Determination of preventive behaviors for pandemic influenza A/H1N1 based on protection motivation theory among female high school students in Isfahan, Iran

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ABSTRACT

Introduction: Influenza A/H1N1 pandemic has recently threatened the health of world's population more than ever. Non-pharmaceutical measures are important to prevent the spread of influenza A/H1N1 and to prevent a pandemic. Effective influenza pandemic management requires understanding of the factors influencing preventive behavioral. This study reports on predictors of students' preventive behaviors for pandemic influenza A/H1N1 using variables based on the protection motivation theory (PMT). **Materials and Methods:** In a cross-sectional study, multiple-stage randomized sampling was used to select 300 female students in Isfahan who completed a questionnaire in December 2009. Data were collected using a self-report questionnaire based on PMT. The statistical analysis of the data included bivariate correlations, Mann-Whitney, Kruskal-Wallis, and linear regression. **Results:** The mean age of participants was 15.62 (SE = 1.1) years old. Majority of participants were aware regarding pandemic influenza A/H1N1 (87.3%, 262 out of 300). Results showed that, protection motivation was highly significant relationship with preventive behavior and predicted 34% of its variance. We found all of the variables with the exception of perceived susceptibility, perceived severity, and response cost were related with protection motivation and explained 22% of its variance. **Conclusion:** Promotion of students' self-efficacy, and intention to protect themselves from a health threat should be priorities of any programs aimed at promoting preventive behaviors among students. It is also concluded that the protection motivation theory may be used in developing countries, like Iran, as a framework for prevention interventions in an attempt to improve the preventive behaviors of students.

Key words: Influenza A/H1N1, preventive behaviors, protection motivation theory

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INTRODUCTION

Nowadays, the spread of infectious diseases across the globe is an important health issue in the society.[1] Respiratory infections are of great importance because of their rapid and extensive spread and their role in mortality of children, adolescents and adults.[2] Influenza A/H1N1 is a highly contagious respiratory disease that it is currently the greatest pandemic disease threat to humankind. This disease affected a large percent of the population with significant morbidity and mortality.[3,4]

According to Center of Disease Control (CDC), signs and symptoms of influenza A/H1N1 are the same as those of

seasonal influenza including fever, cough, sore throat, body pain, headache, lethargy, and fatigue. Some people have digestive symptoms like diarrhea, and nausea.[5,6] One of the concerns of public health is the highly contagious nature of influenza, and its consequent epidemic of disease and death.[7] According to the WHO (2009), current evidence suggests that the main route of human-to-human transmission of the new Influenza A/H1N1 virus is via respiratory droplets, which are expelled by speaking, sneezing or coughing.[8] The probability of transmission through tear or saliva is not certain yet, but all respiratory secretions and fluids of the patients are potentially contaminating. The duration of transmission of this virus is like seasonal influenza. In fact the disease is contagious one day before until 7 days after onset of symptoms.[9-11]

During the pandemic Influenza A/H1N1, preventive behaviors such as face mask use, washing hands, using a tissue when coughing or sneezing, and avoid closely mixing with patients with Influenza-like symptoms have been suggested to be effective in the prevention of the pandemic.[12]

At risk people are those over 65-years old, children aged less than 5-years old, pregnant women, persons with chronic diseases and students.[13,14] On May 2009, more than 700 schools in the US were closed for health reasons. Schools must be prepared a range of threat and hazards and develop plans that address a variety of situation (US Dept. of Education, 2009) cited from CDC 2009.[13]

