COVID-19 Protective Behaviors among Iran's Health System Workers: Psychological Theoretic Design Analysis

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Research Article

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Abstract

Background & Aim: Health system staff is as first front line to combat corona disease, and probability of risk of infection to COVID-19 are more in them. This study aimed to investigate protective behaviors related to COVID-19 in Iranian health system staff using a psychological theoretical framework - EPPM (Extended Parallel Process Model) case.

Methods: The current study was in cross-sectional design and performed online from May 4 to July 22, 2020 on 418 individuals selected from Iranian health system staff including (physician, nurse & laboratory technician, health worker, administrative staff, radiologist). Data was gathered using valid and reliable electronic questionnaire designed based on EPPM which assesses relations of constructs (perceived susceptibility, perceived severity, perceived self-efficacy, and perceived response-efficacy) with the intention and performing protective behaviors) and published through Porsline site. Data was analyzed using descriptive statistics, t–test, analysis of variance, and regression in SPSS software version 16.

Results: Most individuals (40.4%) were in age group of 30-40, which (72%) were married and majority of them was woman (70.6%). Pearson correlation test showed significant association among performing protective behaviors and constructs of perceived self-efficacy (r=0.373, P=0.000), perceived response-efficacy (r=0.120, P=0.014), and intention (r=0.462, P=0.000). Multiple regression analysis recognizes perceived self-efficacy (P=0.000; Beta=0.398), and behavioral intention (P=0.000; Beta=0.283) as predictors of performing protective behaviors. Results of descriptive statistical analysis in order to determine critical point based on EPPM showed that 35.4% of health system staff with critical point lesser than 1, were in fear control process and 34.4% of individuals with critical point more than 1 are involved in danger control process.

Conclusion: Only, one third of health system staff is involved in process of controlling risk of COVID19. Motivation of protection in health system staff is established in case of perception self-efficacy as well as perception efficacy on COVID-19 preventive behaviors. Therefore, programming to perform interventions based on EPPM by emphasis on strategies of promoting perceived self-efficacy and perceived response-efficacy in order to improve performing protective behaviors in this highly vulnerable subgroup is seriously recommended.

Introduction

COVID-19 disease is an acute respiratory disease which as a result of rapid spread, world health organization (WHO) introduced it as a public health emergency and international concern, and was announced as a pandemic disease in March 2020 (1). According to WHO website until October 26th 2020, more than 42966344 cases have been approved and 1152604 cases of death caused by this disease around the world (2), and in Iran, 568896 definite cases and 32616 cases of death (3) were reported. Health system staff is as first front line to combat corona disease, which every day, due to long and uncomfortable work shifts and due to increase in work load to save patients' life, risk of infection of them is increased (4). So that, at first stage of COVID-19 disease pandemic, it was reported that infected nurses account for 29% of all hospitalized patients with COVID-19 (5). Individuals during facing to life-threatening disease or factor make a general image and specific belief on disease and its treatment in their mind which is named disease perception. Disease perception is effective in individual's behavior, adaptation with disease and self-control of the disease. Application of psychological models leads to correct perception on the disease, awareness on complications and perception of importance of prevention of the disease (6). The extended parallel process model (EPPM) which was presented by Kim White at 1992 is of importance and good fitness in this regard. Based on EPPM, if the individuals believe that they are at risk of disease or life-threat (perceived susceptibility), and perceive depth of this risk and its various serious complications in their life (perceived severity), subsequently appraisal of self-efficacy and response efficacy is initiated (7). Relation among constructs of the model is presented in Fig. 1 (8). Theoretical framework of this model is based on that, individuals during facing to risk factor and threat follow one of two pathways based on their perceived self-efficacy and risk analysis: *1, Danger Control;* provides the individual the ability to do preventive action against risk or exposing factor, and *2, Fear Control;* which causes that individual perform a passive mechanism while facing risk and avoid preventive behaviors (9). In case of performing threat appraisal and subsequently assessment of perceived self-efficacy and perceived response-efficacy, probability of attitude change, intention and behavior will be increased (10). Therefore, EPPM plays effective role in prevention and control many high risk behaviors prior to facing to risk factor and/or after facing it (11). Due to high prevalence of COVID-19 and high vulnerability of health system staff to

this emergence, this study aimed to assess protective behaviors related to COVID-19 among Iranian health system staff using psychological theoretic framework of EPPM.

