

# Predictors of Fall Protective Behaviors Among Iranian Community-Dwelling Older Adults: An Application of the Protection Motivation Theory

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**Purpose:** The protection motivation theory (PMT) is a common framework understanding the use of protective behaviors. The aim of this study was to assess the predictors of fall protective behaviors among community-dwelling older adults, Iran.

**Methods:** The cross-sectional study was conducted in Qom, Iran, from May to October 2018. Three hundred older people were selected from retirement centers via stratified sampling method. Data were collected by a questionnaire containing items on socio-demographic information, Falls Behavioral (FaB) Scale, and PMT constructs scale. Data analysis was performed using descriptive statistics and structural equation modeling.

**Results:** The mean (SD) age of the participants was 64.6 (5.5) and the majority were male (77.7%). Level of perceived fall threat was lower than perceived efficacy of fall protective behaviors. There was a significant relationship between protection motivation and fall protective behaviors ( $\beta = 0.515$ ,  $t\text{-value} = 13.650$ ). Coping appraisals ( $\beta = 0.409$ ,  $t\text{-value} = 7.352$ ) and fear ( $\beta = 0.194$ ,  $t\text{-value} = 2.462$ ) were associated with motivation. The model explained approximately 27% of the variance in fall protective behaviors. The goodness of fit index of 0.48 indicating the model good fit.

**Conclusion:** The results indicated that protection motivation, coping appraisals and reasonable fear are considered as the strongest predictors of fall protective behaviors among older people. The results can help health care providers to develop appropriate interventions to fall prevention among older people.

**Keywords:** fall prevention, protection motivation theory, coping appraisals, threat appraisals, aging

## Introduction

A fall refers to an event that results in a person coming to rest inadvertently on the ground or on a lower level, which is a major public health problem worldwide.<sup>1,2</sup> According to the World Health Organization (WHO), 28–35 percent of older people fall every year, and the incidence increases with age.<sup>2</sup> Falls are known to be the main cause of injury, physical inability, and death in older adults.<sup>3</sup> Educational interventions are an important element in health promotion and prevention programs. The effectiveness of which is linked to health behavior theories. The guiding framework derived from health behavior theories can help to understand factors affecting protective behavior to develop effective health promotion programs.<sup>4</sup> The Protection Motivation Theory (PMT), introduced by Rogers (1975) has widely been used as a framework for predicting protective behaviors.<sup>5</sup> Based on PMT, it is assumed that accepting a recommended protective behavior against a health risk is a direct action of one's motivation to protect him/herself. PMT also assesses fear in order to

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predict and encourage people to do protective behaviors,<sup>6</sup> and explains the mediating cognitive processes in terms of threat and coping appraisal. The PMT threat appraisal depends on 1) one’s belief on the seriousness of the perceived problem (perceived severity), 2) one’s estimate of the chance to experience the disease (perceived vulnerability), and 3) one’s belief on positive aspects of her/his unhealthy behavior (perceived rewards). Greater motivation to engage in health-promoting behavior is, therefore, expected if the perceived severity and vulnerability are high and perceived rewards are low. The PMT coping appraisal consists of 1) an individual’s assessment of whether the protective behavior is effective in overcoming the threat (response efficacy), 2) an individual’s belief in his/her abilities to perform protective behavior successfully (self-efficacy), and 3) one’s estimate of any cost such as money, person, time, and effort related to doing protective behavior (perceived response costs).<sup>7</sup> “Response-efficacy” and “self-efficacy” are expected to promote “coping appraisal”, whereas ‘response costs’ are expected to reduce it (Figure 1).

PMT has been widely adopted as a framework for the prediction of and intervention in a range of health-related behaviors such as skin cancer preventive behaviors,<sup>8,9</sup> physical activity,<sup>10</sup> cancer screening,<sup>11,12</sup> tobacco use<sup>13,14</sup> and sexual protective behaviors.<sup>15,16</sup> However, theory-based studies are very limited in terms of fall preventative behaviors. In fact, to the best of our knowledge, there is no study to measure the determinants of fall preventive behaviors using PMT. Determinants of fall preventive behaviors can be considered as a priority for designing appropriate intervention programs. Therefore, this study aimed to assess the predictors of PMT-based preventive fall behaviors among community-dwelling older adults in Iran.