A greater understanding of the factors associated with preventive behavior pandemic influenza among students is required to inform communication strategies that promote improved preparedness for a pandemic.[13,15] We examined the determinant factors of preventive behaviors with used protection motivation theory (PMT), that it has been widely used in health behavior research and interventions. It was originally (Rogers, 1975) in order to better understand fear appeals and how people to protect themselves from a health threat.[16] It has two assessment stages of threat appraisal (perceived sensitivity, perceived severity, and perceived rewards), and coping appraisal (perceived self-efficacy, perceived response, and perceived costs) and fear, that the outcome of these two stages is protection motivation (intention to protect) and behavior.[17] Several previous studies have investigated protective health behaviors of influenza with used protection motivation theory.[18,19] Jiang *et al.* conducted a study about preventive behaviors to fight against SARS disease using protection motivation theory, and showed that perceived threat and perceived response efficacy regarding the SARS preventive behavior was the most important predictor.[20] Valigosky showed that components of PMT are weak predictors of preventive behavior in infectious diseases.[21] Any studies about perception or preventive behaviors for pandemic influenza with used this theory have not been reported in Iran. Therefore, we explored perception and performance of preventive behaviors for pandemic influenza in female high school students based on protection motivation theory (PMT) in Isfahan, Iran.

MATERIALS AND METHODS

This cross-sectional study was conducted on 300 female high school students of Isfahan in December 2009. Sampling was multi-stage random. There were a total of two high schools for female students in region 4 of Isfahan, which were chosen in the present study. Overall of 6 classes were randomly selected, and then the students were randomly chosen for participating in the present study. The principals of these schools were explained about the objectives of the study and informed consent was obtained from them. The research was approved by the Ethics Committee of the Isfahan University of Medical Sciences. After obtaining permission from education office, questionnaires were given to students. A panel of experts, consisting of 5 scholars in the areas of health behavior, health education, and infectious diseases reviewed and assessed the questions. The feedback from the panel of experts, which was mostly regarding the wording and phrasing of questions, was used to revise and modify the instrument. The final questionnaire was pilot-tested among a sub group of students before the starting of the main study. The data were used to estimate the internal consistency of the scales, using Cronbach's coefficient alpha.

The first section, socio-demographic information was collected for age, students' grade, parents' education, parents' occupational, and annual household income. The second section, 40 statements were created to reflect and capture the PMT constructs. Four items were used to measure perceived sensitivity that for this variable an alpha coefficient of. 58 was reported. Three items were used to measure perceived severity that an alpha coefficient for this scale was 0.63. Response efficacy was assessed by six items that an alpha coefficient of 70 was reported. Self-efficacy was measured by five items that internal reliability was good ($\alpha = 0.82$). Response cost was assessed by four items that for this variable an alpha coefficient of 0.56 was reported. Rewards were measured by three questions items that an alpha coefficient of 0.70 was reported. Fear was measured by three items that an alpha coefficient for this scale was 0.78. Protection motivation was measured by six items that internal reliability was good ($\alpha = 0.86$). All questions, except for preventive behaviors were scored on 5-point likert scale ranging from 1(strongly disagree) to 5 (strongly agree). Preventive behavior was assessed by six items ($\alpha = 0.80$) and using a 4-point scale (1, never; 2, sometimes (2-3 times a day); 3, often times (5 times a day); 4, always).

Statistical analysis was done using SPSS[14] software. Descriptive statistics were used to examine demographic characteristics and study variables. Mann-Whitney and Kruskal-Wallis were done to determine difference in preventive behaviors according to demographic variable categories. Correlation analysis was used to examine the simple association between study variables. Linear regression tests to evaluate how well perceived sensitivity, perceived severity, rewards, self-efficacy, perceived response, and perceived costs predicted the variance in both protection motivation and preventive behaviors. Before doing statistical

testes, normal distribution of quantitative variables was evaluated and confirmed.

RESULTS

Students had a mean age of 15.62 ± 1.1 years with the highest frequency for 15-year-olds (32.7%; *n* = 98), and 16-year-olds (30.3%; *n* = 91). Most parents were high school dropouts (fathers, 53.7%; n = 161, and mothers, 62.7%; *n* = 188). Most fathers were self-employed (44.3%; *n* = 133), and most mothers were housewives (89.3%; *n* = 268). The main sources of information about influenza A/H1N1 were radio and TV (76.3%), family (37.3%), poster (35%), friends (25.3%); only 20% had received health information from health workers.

