

# Examining the Structural Validity of Health Motivation Scale in Physical Activity

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## Abstract

The purpose of the present study was to examine the structural validity of health motivation scale in physical activity. Confirmatory Factor Analysis indicated that the structure of the Health Motivation Scale in Physical Activity was consistent with the process model of health motivation. The findings, while limited to a college sample in the US, suggested that the process model of health motivation may be applied to physical activity. However, further studies, particularly longitudinal studies, are required to further test the efficacy of the process model of health motivation.

**Keywords:** Health motivation; Physical activity; A process model of health motivation

## A Process Model of Health Motivation Applied to Physical Activity

Physical inactivity is the fourth leading risk factor for global mortality [1]. In order to improve individuals' health, and to reduce the global burden of the chronic non-communicable diseases that are associated with physical inactivity, programs have been developed to encourage people around the world to be more psychically active. For example, in Australia, the highly successful 'Life: Be in it' campaign has been instrumental in changing Australians' attitudes to exercise and healthy eating since the late 1970s. Over more than 30 years this campaign, initially government funded, but then privately funded, has encouraged people to "Live more of your life" through engagement in a healthy active lifestyle that promotes the prevention and control of chronic disease.

Essentially, campaigns such as 'Life. Be in it' aim to motivate people to be active, and indeed, research has shown that such motivation increases the likelihood of engagement in physical activity. For example, Song et al. [2] conducted a study examining whether motivation enhancement would change elders' dance activity. Grouping participants in a traditional Korean dance movement program that ran 4 times per week for 6 months into participants or dropouts by the criteria of 80% attendance, Song, et al. found that this program improved participants' health motivation and that such enhancement in motivation was associated with more frequent engagement in dancing.

Several theorists have attempted to explicate the basis of health motivation [3]. Cox and Cheryl proposed a multidimensional health motivation system that included the processes of choice, the need for competency, and self-determination in relation to one's health [3,4] suggested that both intrinsic and extrinsic motivations are highly associated with health behaviors such as exercise maintenance, but in their study they found that intrinsic motivation contributed to exercise maintenance more than extrinsic motivation.

One core characteristic of motivation is that it is goal-oriented. Although the above two approaches suggest some important components of health motivation, they do not emphasize the ultimate goals of health motivation such as maintaining or improving health [5,6]. Through her work on personal strivings, Xu et al. [5,7]

characterized health motivation as "a strong desire to exercise; to eat well; to live in a healthy environment; to stay in shape, and to be calm and tranquil while sleeping well, and avoid stress".

To better predict health behaviors, Xu et al. [5,6] developed a process model of health motivation. They proposed that health motivation produces the inner force which energizes and orients individuals to select behaviors that can maintain and promote their health, and can protect them from diseases. This process model of health motivation suggests that health motivation is a dynamic system that involves four sequential stages (Figure 1). Firstly, people generate their health-related motivation tendencies in response to personal or environmental factors. The personal factors that develop individuals' health motivation tendency include self-efficacy, beliefs, health values, and knowledge about health. The environmental factors include community campaigns such as "Life be in it", peer pressure, facilities in the community, and the weather. The second stage of the health process model relates to intention and planning. If individuals' motivation to be healthy is strong enough, they make plans or form health intentions; including how and when they will engage in activities to achieve their health goals. For instance, if they think physical activity is an appropriate way to improve health, they may decide to start exercising. In the third stage of the health process model, individuals initiate health-related activities. For example, they may exercise or perform any form of physical activity to try to achieve their goal of being healthy. In the final stage of the health process model, individuals persist in their health behaviors because intermittent or inconsistent engagement (e.g., to exercise once or twice) cannot lead to the achievement of one's goal of improving health. Xu et al. [5] and Xu et al. [6] argued that personal and environmental factors can impact individuals' physical activities at any stage of the process model. Any changes in those factors may result

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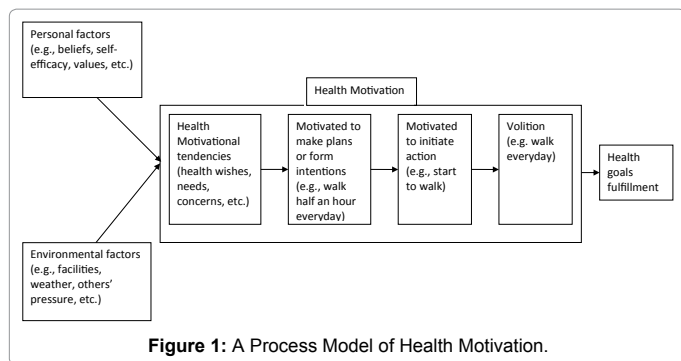


Figure 1: A Process Model of Health Motivation.

in changes in health motivation, and consequently cause changes in health related behaviors.