Methods

Study Design & Population

The current study was conducted in cross-sectional design and online from May 4 to July 22, 2020 on 418 Iranian health staff including (Nurse, Physician, Health worker, Laboratory technician & Radiologist, Administrative staff). Inclusion criteria were staff employ in all centers of Iranian health system, those tended to participate in study and also access to internet to respond questions of electronic questionnaire, and exclusion criteria were refusing to continue cooperation in responding questions of the questionnaire as well as incomplete questionnaires. Data was gathered using electronic questionnaire published through Porsline website. In order to perform this, a general announcement was sent in websites and social media through Telegram and WhatsApp in order to invite to participate. In addition, messages were sent to several influential people such as some managers of hospitals and health centers whom had access to health system staff in order to share questionnaire link. The required sample size was determined at 422 individuals based on equation below considering d = 0.05, P = 0.5, Z = 0.95 and by probability of 10% attrition rate.

$$n = \frac{Z_{۱-\frac{\alpha}{۲}} P(۱-P)}{d^{۲}}$$

Theoretical Framework & Measures

Data gathering tool in this study was a researcher-made questionnaire including demographic characteristics with 8 questions (age, gender, marital status, educational level, job experience and etc.) and questions related to constructs of EPPM with six questions as below:

- The perceived susceptibility which shows individual's perception on degree of vulnerability to COVID-19 was measured by the item (I am worry to be infected by COVID-19) and based on 3-point Likert scale *"Agree, No Idea, and Disagree"*.
- The perceived severity which refers to individual' perception on severity of risk of COVID-19 was measured by item (COVID-19 is a fatal and hazardous disease) and based on 3-point Likert scale of *"Agree, No Idea, and Disagree"*.
- Perceived self-efficacy shows assurance by the individual on his/her ability to perform protective behaviors to COVID-19, and was measured by item of (I can do COVID-19 protective behaviors every day such as wearing a masks, gloves, specific cloths, and etc.) and based on 3-point Likert scale of *"Agree, No Idea, and Disagree"*.
- Perceived response-efficacy means whether protective behaviors are able to prevent COVID-19. This construct was measured by item of (Daily performing protective behaviors - such as wearing a masks, gloves, specific cloths, and etc. - protects me from infecting by COVID-19) and based on 3-point Likert scale of *"Agree, No Idea, and Disagree"*.
- Intention to do protective behaviors on COVID-19 was measured by item of (I intent to do protective behaviors up to end of epidemic of COVID-19 such as wearing a masks, gloves, specific cloths, and etc.) and based on 3-point Likert scale of *"Agree, No Idea, and Disagree"*.
- Doing protective behaviors by health system staff was measured by item of (I currently do protective behaviors regularly in my work shift such as wearing masks, gloves, specific cloths, and etc.) and was evaluated by 5-point scale of *"Never, Rarely, Sometimes, Often, and Always"*.

Scoring of questions was so that options of *I agree*, *No idea* and *I disagree* were allocated 3, 2 and 1 scores respectively. Regarding behavior, scores of 1–5 were considered for options of *Never*, *Rarely*, *Sometimes*, *Often* and *Always*, respectively.

Validity & Reliability

Content validity of questionnaire was assessed by a survey of 10 specialists of health education and health promotion and communicable diseases. For this purpose, the designed questionnaire was provided to them based on EPPM through email, and the modifications were resolved and the questionnaire was confirmed regarding (CVR: 0.81, CVI: 0.79). Evaluation of reliability of questionnaire was also confirmed through internal consistency (Cronbach's alpha = 0.7).

Data Analysis & Crisis Point Determination

Results were analyzed by SPSS software version 16 and statistical tests (descriptive statistical tests, independent t-test to compare means, ANOVA test, Pearson correlation test to compare mean in subgroups of the study, and multiple regression for prediction of intention and behavior). In order to determine critical point, threat subtraction (the sum of perceived susceptibility and perceived severity) of efficacy (sum of perceived self-efficacy and perceived response-efficacy) was used.

