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Original Article

Factors associated with health-promoting behavior of people with or at high risk of metabolic syndrome: Based on the health belief model

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ABSTRACT

Purpose: The purpose of this study is to identify the associations between self-efficacy and the various factors in the Health Belief Model (HBM), and the health-promoting behaviors of people with, or at high risk of, Metabolic Syndrome (MS).

Methods: 132 adults with two or more MS components were included in this cross-sectional study. Health-promoting behavior, self-efficacy and the four-constructs of HBM (perceived threat, cues, benefits, and barriers) were measured using validated tools. The contributions of each HBM factor towards the respective behavior were identified using a three-step hierarchical regression approach.

Results: After controlling for age, gender, education level, income and knowledge of MS, HBM factors accounted for 11% of the total variance in health-promoting behaviors. Beliefs about barriers were found to be a significant predictor of exercise ($\beta = -.28$, $p < .01$) and diet management ($\beta = -.24$, $p = <.01$), suggesting that a higher level of perceived barrier was associated with a lower frequency of health-promoting behaviors. In the final model, self-efficacy explained an additional 31% of the variance in exercise behavior and 13% in diet management behavior.

Conclusions: Self-efficacy and perceived barriers made independent contributions to health-promoting behavior among people with, or at high risk of, MS. Community health program targeting this particular group should tailor strategies that can enhance individuals' self-efficacy and address barriers perceived.

1. Background

Metabolic syndrome (MS) is characterized by a cluster of metabolic risk factors, which include impaired glucose tolerance, dyslipidemia, elevated blood pressure, and central obesity (Grundy et al., 2005). The prevalence of MS is approximately 23% in United States and 21% in Hong Kong China (Bandura, 1977; Beltrán-Sánchez, Harhay, Harhay, & McElligott, 2013). While the presence of MS increases risk of cardiovascular events by approximately 2 times, people with MS are also five times more likely than others to develop diabetes mellitus (Mottillo et al., 2010).

Current guidelines suggest that individuals with MS at the pre-morbid state should first be encouraged to undertake lifestyle modifications, including the practicing of health-promoting behaviors such as an increase in physical activity and improvements in diet management (Grundy et al., 2005). Previous studies have identified the relationship between these health-promoting behaviors and socio-demographics status and health perceptions among individuals with diabetes (Aljasem, Peyrot, Wissow, & Rubin, 2001; Green, Bazata, Fox, & Grandy, 2007). The identification of key predicting factors of health behavior, within a theoretical framework, can provide information useful for improving health services. Importantly, in Hong Kong China, there is so far no reported health promotion program for people with, or at high risk of, MS at the primary care level. Therefore, empirical evidence is required for the development of health promotion service targeting people with, or at high risk of, MS.

The Health Belief Model (HBM) is one of the mostly commonly used models in health-related research that explain and predict health behavior (Carpenter, 2010). In the HBM, perceived susceptibility to, and perceived severity of, the disease jointly form the perceived threat, which is modulated by individuals' knowledge about the diseases, any cues to action and their socio-demographic status (Janz & Becker, 1984). The perceived threat combines with the perceived benefits of, and barriers to, the health-promoting behavior to affect the likelihood of performing the respective health-promoting behavior.

Meanwhile, self-efficacy was found to be associated with the likelihood of health-promoting behaviors for many chronic health conditions such as diabetes and hypertension (Aljasem et al., 2001; Yoo, Kim, Jang, & You, 2011), where it was often considered together with the HBM because of its influence on changes in health behavior (Strecher, DeVellis, Becker, & Rosenstock, 1986). The concept of self-efficacy was originated in Bandura's Social Cognitive Theory, which described the sense of personal control over a desired change of behavior (Bandura, 1977). This study therefore aimed to assess health-promoting behaviors of people with, or at high risk of, MS guided by the HBM and the association between self-efficacy and such behaviors. The conceptual model applied is illustrated in Fig. 1.

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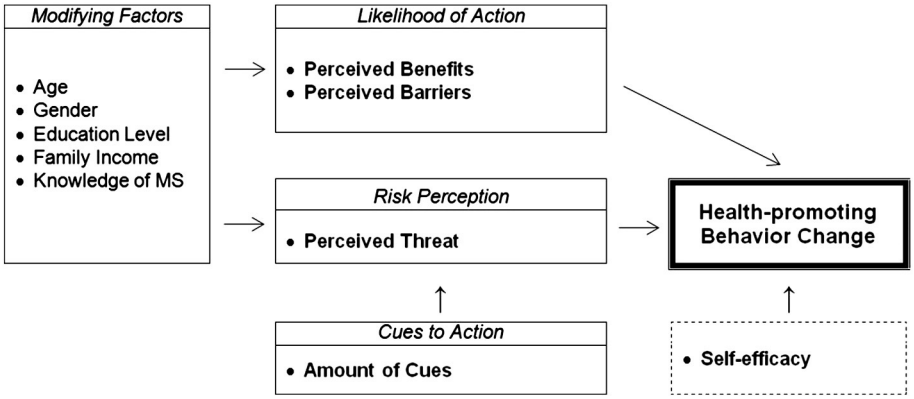

Fig. 1. Conceptual model of behavior change.