Studies have supported the structure of the process model of health motivation. For example, in Xu and Millar [6] study, college students completed the Health Motivation Scale in Healthy Eating. The structure of the model was supported, and health motivation was one of the most powerful predictors of healthy eating. However, since no studies have tested the process model of health motivation in relation to other health behaviors, the purposes of the current study was to test the structure of Health Motivation Scale developed by Xu and Miller [6] when it is applied to physical activities.

## Participants

Two hundred and forty undergraduate volunteers were recruited from the Subject pool of a southern university in the United States. Among them, seventy two were males; one hundred and fifty one were females; seventeen were not identified. They aged from 18 to 49, with the mean age of 20.95 (SD = 4.47), and eight of them did not report their age. Their weight ranged from 95 to 272 pounds (15 were missing), with the mean weight of 152.00 pounds (SD = 35.51), with the height ranging from 59 to 76 inches (M = 66.48 inches, SD = 3.89) (ten were missing). The minimum BMI was 16.82 and the maximum was 40.35, with a mean of 24.04 (SD = 4.44); and 16 were missing. Most of the participants (40.2%) were White; 6.6% were African American, 8.3% were Hispanic; 7.1% were Native American; 12.0% were Asian; and 15.3% were not-identified or other.

## Method

### Measures

#### Health Motivation Scale in Physical Activity

Based upon the process model [5,6], the Health Motivation Scale in Physical Activity (HMS-PA) was developed to measure health motivation in physical activities. It consists of four subscales: Health Motivational Tendency, Health Intention, Action Initiation Motivation, and Persistence Motivation (Volition). The scale is composed of 9 items in total, with 2 items for the first three subscales, and 3 items for the last subscale, persistence motivation. An item example is "I can engage in physical activities over a long period of time for the purpose of being healthy".

### Procedure

Approval to conduct the study was obtained from the University Research Ethics Committee. Participants responded to an announcement about the study and came to the lab in small groups

and were informed of the purposes of the study before they consented to participate. They then completed the scales, and were later debriefed.

### Analytic approach

To test the structure of the Health Motivation Scale in Physical Activity, higher order Confirmatory Factor Analyses were conducted. A variety of fit indices were calculated and compared to published criteria to determine if the model fit the data. These included Bollen's normed-chi-squares ( $\chi^2/df$ ) criterion [8,9] criterion values of CFI, GFI, NFI, and NNFI (greater than .90), [10] criterion that Standard RMR be less than .10, and [11] criterion that RMSEA be not greater than .05 for a good fit, .05 and .08 for a reasonable fit, with greater than .10 indicating a poor fit.

### Results

The aim of this study was to test the structure of the Health Motivation Scale in Physical Activity. To do this higher order Confirmatory Factor Analyses were conducted using EQS 6.1. The first-order model specified four factors (health motivation tendencies, health intention, action initiation, and persistency motivation), with 2-3 indicators for each factor. Each indicator was constrained to load just on the designated factor. All the factor covariances were free to be estimated; error terms associated with each indicator were uncorrelated. The fit indices were:  $\chi^2 = 44.267$ ,  $p < .01$ ,  $\chi^2 / df = 2.11$ , CFI = .978, GFI = .960, NFI = .960, NNFI = .963, Standard RMR = .041, RMSEA = .069 (CI = .040, .97). When compared to the criteria listed above, these fit indices suggest that the model was a good fit to the data. The loadings ranged from .63 to .90 and the R-squared ranged from .40 to .82. Figure 2 presents the first-order model, along with the estimates of factor loadings and error terms.

The Wald test and LM test were conducted to examine the parameters and determine if any parameters should be added or dropped. No parameters were suggested to be dropped by the Wald test. However, a few factor loading parameters were suggested to be added by the LM test. Nevertheless, no changes were made because when those parameters were added, the improvement was not significant.