Results

In total, 418 respondents were entered in the final analysis and results showed that most individuals (40.4%) aged 30–40 years old, whom 72% were married, and majority of them was woman (70.6%), 49.5% had Bachelor degree and 53.6% of the staff had job experience more than 10 years (Table 1). Results of assessment of relation among EPPM constructs and demographic variables are presented in Table 2, according to findings, there was significant statistical association among financial status and constructs of perceived severity (P = 0.002), perceived self-efficacy (0.041), and behavior (P = 0.044), variable of job and construct of perceived response-efficacy (p = 0.039), in addition variable of gender and constructs of perceived self-efficacy (P = 0.037), and behavior (P = 0.043), no significant association was observed in other demographic variables with constructs of EPPM. Pearson correlation test was used to assess association among constructs of EPPM, so that there was significant association among constructs of perceived susceptibility and perceived severity (r = 0.286, P = 0.000), perceived self-efficacy and perceived response-efficacy (r = 0.237, P = 0.000), perceived self-efficacy and intention (r = 0.225, P = 0.000), intention and perceived response-efficacy (r = 0.147, P = 0.003), and also doing protective behavior regarding COVID-19 with perceived self-efficacy constructs (r = 0.373, P = 0.000), perceived response-efficacy (r = 0.120, 0.014), and intention (r = 0.462, 0.000). All of the associations were positive (Table 3).

Table 1
Characteristics of health system staff involved in study

Variable	*N (%)*
Age	87 (20.8)
20–29	169 (40.4)
30–39	142 (34)
40 & more	398 (95.2)
Total	
Gender	123 (29.4)
Male	295 (70.6)
Female	418 (100)
Total	
Marriage Status	117 (28)
Single	301 (72)
Married	418 (100)
Total	
Number of Children	154 (36.8)
No	100 (23.9)
One	150 (35.9)
Two & more	404 (96.7)
Total	
Education Status	72 (17.2)
Associate Degree	207 (49.5)
Bachelor	132 (31.6)
Master degree and higher	411 (98.3)
Total	
Economic status	42 (10)
Poor	278 (66.5)
Not good, not bad	98 (23.4)
Good	418 (100)
Total	

Variable	*N (%)*
Occupational status	133 (31.8)
Nurse	171 (40.9)
Health worker	29 (6.9)
Physician	32 (7.7)
Laboratory technician & Radiologist	52 (12.4)
Administrative staff	417 (99.8)
Total	
Work experience	106 (25.4)
1–5 years	80 (19.1)
6–10 years	224 (53.6)
10 & more	410 (98.1)
Total	

Table 2
Relationship between EPPM constructs and demographic characteristics of participants

	Susceptibility	Severity	Self-efficacy	Response-efficacy	Intention	Behavior
	Mean (SD)	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*
Age	2.59 (0.70)	2.25	2.52 (0.77)	2.27 (0.81)	2.77 (0.49)	4.03 (1.06)
20–29	2.63 (0.67)	2.31	2.47 (0.79)	2.44 (0.76)	2.79 (0.48)	4.07 (1.13)
30–39	2.63 (0.62)	2.26	2.66 (0.67)	2.46 (0.79)	2.80 (0.50)	4.16 (0.99)
40 & more	0.907	0.801	0.078	0.174	0.840	0.595
P-value						
Number of Children	2.67 (0.64)	2.26	2.56 (0.74)	2.29 (0.80)	2.83 (0.43)	4.16 (1.00)
No	2.64 (0.65)	2.26	2.47 (0.79)	2.45 (0.74)	2.73 (0.52)	4.01 (1.05)
One	2.60 (0.66)	2.30	2.60 (0.71)	2.50 (0.78)	2.82 (0.47)	4.04 (1.12)
Two & more	0.660	0.920	0.363	0.069	0.197	0.439
P-value						
Education Status	2.56 (0.66)	2.18	2.56 (0.72)	2.38 (0.77)	2.80 (0.52)	4.15 (1.07)
Associate Degree	2.67 (0.62)	2.23	2.51 (0.77)	2.38 (0.82)	2.77 (0.50)	4.02 (1.06)
Bachelor	2.57 (0.71)	2.41	2.64 (0.70)	2.45 (0.74)	2.81 (0.47)	4.18 (1.06)
Master degree and higher	0.291	0.093	0.282	0.722	0.753	0.341
P-value						
Economic status	2.61 (0.69)	2.61	2.30 (0.89)	2.23 (0.84)	2.78 (0.47)	3.71 (1.13)
Poor	2.63 (0.64)	2.30	2.57 (0.72)	2.38 (0.78)	2.79 (0.50)	4.15 (1.04)
Not good, not bad	2.62 (0.68)	2.07	2.65 (0.70)	2.53 (0.74)	2.80 (0.46)	4.11 (1.07)
	0.975					
Good		0.002*	0.041*	0.105	0.962	0.044*
P-value						