A summary of the means and standard deviation and Spearman's correlation matrix for all variables are present in Tables 1 and 2.

Almost all the participants, (74%; n = 222) reported that they always washed their hands with soap and water,

and (69.7%; n = 209) always used a tissue when sneezing and coughing, (53.7%; n = 161) kept a distance of at least 1 meter away from suspected people, and (50%; n = 150) avoided contact with sick people.

The significant relationship was between fathers' job and perceived sensitivity (*P* = 0.016). Perceived sensitivity in students whose fathers were jobless was higher. Furthermore, mothers' job was significantly related with preventive behaviors (*P* = 0.027). Preventive behaviors were more in students whose mothers were housewives. We found moderate association between mothers' higher education and obtain information about influenza A/H1N1 (*P* = 0.033). Furthermore, a significant relationship was found between obtain information and self-efficacy (*P* < 0.001), protection motivation (*P* = 0.006) and behavior (*P* = 0.47).

Using the PMT as a guide, a hierarchical regression was conduct. As seen in Figure 1, perceived sensitivity, perceived severity, response efficacy, self-efficacy, response-cost, reward, and fear together explained 22.8% of the variance protection motivation. Response efficacy, self-efficacy, reward, and fear were related to protection motivation, whereas perceived sensitivity, perceived severity, and response-cost were not related. The strongest predictor was response efficacy (β = 0.208) and self-efficacy (β = 0.200). Only reward toward not taken preventive behavior was a significant negative predictor of protection motivation and the other components had high and moderate statistically significant positive association with protection motivation directly. In predicting behavior, Figure 1 shows that protection motivation and PMT predicted 35.8% of the variance in behavior. Protection motivation, response efficacy, self-efficacy, and reward were significant predictors of behavior. The strongest predictor was protection motivation. In predicting protection motivation,

Table 1: Descriptive statistics			
Variable	Mean	Standard deviation	Range
Perceived sensitivity	15.29	2.4	4-20
Perceived severity	11.67	2.24	3-15
Response efficacy	23.47	3.90	6-30
Self-efficacy	19.27	4.39	5-25
Response-cost	11.68	3.12	4-20
Reward	8.84	3.36	3-15
Fear	10.50	3.33	3-15
Protection motivation	23.17	5.76	30-60
Preventive behaviors	18.38	4.96	6-24

Table 2: Spearman's correlation matrix of all variables												
Variable	1	2	3	4	5	6	7	8	9	10	11	12
Age	1											
Perceived sensitivity	0.059	1										
Perceived severity	0.039	0.325**	1									
Response efficacy	0.139*	0.345**	0.394**	1								
Self-efficacy	−0.080	0.327**	0.276**	0.377**	1							
Response-cost	0.102	000	0.027	0.068	−0.095	1						
Rewards	0.209**	−0.171**	−0.039	0.002	0.335**	0.185**	1					
Fear	−0.025	0.116*	0.220**	0.029	0.280**	0.207**	0.014	1				
Threat appraisal	0.086	−0.675**	−0.525**	−0.300**	−0.444**	0.097	0.725**	−0.123*	1			
Coping appraisal	−0.020	0.365**	0.322**	0.671**	0.801**	−0.407**	−0.232**	0.112	−0.409**	1		
Protection motivation	0.006	0.241**	0.213**	0.349**	0.498**	0.025	−0.329**	0.308**	−0.382**	0.443**	1	
Preventive behaviors	−0.024	0.163**	0.149**	0.44**	0.327**	−0.027	−0.263**	0.095	−0.286**	0.337**	0.427**	1

*P<0.05, **P<0.01

Figure 2 shows that threat appraisal and coping appraisal predicted 14.4% of the variance in protection motivation. Between them, the role of coping appraisal (β = 0.262) was more that of threat appraisal (β = -0.179). Threat appraisal, coping appraisal, and protection motivation together predicted 34.5% of preventive behaviors, where the role of protection motivation (β = 0.244) was more than that of coping appraisal (β = 0.224) and threat appraisal (β = -0.112).

