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# Expanded Health Belief Model Predicts Diabetes Self-Management in College Students

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**ABSTRACT** An instrument was designed to determine relationships between constructs of the Expanded Health Belief Model and to identify characteristics of college students who successfully manage their diabetes. The Diabetes College Scale was developed to measure attitudes and behaviors pertinent to diabetes management and college life. It was tested for content validity, test–retest reliability, and internal consistency. Data were collected from college students using a cross-sectional design. Campus health care providers were invited via electronic mail to administer the survey to students with Type I diabetes. Ninety-eight questionnaires were mailed to interested providers, of which 86 (88%) were returned. Mean scores for attitude constructs, seven behaviors, and two outcomes were measured. Twenty-six experts established content validity. Instrument reliability was evaluated using paired t-tests, Cronbach's alpha, and correlation coefficients. Correlation coefficients and stepwise multiple regression analysis evaluated relationships among variables measured. Intention and emotional response were strong predictors of exercise, whereas health importance and intention were predictive of testing blood sugar. Situational factors and emotional response were substantial barriers to optimal diabetes self-care. College health care providers should address these areas in providing services to this population. Additional testing of the instrument is also recommended.

(*JNE* 33:17–23, 2001)

## INTRODUCTION

Diabetes is a chronic illness that requires continuing medical care and education to prevent acute complications and reduce the risk of long-term complications.[1] Approximately three-quarters of all newly diagnosed cases of Type I diabetes occur in individuals below the age of 18.[1] Adolescence combined with a chronic illness such as diabetes poses a unique problem for several reasons: developmental priorities may

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compete with demands of health care, chronic illness may interfere with social integration or affect psychosocial functioning, and the shift in responsibility of care from parents to the individual may cause confusion or anxiety.[2] With these matters in mind, college life raises concerns for adolescents who are not prepared for new independence or challenges. One study reported that college students with diabetes felt anger at having the illness, sadness that no one seemed to understand them, and frustration at not being like everyone else.[3] More recent research indicates that this population faces barriers to appropriate self-care, such as time management difficulties, stress, frequent hypoglycemic reactions, diet management constraints, and inadequate finances, as well as the inconvenience of diabetes management, social support problems, denial, and rebellion.[4]

Although it appears obvious that college students are in need of assistance in managing their diabetes while at school, there is limited research on this population. Because little is known about their beliefs or attitudes, college students with diabetes were identified as the target population. Insight is needed in identifying characteristics of college students who successfully manage their diabetes. An evaluation instrument could provide such insight and identify characteristics that are most predictive of good diabetes management.

It is recommended that models and theories be employed in research and programs for studying human behavior, in order to plan more effective evaluations and conduct more productive research.[5] The Expanded Health Belief Model (EHBM), which has not been previously empirically tested, was chosen for this study because of its broad examination of health history, attitudes, beliefs, and behaviors. The EHBM was developed to explain difficulties encountered in getting patients to recognize health risks and/or practice long-term compliance with health care recommendations.[6] Proposed to extend the Health Belief Model (HBM), the EHBM contains the HBM components of perceived threat, benefits, barriers, and cues to action.[7] It also encompasses Social Learning Theory (SLT) variables such as self-efficacy and outcome expectations[8] and Theory of Reasoned Action (TRA) variables, such as intention and subjective norm.[9] In addition, the EHBM includes measures of health importance, locus of

control, emotional response, value of action, and situational factors (Fig. 1). The EHBM further includes demographics and health history as well as stages and feedback mechanisms.[6] Thus, it measures pertinent attitudes and reasons people engage in, or fail to engage in, recommended health care actions. Although various components of the EHBM (HBM, TRA, and SLT) have been widely used in research projects and interventions designed for persons with diabetes,[10–15] the efficacy of the EHBM has not been tested with any population to our knowledge.

The purposes of this study were to (1) develop an attitude and self-care assessment instrument based on the variables in the EHBM and targeted to college students with Type I diabetes, (2) establish content validity of constructs as well as test–retest and internal consistency reliability, and (3) identify attitudes and other characteristics of college students who successfully manage their diabetes.