	Susceptibility	Severity	Self-efficacy	Response-efficacy	Intention	Behavior
	Mean (SD)	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*
Occupational status	2.63 (0.67)	2.36	2.51 (0.79)	2.30 (0.83)	2.80 (0.46)	4.24 (0.93)
Nurse	2.66 (0.63)	2.22	2.54 (0.75)	2.50 (0.73)	2.78 (0.50)	3.96 (1.12)
Health worker	2.58 (0.73)	2.24	2.55 (0.73)	2.10 (0.85)	2.79 (0.49)	4.17 (1.10)
Physician	2.71 (0.58)	2.18	2.71 (0.63)	2.37 (0.83)	2.96 (0.17)	4.31 (0.78)
Laboratory technician & Radiologist	2.51 (0.67)	2.34	2.65 (0.65)	2.51 (0.69)	2.69 (0.64)	4.00 (1.26)
Administrative staff	0.633	0.611	0.580	0.039*	0.178	0.140
P-value						
Work experience	2.61 (0.69)	2.21	2.47 (0.81)	2.28 (0.78)	2.80 (0.46)	3.98 (1.04)
1–5 years	2.67 (0.66)	2.36	2.51 (0.74)	2.40 (0.78)	2.73 (0.56)	4.10 (1.12)
6–10 years	2.64 (0.63)	2.28	2.62 (0.70)	2.45 (0.78)	2.82 (0.45)	4.14 (1.04)
10 & more	0.747	0.526	0.173	0.164	0.412	0.413
P-value						
Gender	2.58 (0.71)	2.34	2.44 (.081)	2.34 (0.81)	2.76 (0.51)	3.93 (1.08)
Male	2.65 (0.63)	2.26	2.61 (0.70)	2.43 (0.77)	2.80 (0.48)	4.16 (1.05)
Female	0.277	0.382	0.037*	0.286	0.434	0.043*
P-value						
Marriage status	2.64 (0.65)	2.25	2.58 (0.75)	2.43 (0.79)	2.79 (0.49)	4.08 (1.06)
Single	2.59 (0.68)	2.35	2.58 (0.72)	2.33 (0.77)	2.79 (0.50)	4.13 (1.06)
Married	0.530	0.269	0.772	0.232	0.988	0.665
P-value						

Table 3
Correlations among EPPM constructs' scores in participants

	Susceptibility	Severity	Self-efficacy	Response-efficacy	Intention	Behavior
Susceptibility		0.281**	-0.020	0.031	0.083	0.080
Pearson correlation		0.000	0.686	0.533	0.090	0.102
P-value						
Severity	0.281**		-0.019	0.034	0.025	0.023
Pearson correlation	0.000		0.694	0.492	0.610	0.632
P-value						
Self-efficacy	-0.020	-0.019		0.237**	0.225**	0.373**
Pearson correlation	0.686	0.694		0.000	0.000	0.000
P-value						
Response efficacy	0.031	0.034	0.237**		0.147**	0.014
Pearson correlation	0.533	0.492	0.000		0.003	0.418
P-value						
Intention	0.083	0.025	0.225**	0.147**		0.462**
Pearson correlation	0.090	0.610	0.000	0.003		0.000
P-value						
Behavior	0.080	0.023	0.373**	0.120*	0.462**	
Pearson correlation	0.102	0.632	0.000	0.014	0.000	
P-value						
N: 418, **: P-value = 0.01, *: P-value = 0.05						

At first phase of multiple regression analysis, in order to predict intention using EPPM constructs it was identified that amongst constructs of perceived susceptibility, perceived severity, and perceived self-efficacy and perceived response-efficacy in the analyzed model, two variables of perceived self-efficacy (p = 0.000), and perceived response-efficacy (p = 0.043) were predictors of intention, which these variables explain 6% of changes of intention in total. In addition, by increasing one standard deviation in perceived self-efficacy score and perceived response-efficacy, the score of intention was increased 0.20, and 0.10, respectively (Table 4). At the second phase of multiple regression analysis, in order to predict performing protective behaviors using constructs of EPPM, it was identified amongst constructs of perceived susceptibility, perceived severity and perceived self-efficacy and intention in the analyzed model, two variables of perceived self-efficacy (p = 0.000), and intention (p = 0.000) were predictors of doing protective behaviors, which these variables explain 28% of behavioral change totally. So that by increasing one standard deviation in scores of intention and perceived self-efficacy, score of behavior was increased 39.0 and 28.0, respectively (Table 4).