## Method

### Design and Participants

This cross-sectional study conducted from May to October 2018 in Qom, Iran. Three hundred were recruited

from the older peoples who referred to active elderly centers via stratified sampling method. Participants were selected based on the following inclusion criteria: age 60 years or older; living independently in the community; Persian speaking; ability to complete the survey and willing to participate in this study

### Data Collection

The purpose of the study, data collection procedure, and confidentiality of information to the researcher were explained to the participants, followed by obtaining their satisfaction. Data were then collected from the questionnaires conducted in the form of face-to-face interviews over a period of 6 months. Completion lasted for about 20–30 mins for each participant.

### Measurements

We used a questionnaire in three sections follows:

1. Socio-demographic information including age, gender, marital status, educational status, economic status, body mass index (BMI), comorbidity, falls history was asked in the first section of the questionnaire.
2. The fall protective behaviors were measured using the Falls Behavioral (FaB) Scale, originally developed by Clemson (2008) to identify the older person’s awareness of and practice of behaviors that could potentially protect against falls. FaB includes 30 items related to fall prevention behaviors, including cognitive adaptation, protective mobility, avoidance and awareness among others. Respondents are asked to indicate how much each item describes the actions they are in fact doing in their everyday life. Each item of the FaB is rated on a four-level response scale ranging from 1 (never) to 4 (always). An average item score can

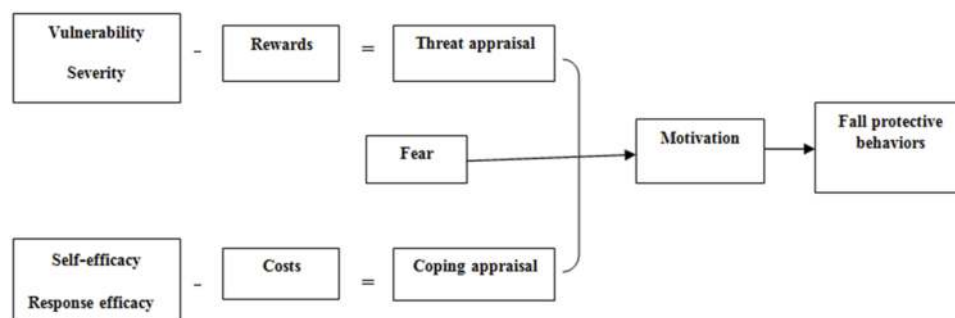


Figure 1 Framework of the Protection Motivation Theory (PMT).

be computed for the respondent after completion of the FaB. Previous evaluation of the original of the FaB indicated good reliability and validity.<sup>17</sup>

3. PMT constructs were assessed using the [PMT scale](#) for behaviors of falls. It was compiled of 35 items, and 8 subscales as follows: perceived vulnerability (3 items, e.g., “I’ll likely fall in the future”), perceived severity (6 items, e.g., “If I fall, I will break and injure my extremities”), fear (3 items, e.g., “When I think of falling, I become anxious”), costs (5 items, e.g., “I do not know how to prevent falls”), rewards (2 items, e.g., “Making things fast is a pleasure for me”), perceived self-efficacy (5 items, e.g., “I can use a cane or auxiliary equipment when needed, even if I seem unable”), response efficacy (6 items, e.g., “Considering the possible dangers of doing things, falls can be prevented”), and protection motivation (5 items, e.g., “I intend to look for new information to protect myself from the falls”). These items were assessed using a 5-point Likert scale from 1 strongly disagree to 5 strongly agree. The score of each subscale was obtained by the average computed as the sum of items of it. Content validity ratio (CVR) and content validity index (CVI) were used to determine content validity. The Result showed high overall CVI and CVR of the PMT scale. CFA confirmed an acceptable eight-factor model fit of the PMT sub-constructs with factor loadings from 0.59 to 0.93. The discriminant validity was verified using Fornell and Larcker method. The Cronbach’s alpha ranged from 0.68 to 0.90 and the test-retest reliability ranged from 0.78 to 0.90, indicating an acceptable result.