METHOD

**Research design.**    This was a cross-sectional, exploratory study to determine factors predicting diabetes self-management. The independent or predictor variables were attitudes, age, duration of diabetes, and gender. The outcome or dependent variables were seven behaviors and two outcomes, frequency of insulin reactions, and self-reported most recent hemoglobin A1c (HbA1c) value, a measure of glycemic control.

**Subjects.**    Subjects were college students with Type I diabetes. A notice was posted on an Internet college health listserv asking health care providers on campuses throughout the country to administer the developed instrument.[16] A total of 98 questionnaires were requested by and mailed to 22 interested college health care providers who then administered the questionnaires to students with diabetes on their campus. Eighty-six (88%) were returned; of these, two were eliminated because the respondents did not have Type I diabetes and one was eliminated because the respondent was in high school.

**Procedures.**    Approval for the study was obtained from the university's Human Research Committee. An extensive questionnaire, the Diabetes College Scale (DCS), was developed to measure attitudes, behaviors, and outcomes pertinent to diabetes management and college life. It was tested for content validity as well as test–retest and internal consistency reliability. Subjects took approximately 15 minutes to complete all eight pages of the instrument. The data collected were used to test the EHBM and develop multiple regression equations to predict diabetes self-care.

**Instrument.**    The items in the instrument were based on the literature, meetings with health care providers, and issues raised in focus groups and telephone interviews of college students with Type I diabetes.[4] Topics addressed included self-care practices such as diet, exercise, self-monitoring of blood glucose, insulin administration and hypoglycemic reactions, and college life issues such as stress and alcohol.

Initially, 171 items were developed for 13 constructs, representing the 13 attitude variables of the EHBM model (see Fig. 1). All except those in the Locus of Control (LOC) construct were developed specifically for this project to meet guidelines of the particular variable as described by Burns.[6] The items in the LOC construct were taken from the Health LOC questionnaire by Wallston et al.[17] This scale was
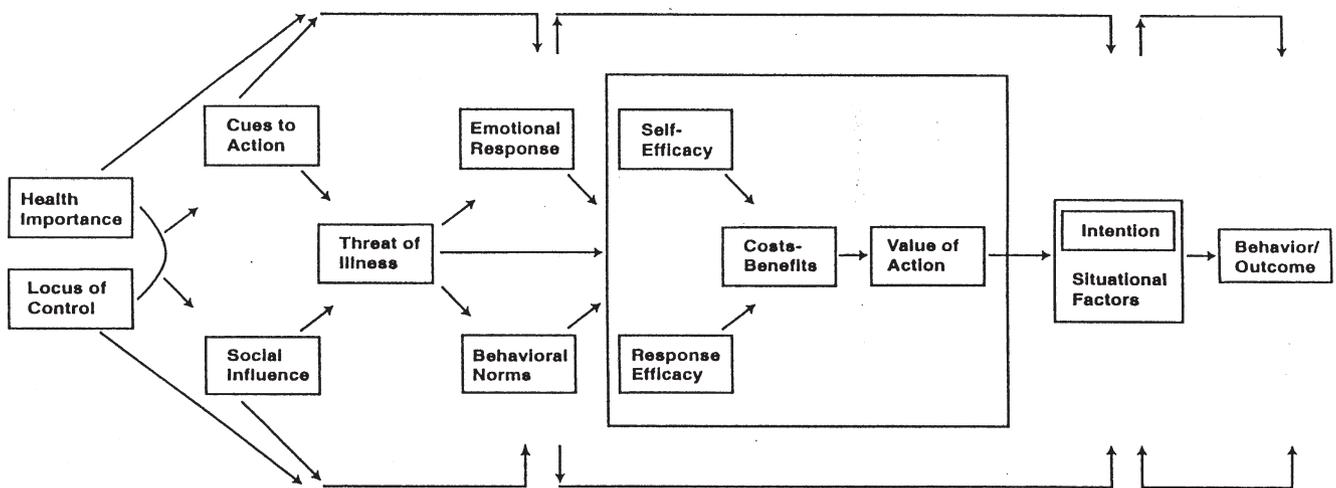


**Figure 1.**    Expanded Health Belief Model.