Table 4
Regression findings for prediction of COVID-19 protective intentions and behaviors

Dependent variable	Predictor variable	B	SE	Beta	T	P
Intention	*Constant*	2.300	0.101	-	22.880	0.000
	Self-efficacy	0.134	0.033	0.201	4.108	0.000
	Response efficacy	0. 063	0.031	0.100	2.032	0.043
	R= 0.245	**R^2= 0.060**	**ADJ.R^2= .055**			
Behavior	*Constant*	0.666	0.271	-	2.456	0.014
	Intention	0.856	0.091	0.398	9.370	0.000
	Self-efficacy	0.405	0.61	0.283	6.572	0.000
	R= 0.538	**R^2= 0.289**	**ADJ.R^2= .286**			

Results of descriptive statistical analysis in order to determine critical point in EPPM showed that in 148 individuals (35.4%) of health system staff with critical point lesser than one, which are at process of fear control, probability of not doing protective behavior, and in 144 individuals (34.4%) with critical point more than one whom are in danger control process, there is probability of doing protective behavior, and 126 individuals (30.1%) with critical point of zero were indifferent to protective behavior of COVID-19 and were borderline (See. Chart 1).

Discussion

This study aimed to determine protective behaviors related to COVID-19 in Iranian health staff using a psychological theoretic framework of EPPM. In the current study, only 8.47% of health system staff regularly used protective behaviors against COVID-19 (such as; wearing masks, gloves, specific cloths, and etc.) and other cases are undesirable. So that according to recommendations of WHO, regular use of mask and glove in all caring procedures at the time of COVID-19 pandemic is essential (12). The present evidences indicate that at the first stage of COVID-19 pandemic, 29% of all patients were infected nurses (5), performing protective behaviors against diseases and injuries of job environment amongst staff and students of health and treatment section such as nurses and physicians was not desirable in other studies (13, 14). These findings are in line with the current study while inconsistent with the results of the currents study, findings of the study by Rajura et al showed that 85% of Indian physicians and nurses wore mask at the time of epidemic of H1N1 influenza at their work environment (15). Results of the study by Shirahmadi et al also showed that more than 70% of participants did recommended behaviors against COVID-19 (25). Consolo et al also reported similar results (16). It seems that reason for this inconsistency with other studies and also reasons for undesirable level of these behaviors in the current study might be low awareness, lack of habit to use protective tools for long-term, interaction with other duties, time-wasting, high level of tiredness and low perception of importance of adhering to health and protective principles and also limitation in providing protective facilities and equipment. Subsequently in order to promote level of awareness, attitude, and performance of health system staff, interventions such as regular supervision on adhering to protective principles by staff, appropriate and effective educations to this vulnerable group and also more considering by authorities and managers to provide requirements seem to be necessary. In addition, results of the study showed that to determine critical point based on EPPM, approximately equally, 35.4% of health system staffs were in fear control process (defensive avoidance, oppositeness, disagreement), and 30.1% were indifferent to do protective behaviors to prevent COVID-19, and only 34.4%, means one third of health system staff were faced to COVID-19 in danger control process (change in attitude, intention and behavior). In other words, health system staff were not at a desirable level regarding coping appraisal and prevention. In contrast, perceived susceptibility and perceived severity and thoroughly perceived threat of individuals was assessed approximately well. Critical point is a key concept in EPPM, and occurs when the individuals despite high perceived threat, realize some reasons such as the recommended approach is not effective or ways of defeating against the risk or problem is high cost and requires time, or they have low perceived self-efficacy, therefore, they believe that they do not have ability to repel and prevent occurrence of an important threat such as COVID-19, at the time process of fear control overcomes process of danger control (10). Results of the current study were in line

with finding of the studies performed with the extended parallel process model in health topics, behaviors and hazards (6, 17, and 18). Additionally, in assessment of variables of EPPM by Rimal et al, it was identified that individuals with high perceived risk and high perceived efficacy, showed more self-protective behavior comparing to those who are inactive, indifferent and avoidant (19). Since, we expect that health system staff are at highest level of threat and efficacy and experience process of danger control, and since it seems that according to results, dose of fear and threat made by mental pressure of COVID-19 becomes excessive in Iranian health system staff- which such over dose fear is induced approximately around the world- it is necessary to consider more precise programming to promote self-efficacy level of staff to perform protective behaviors and emphasize efficacy of the recommended practices and approaches in addition to produce and publish messages containing threat in programs of staff re-teachings and educations to promote protective behaviors, which is based on comments of White indicating that messages with strong fear attraction along with high efficacy produces more behavioral change, while messages with strong fear attraction and low efficacy produces more defensive responses (10).