## Ethical Considerations

Approval to conduct the study was obtained from the Medical Ethics Committee at Hamadan University of Medical Sciences (registration number: IR.UMSHA.REC.1396.911). The study procedure was explained to the participants who met the eligibility criteria. Written informed consent to participate in the study was obtained from all participants. They were free to withdraw from the study. The study was conducted in accordance with the Declaration of Helsinki.

## Data Analysis

Statistical analyses were completed using SPSS software version 20 and the Partial Least Square (PLS) software version 3. Descriptive statistics were used to summarize the sample characteristics. Pearson correlation coefficients

were computed to assess the relationship between the fall protective behaviors and PMT constructs. Moreover, structural modeling was applied to analyze the strength of influence between the fall protective behaviors and PMT constructs. Regarding the theoretical framework of this study, PMT constructs, as independent variable fall protective behaviors as a dependent variable were included in the model. In the structural model, two important criteria, path coefficient, and R square were used to measure relationships among constructs. The results demonstrate path coefficients for each hypothesized path, while the corresponding t-values that denote the direction and significance of the coefficients along with R square values for the dependent variables.<sup>18</sup> Accordingly, coping appraisals appear to play a greater role than the threat components in predicting fit (GoF) index was calculated to display the model fit to the data.<sup>19</sup>

## Results

### Sample Characteristics

The sample comprised 300 older people of 60–88 years, with a mean age of 64.6 years. Most participants were males (77.7%), married (88.7%), and had low literacy (58.6%). 55% of participants had a history of falls; 24% of those had fallen more than once and 6.3% of participants reported one or more injurious falls. The demographic characteristics of participants are presented in [Table 1](#).

### PMT Constructs About Fall Protective Behaviors

[Table 2](#) shows the means and standard deviations of PMT constructs. Participants rated fear (39%) and susceptibility (47%) as the lowest percentage indicating they did not perceive fall as a serious risk. Rewards (81%), response efficacy (80%), and self-efficacy (73%) were the highest percentage of the mean from the maximum obtainable score.

### Relationships of the PMT Constructs and Behavior Measure

Relationships among PMT constructs and FaB are shown in [Table 2](#). Fall protective behaviors were significantly associated with severity ( $r = 0.176$ ,  $p = 0.009$ ), fear ( $r = 0.158$ ,  $p = 0.019$ ), self-efficacy ( $r = 0.238$ ,  $p < 0.001$ ), and response efficacy ( $r = 0.253$ ,  $p < 0.001$ ), and motivation ( $r = 0.347$ ,  $p < 0.001$ ). No significant associations were observed between other PMT constructs with FaB.

**Table 1** Demographic Characteristics of the Study Sample (n = 300)

Factor	Number	Percent
Age (yr)		
60–64	180	60.0
65–69	69	23.0
≥70	51	17.0
Gender		
Male	233	77.7
Female	67	22.3
Marital status		
Married	266	88.7
Widow & Divorced	34	11.3
Educational level		
Illiterate	77	25.3
Primary school	100	33.3
Secondary school	21	7.4
High school	39	13.0
University	63	21.1
Income		
Poor	211	70.3
Good	89	29.7
Body mass index (kg/m <sup>2</sup> )		
Normal weight (<24.9)	237	81.4
Overweight (≥25.0)	59	18.6
Comorbidity (yes)	225	75.0
Previous falls (yes)	165	55.0
Injury with previous falls (yes)	19	6.3

## Results from the Structural Modeling Analysis

Table 3 and Figure 2 provide the results of the structural model. The model explained 27% of the variance of fall protective behaviors as the dependent variable (R square = 0.265). The R square for protection motivation is 0.278 that suggesting

28% of the variance of protection motivation can be explained by coping appraisals.