DISCUSSION

The most commonly discussions at the time of H1N1 pandemics were of increasing preventive behaviors like frequent hand washing and using a tissue when sneezing and coughing.[22,23] In the present study, preventive behaviors were presented in the framework of PMT. In the present study, the total score of behavior was 77%, which is suitable. The most prevalent predictive behavior was frequent hand washing with soap and water. Rubin *et al.* reported that 40% of participants did preventive behaviors at the time of influenza A/H1N1 pandemics.[24] Akan *et al.* reported some preventive behaviors (washing hands and general hygiene) to be 53.5% among university students.[25] Van *et al.* found that 61.8% of the participants did not do any of the preventive behaviors, which is high as compared with our results.[26]

In line with PMT-relations, univariate results from the present study showed that perceived sensitivity and perceived severity were positively and significantly related. This finding contradicts the result of Kok *et al.*,[27] but corresponds with that of Park *et al.*,[22] and Valigosky.[23] The present study showed a strong and significant relationship between perceived severity and response efficacy in that people who had a higher perceived severity about the risks of influenza A/H1N1 reported higher response efficacy. McCool *et al.* found the same result in their study.[28]

The results of the present study showed a highly significant relationship of protection motivation with preventive behavior of influenza A/H1N1. This subject shows that if the person has more intension to do a behavior, the chances that he does the behavior are higher.

One of the stronger findings is that all variable in the protection motivation theory explained 22.8% of the variance in protection motivation and 35.8% of the variance in preventive behavior [Figure 1]. Both perceived severity and sensitivity are components of threat appraisal that in this study two components were small predicted of protection motivation. Furthermore, response efficacy and self-efficacy were the strongest predictions of protection motivation, which is in line with that of Barnett *et al.*[29] The effect sizes of such two components in previous meta-analyses were medium and barely predicted of protection motivation and behavior compared to the components of coping appraisal (response efficacy and self-efficacy).[30,31] Other studies showed
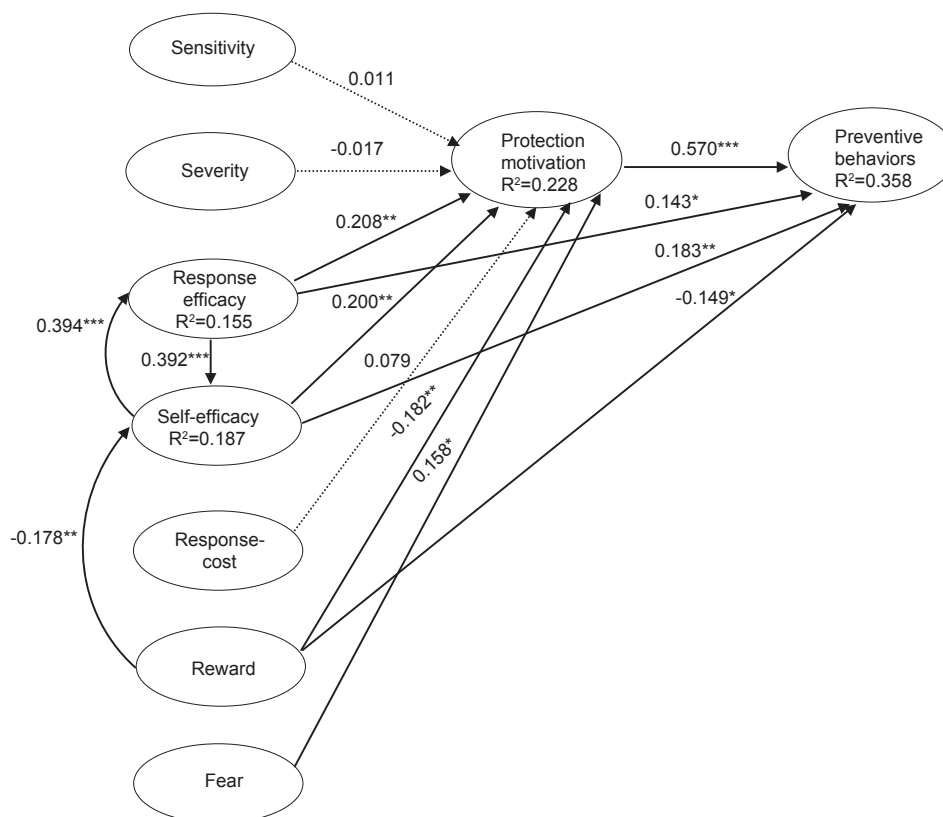