Based on results of multiple regression analysis in this research, perceived self-efficacy was predictor of doing self-protective behaviors. Prediction by perceived self-efficacy represents this point that promotion of staff's confidence belief on applying self-protective behaviors in every conditions can be effective in improvement of prevention from COVID-19. Perceived self-efficacy was also considerable as a predicting factor of behavior in other studies (20, 21). Decreasing work shifts and subsequently resolving physical and mental tiredness of health staff and injecting new auxiliary labor to system and teaching to use relaxation techniques as well as using encouragement and motivating approaches are effective strategies which can be applied regarding promoting self-efficacy of individuals. In addition, interventions should concentrate on educations to increase perception of individuals on usefulness and efficacy of protective behaviors along with providing better technical and protective facilities and equipment in hospitals and centers.

Strengths & Limitations

The strength of this study was using online sampling method through Porsline website to complete data which provides possibility of well-timed gathering of wide spectrum of health system staff in Iran. Since, other methods of data gathering were insecure and difficult for researchers and participants at acute condition of COVID-19 disease. One limitation of the study was self–report measurement of behavior - that is unavoidable in such researches - which can produce bias and present false information.

Conclusion

Health system staff had not appropriate status to control risk of COVID-19. Motivation of protection is established in health system staff in case of perceiving self-efficacy as well as perceiving efficacy of COVID-19 preventive behaviors. Therefore, programming to perform interventions based on EPPM by emphasis on strategies of promoting self-efficacy and response-efficacy in order to improve performing protective behaviors in this highly vulnerable subgroup is seriously recommended.

Declarations

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Author Contributions

K.GH. and F.H. wrote the main manuscript text and S.R. and M.GH. Performed data analysis and prepared Table 1-3 and Chart 1. M.Gh. did the final writing of the manuscript. All of the authors provided critical review and provided critical comments. All authors have read and approved the final version of manuscript.

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Availability of data and materials

The datasets used during the current study are available from the corresponding author on a reasonable request.

Ethic declarations

Ethical Approval and Consent to Participate

This article is extracted from the project approved by research committee of Shahid Beheshti University of Medical Sciences with the approval code of 23218 and ethical code of IR.SBMU.PHNS.REC.1399.040. This project adhered the relevant guidelines and regulations. All participants completed a written informed consent to participate as per the requirements of the ethics approval. The authors are attesting that the participants were aware of the study purpose, risks, and benefits. Questionnaire address: https://survey.porsline.ir/s/JQmjGGp/

Consent for publication

Not applicable.