2. Methods

2.1. Design and data collection

A cross-sectional survey design was used to assess health-promoting behaviors of people with, or at high risk of, MS in a community setting. A health assessment program was run in two large urban areas of Hong Kong China to promote awareness of cardiovascular health for those between the ages of 18 and 65. A registered nurse first conducted basic health assessments, consisting of the measurement of height, weight, body fat composition, waist circumference, blood pressure, and fasting capillary glucose level to identify subjects with or at high risk of MS. Medical history and current prescriptions of participants were collected based on data provided by the participants. Participants were then invited to complete a self-administered questionnaire to assess their health-promoting behaviors and factors affecting their behavior as guided by the HBM. These factors included constructs explained in the HBM, self-efficacy, and socio-demographics. This study received ethical approval from The Chinese University of Hong Kong and all participants gave written informed consent to their participation in this study.

2.1.1. Subjects

In the present study, the criteria for MS used to identify subjects with, or at high risk of, MS were listed as in Table 1 (Grundy et al., 2005). Participants with two or more cardiometabolic risk factors from the MS definition, and able to read Chinese, were included. Those with known cardiovascular disease (CVD) or who were enrolled in other cardiovascular health promotion classes were excluded.

Table 1
Criteria for clinical diagnosis of metabolic syndrome.

Criteria and respective clinical indicators		
Elevated waist circumference (ethnicity-based)		
Male	> = 90 cm	
Female	> = 80 cm	
Reduced high-density lipoprotein cholesterol		
Male	<40 mg/dL (1.0 mmol/L)	*or on drug treatment*
Female	<50 mg/dL (1.3 mmol/L)	
Elevated triglycerides		
> = 150 mg/dL (1.7 mmol/L)		*or on drug treatment*
Elevated blood pressure		
> = systolic 130 mmHg and/or		*or on drug treatment*
> = diastolic 85 mmHg		
Elevated fasting glucose		
> = 100 mg/dL (5.6 mmol/L)		*or on drug treatment*

2.1.2. Measures

2.1.2.1. Outcome variables. Each individual's health-promoting behaviors relating to exercise and diet management were assessed using the two subscales of the Health-Promoting Lifestyle Profile II (HPLPII) Chinese version (Lee & Loke, 2005). Subjects were asked to respond to subscales on exercise (8 items) and diet management (9 items), using a four-point Likert scale (1="never" to 4="routinely"), on the frequency of performing the respective health-promoting behaviors. A higher mean score indicated a higher frequency of performance of the health behavior concerned. Walker & Hill-Polerecky (1996) reported a Cronbach's alpha of 0.94 for the total HPLPII scale, whereas Cronbach's alphas for the exercise and diet management subscales were 0.78 and 0.69 respectively in the present study, demonstrating acceptable internal consistency.

2.1.3. Predictors

The following predictors were selected as guided by the HBM.

Perceived threat of CVD was assessed by a one-item measurement that asked participants to rate their perception of the likelihood of experiencing CVD on a 100 mm visual analogue scale (0="very unlikely and 100="very likely"). A higher score indicated a higher perceived threat of CVD.

Cues to action were measured by subjects indicating whether they have received information on their perceived threat from the media, family/friends or healthcare professionals. One point was given for receiving a cue from each source, and the total score could thus range from zero to three, with zero indicating no cue was ever received.

The level of MS knowledge affects the views of individuals towards taking preventive action for reducing cardiovascular risks. Knowledge of MS (K-MS) was measured using a ten-item scale designed by See, Tu, Tsai, Li, and Lu (2010) with scoring based on the number of correct answers. One point is given for each correct answer, so the score of K-MS can range from zero to ten with a higher score indicating of a better knowledge of MS. The original K-MS scale has a Cronbach's alpha of 0.69; Cronbach's alpha was 0.71 in the present study, demonstrating acceptable internal consistency.

Perceived benefits/barriers to exercise were measured using an 8-item and 7-item scale respectively adopted from Chen and Lin (2010). Subjects were asked to rate their beliefs on benefits/barriers of the health action on a five-point Likert scale (1="strongly disagree to 5="strongly agree"). Scoring of these two scales can range from 8 to 40 and 7 to 35 respectively with a higher score indicating higher perceived benefits/barriers of performing exercise. Similarly, the perceived benefits/barriers of diet management were respectively measured by a 7-item and 6-item scale. Scoring of these two scales can range from 7 to 35 and 6 to 30 respectively with a higher score indicating higher perceived benefits/barriers to performing diet management. The original study reported Cronbach's alphas ranging from 0.90 to 0.95 for the original scales, whereas Cronbach's alpha of 0.79 to 0.87 was achieved

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