health-promoting self-care behaviors and their influential factors in people with pre-diabetes.

representing health-promoting self-care behaviors, the minimum sample size was 160 participants.

### 2.3. Procedures

This study was approved by the Human Experiment and Ethics Committee of Antai Tian-Sheng Memorial Hospital (IRB-101011). To identify the target population of patients with pre-diabetes, the author screened all medical records generated by the health examination center at two hospitals within the past 6 months. Pre-diabetes was defined as a record of blood sugar 100–125 mg/dl after 8 hours fasting. Patients in the target population who met all inclusion criteria were contacted by telephone and invited to participate in the study. During their visits to the hospital, the researcher fully explained the purpose of the study, its procedure, and its relevant risks and benefits. After giving informed consent to the study, each participant took 20–30 minutes to complete the questionnaires.

### 2.4. Measurements

#### 2.4.1. Personal characteristics

Personal characteristics included sex, age, marital status, education level, religion, employment status, tobacco use, alcohol use, body mass index (BMI), family history of diabetes, chronic disease, and metformin use.

#### 2.4.2. Pre-diabetes knowledge

Pre-diabetes knowledge was assessed with the Chinese version of the Pre-diabetes Knowledge Scale (Wei & Lu, 2005). The scale analyzed risk factors, diagnoses, symptoms, medical treatments and complications. The correct answer was “true” for 6 items on the scale and “false” for 2 items on the scale. A high score indicated high pre-diabetes knowledge. The content validity index (CVI) was .92, and Cronbach alpha was .85 in this study.

#### 2.4.3. Self-efficacy

Self-efficacy was assessed by the Chinese version of the 25-item Self-efficacy of Health Behavior Scale, which was developed by Chung (2000) to measure individual beliefs about nutrition, exercise, psychological comfort and health responsibility. Items were rated on a Likert scale from 1 to 4 for no belief to complete belief, respectively. The total possible score ranged from 25 to 100 where higher scores indicated better self-efficacy. Chen and Lin (2010) obtained a Cronbach alpha of .95 for the Chinese version of the scale in a Taiwan population with pre-diabetes. Here, the Cronbach alpha was .91.

#### 2.4.4. Social support

Social support was assessed using the Chinese version of the Medical Outcomes Study (MOS) Social Support Survey (Wang, Wang, & Lin, 1998). The MOS includes three subscales: information, tangible factors, and affection. Each item was measured using a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Higher scores indicate better social support. In this study, the MOS had a CVI of .90 and a Cronbach alpha of .88.

#### 2.4.5. Perceptions of the empowerment process

This study defined perceptions of the empowerment process as how people with pre-diabetes perceive the series of actions performed by healthcare professionals to assist them in developing and using their ability and rights to practice health-promoting self-care behaviors. Perceptions of the empowerment process were assessed using the 15-item Chinese Diabetes Empowerment Process Scale (Chen et al., 2011), which assesses awareness (4 items), mutual participation (4 items), providing necessary information (3 items) and open communication (4 items). The instrument requires the patient to respond to each item on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). An earlier study of a Taiwan population of diabetes patients established that this scale had acceptable construct validity, concurrent

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