Coping appraisals ( $\beta = 0.409$ ,  $t\text{-value} = 7.352$ ) and fear ( $\beta = 0.194$ ,  $t\text{-value} = 2.462$ ) associated with motivation. Also, motivation ( $\beta = 0.515$ ,  $t\text{-value} = 13.650$ ) was associated to fall protective behaviors. No significant associations were observed between threat appraisal with motivation and fall protective behaviors (Table 3).

The model’s predictive power was tested by calculating Q2 indexes of motivation (Q2 = 0.22) and fall protective behaviors (Q2 = 0.13), exceeding the recommended threshold value (Q2 > 0), demonstrating an adequate predictive value of the model. Finally, GoF = 0.48, indicating the model good fit.

## Discussion

The current study utilized a PMT framework to identify the relationship between perceived risk of falls and fall protective behaviors among a community-based sample of older adults. To the best of our knowledge, this is the first study to investigate the applicability of PMT in understanding the fall protective behaviors among older adults. Promising targets for interventions designed to decrease PMT constructs are considered to be key determinants of fall protective behaviors among older people. Based on the protection motivation theory, preventative actions will be of greater attention in a high threat situation when both the self-efficacy and the efficacy of the recommended action are known to be high.<sup>6</sup>

A strong significant association was found between protection motivation and fall protective behaviors supporting previous findings that the intention of human being was generally regarded as the most vital determinant of such behaviors.<sup>20</sup> In the absence of protection motivation, the

**Table 2** Bivariate Correlations of PMT Variables and Fall Behaviors

Variable	Mean (SD)	Percentage <sup>a</sup>	2	3	4	5	6	7	8	9
1. Vulnerability	2.91(0.49)	47	0.234**	0.292**	0.093	-0.049	0.041	0.068	0.097	0.055
2. Severity	3.74(0.55)	68		0.385**	0.192**	0.185**	0.168**	0.026	0.061	0.176**
3. Fear	2.57(1.20)	39			0.056	0.218**	-0.074	0.045	0.121	0.158*
4. Self-efficacy	3.92(0.87)	73				-0.049	0.141*	-0.103	0.597**	0.238**
5. Costs	2.52(1.19)	38					-0.022	0.215**	0.104	-0.003
6. Response efficacy	4.22(0.46)	80						0.083	0.210**	0.253**
7. Rewards	4.23(0.68)	81							0.025	-0.112
8. Motivation	3.18(0.90)	54								0.347**
9. Fall behaviors	2.70(0.35)	56								

Notes: <sup>a</sup>Percentage of mean from maximum obtainable score. \*Significant at the 0.05 level. \*\*Significant at the 0.01 level.