Figure 1: Presents the results from the path analysis which was conducted to examine the direct and indirect effects of the PMT components on the protection motivation and preventive behavior
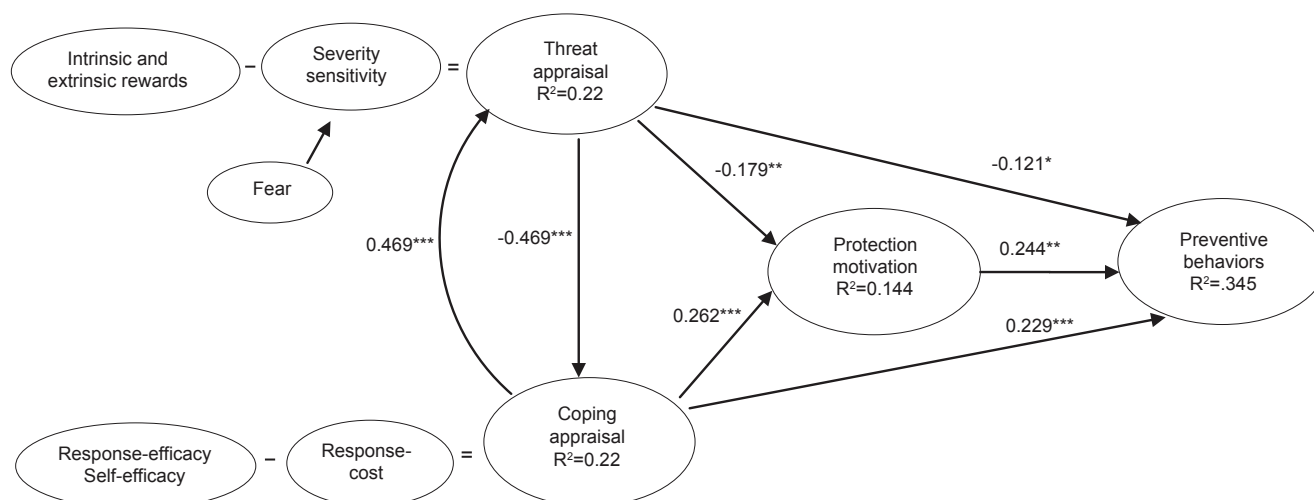
Figure 2: Presents the results from the path analysis, which was conducted to examining the effects two variables, threat appraisal and coping appraisal on the protection motivation and preventive behavior

that perceived efficacy of preventive behaviors of SARS, bird flu and swine flu were related with doing preventive behaviors.[32,33] We also find that self-efficacy was the second most important predictive of behaviour after protection motivation.

The present study coping appraisal predicted protection motivation and preventive behavior more than threat appraisal. Negative association was found for threat appraisal with protection motivation and preventive behavior. Grunfeld *et al.* expressed that threat appraisal and after that coping appraisal were stronger predictors of intention to perform safe sun exposure behaviors.[34]

One of the restrictions was difficulty in measuring the functioning because of using self-reporting questionnaire in this study. Moreover, studying only female students in one region of Isfahan is another restraint in this study. In attention people's attitude affected their behavior with regard to protecting themselves against influenza A/H1N1; it is recommended that attempt to improve people's performance in epidemics. The results of this study show the application of PMT in predicting behavior, so it can be used to devise training programs and interventional techniques to change attitude and behavior of students. The study points to issues that warrant attention in future prevention and preparedness efforts against influenza A/H1N 1.

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