Competing interests

The study authors declare no competing interests

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Figures

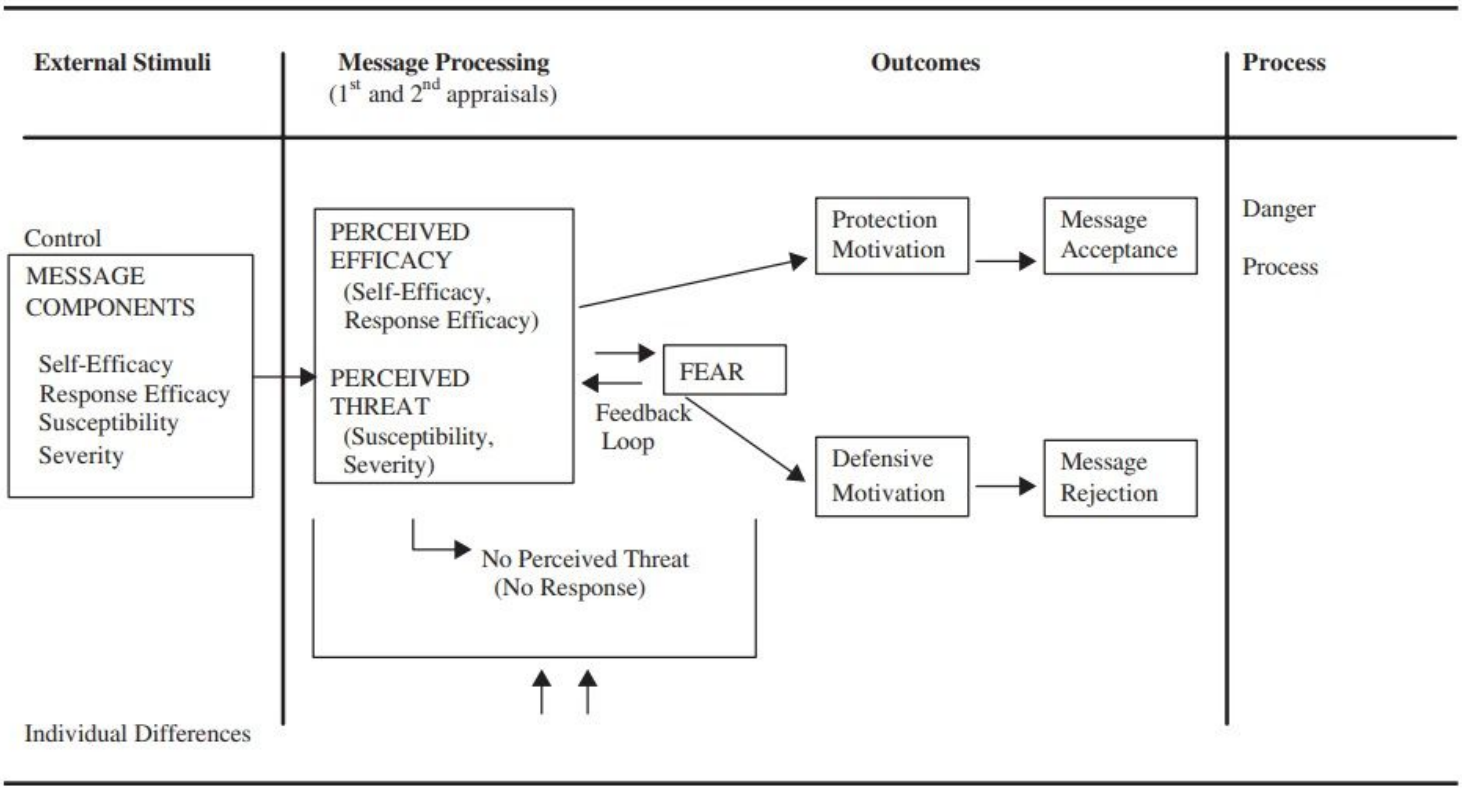

Figure 1

Witte's Extended Parallel Process Model (EPPM)

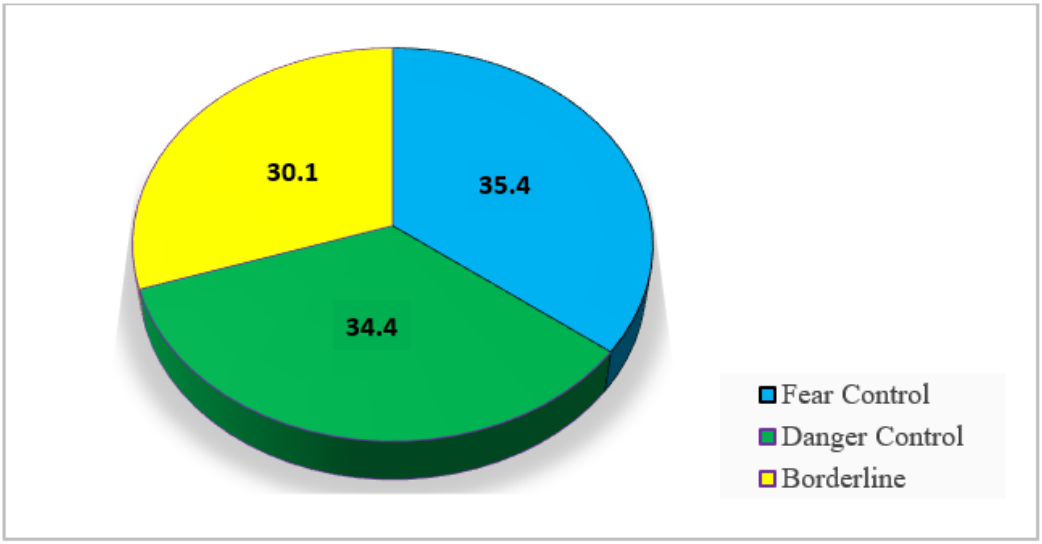

Figure 2

Chart 1- Determination of crisis point based on EPPM for Participants