The correlations between the four first-order factors were moderate or high, ranging from .53 to .75 (Table 1). These correlations suggested that there might be a higher-order factor that may explain the strong relationships among these factors.

### Second-order factor model

Only one factor, health motivation, was included in the second-order factor model, in place of first-order factor covariances. The indices were:  $\chi^2 = 52.145$ ,  $p < .001$ ,  $\chi^2 / df = 2.27$ , CFI = .973, GFI = .951, NFI = .953, NNFI = .957, Standard RMR = .054, RMSEA = .073 (CI = .047, .100). The loadings ranged from .63 to .91 and the R-squared ranged from .39 to .82 (Figure 3). These indices also suggested that the process model fit the data well. The estimates of factor loadings and disturbance terms were along with the figure. The Wald test indicated that no parameters needed to be dropped. Similar suggestions as that of the first-order factor model examination were made by the LM test, but no parameters were added because the model fit did not improve significantly.

The internal consistency (Cronbach  $\alpha$ ) for the total Health Motivation Scale for Physical Activity was .89. For the tendency dimension it was .73, for the intention dimension it was .78, for

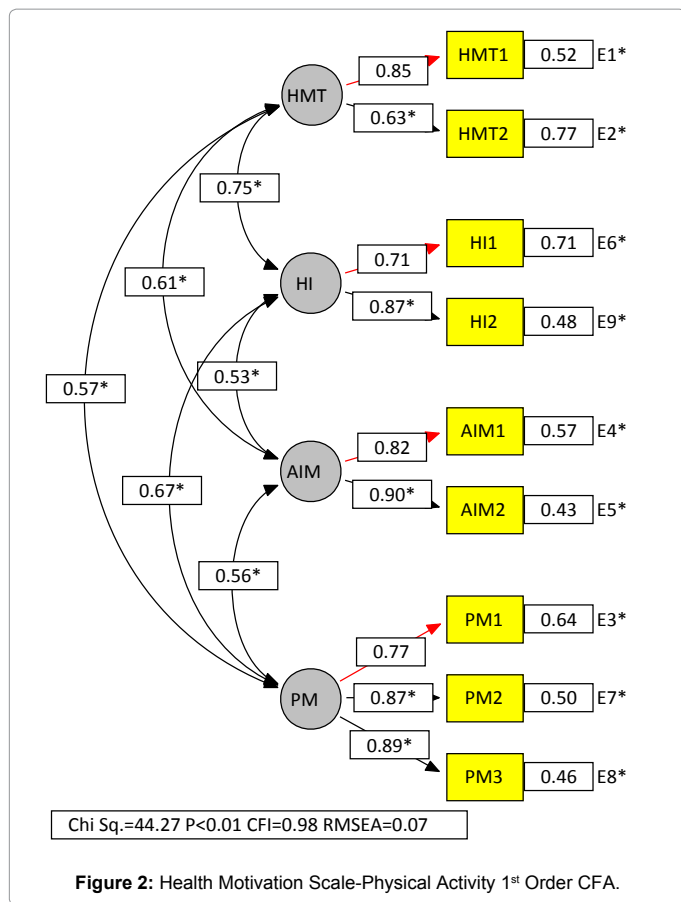


Figure 2: Health Motivation Scale-Physical Activity 1<sup>st</sup> Order CFA.