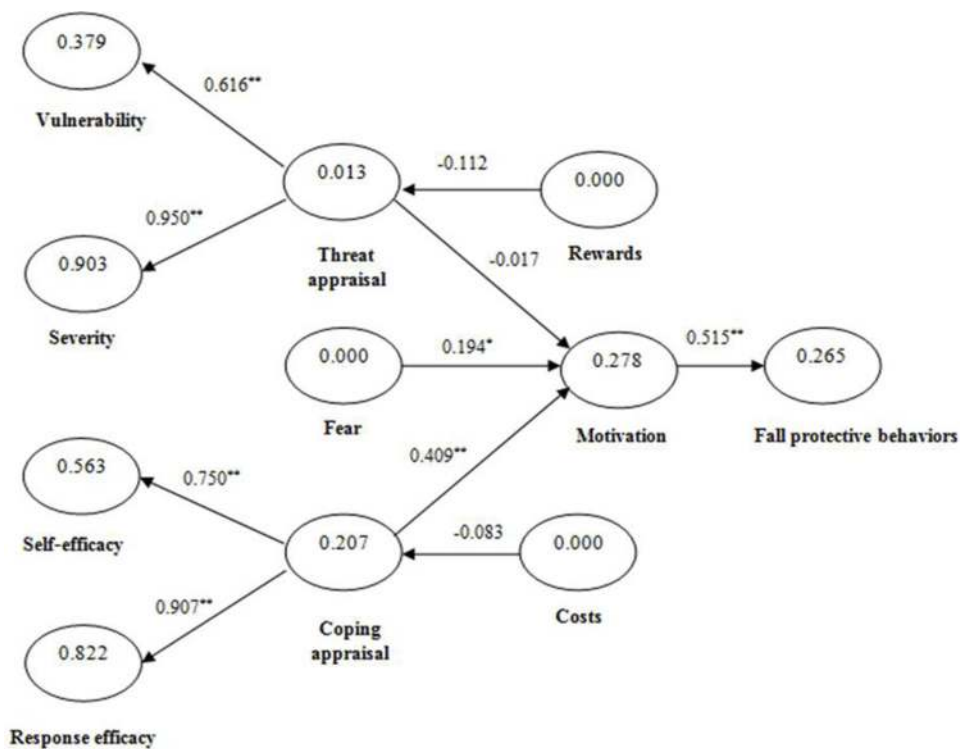
**Table 3** Path Analysis of PMT Fall Prevention Model (n = 300)

Dependent Variable	Independent Variables	Path Confidence	t-value	R Square
Behavior	Motivation	0.515	13.650	0.265
Motivation	Coping appraisal	0.409	7.352	0.278
	Threat appraisal	-0.017	0.050	
	Fear	0.194	2.462	

recommended protective action is judged to be ineffective in averting the threat or impossible to undertake, resulting in no intention to act.<sup>21</sup>

Coping appraisals were identified to have significant positive associations with protection motivation. The strong relationships of the coping appraisal components with fall protective behaviors are similar to those of previous studies showing that coping appraisals to be important in predicting fall protective behaviors.<sup>22</sup> Accordingly, coping appraisals appear to play a greater role than the threat components in predicting intent; however, it would be premature to focus exclusively on coping appraisals without a better understanding of threat appraisal contributions to overall PMT model.<sup>23,24</sup>

Contrary to the current expectations based on the PMT constructs, it is generally seen that none of the threat appraisal components (severity, vulnerability, and maladaptive response rewards) predicted protection motivation and behavior accurately. A possible explanation for this ineffective predictive relationship is that fall protective behavior is less likely to be affected by emotional factors.<sup>25</sup> Additionally, as levels of perceived vulnerability and severity were low based on PMT, people know what to do but are not really motivated to do much, so they should be trained about the risk. Rippletoe and Rogers (1987) reported that high perceived threat could have different consequences, with increasing motivation leading to preventive behaviors in some cases, but resulting in avoidance and denial in other cases.<sup>25</sup>



**Figure 2** Structural equation modeling of fall protective behaviors. \*Significant at the 0.05 level. \*\*Significant at the 0.01 level.



There are several limitations in this study, which should be noted cautiously. First, data used for this study were collected through a cross-sectional survey, which limits the potential for recall and interviewer biases. Longitudinal data design could clarify the direction of influence between variables. Second, given that all our participants were members of elderly centers and only 6.3% had ever been injured due to a fall, the findings of this study might not be generalized to all populations of older people. It is also important to note that the current study focuses on PMT only in terms of fall protective behaviors. Future research can investigate predictors of fall protective behaviors from a more ecological approach by examining PMT constructs accompanied by broader levels of individual and social factors.

## Conclusion

In conclusion, the present study demonstrates that some of the PMT constructs such as protection motivation, coping appraisals and, reasonable fear are useful in understanding fall protective behaviors, and can help health care providers to develop appropriate interventions to fall prevention among older people.

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## Disclosure

The authors report no conflict of interests in this work.

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