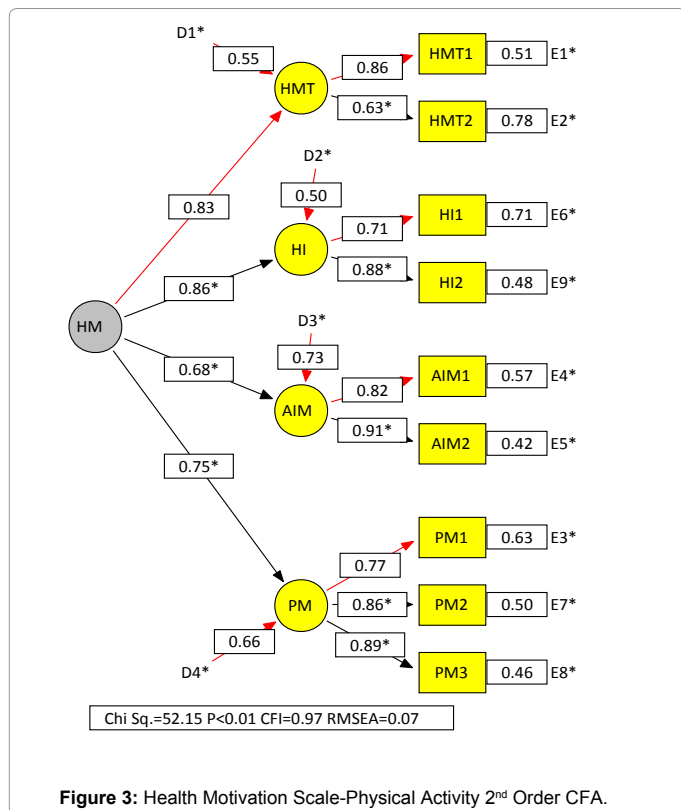


Figure 3: Health Motivation Scale-Physical Activity 2<sup>nd</sup> Order CFA.

	Health Motivation Tendency	Health Intention	Action Initiation	Persistency Motivation
Health Motivation Tendency	1.00			
Health Intention	.75	1.00		
Action Initiation	.61	.53	1.00	
Persistency Motivation	.57	.67	.56	1.00

Table 1: Correlations between the First-order Factors  $p < .05$ ;  $p < .01$ .

the action initiation dimension it was .86, and for the persistency dimension it was .88.

### Path Analysis

The process model of health motivation proposed by Xu suggests that only when individuals' motivation to be healthy is strong enough, will they would move to the step of making plans to stay healthy, then initiate actions, and persist in their actions. Thus, a path analysis was conducted to further test this process model (Figure 4). The fit indices were:  $\chi^2 = 1.636$ ,  $\chi^2 / df = .545$ , CFI = 1.000, NFI = .996, RFI = .979, RMSEA = .000. The loadings ranged from .35 to .94.

### Discussion

The purposes of this study was to evaluate the structural validity of the Health Motivation Scale when it was applied to physical activity among college students. The results supported the structure of the Health Motivation Scale in Physical Activity.

The support for the structure of the Health Motivation scale when it is applied to physical activity is consistent with the structure of the process model of health motivation, and its effectiveness in capturing individuals' health motivation in relation to engagement in physical activities. Given that it has already been applied to healthy eating, it may be possible to broaden its application to other activities such as personal hygiene, safe sex, and many other health behaviors. Future studies could investigate these areas.

As described in the process model of health motivation, internal and external factors influence people's health motivation. If we want to encourage people to engage in physical activities in order to stay healthy, we may stimulate their health motivation using different strategies (e.g., teach them the potential intrinsic rewards of physical activities) and strengthen their health motivation to the degree that they want to perform physical activities. Then, we might assist them to develop plans to engage in physical activities, and help them initiate these activities. Finally we can aim to enhance their health motivation using different strategies to help them persist in their physical activities. However, the practical plan to stimulate, enhance, and strength people's health motivation is not as easy as the description above.

Despite above, the study is limited by its sample being made up of young people from just one university campus in the United States. It is possible that health may be more or less salient across age cohorts as individuals are faced with different health-related issues at different life stages. This may also vary across locations and cultures. The study reported here is cross sectional in nature, so no prospective

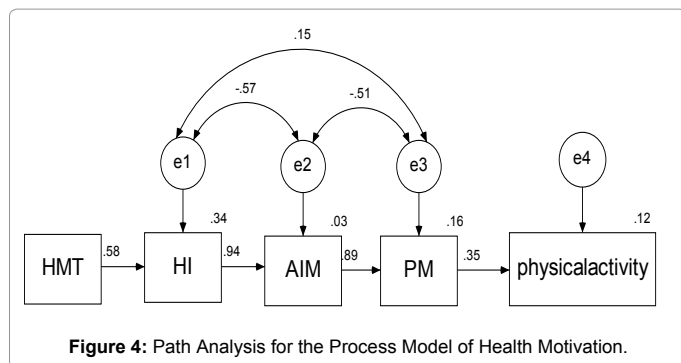


Figure 4: Path Analysis for the Process Model of Health Motivation.

predictive relationships could be determined. Future studies could use a longitudinal design to further explore the relationship between health motivation and physical activity, as well as other variables and health-related behaviors.

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