Psychometric Properties of Coronavirus Infection Risk Perception Questionnaire with a Working Life Approach

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ABSTRACT

Background: Coronavirus is a viral disease with a fast-spreading rate. It has become a pandemic. For preventing the covid-19 infection, respect for health protocols is necessary. The level of adherence to the protocols depends on one's risk perception. To measure the level of risk perception, a valid and reliable measurement tool is needed. The present study is an attempt to evaluate the psychometric properties of the coronavirus infection risk perception (CIRP) questionnaire, with a working life approach. **Methods**: The article concentrated on the generation, translation, cross-cultural adaptation, and psychometric properties of the CIRP questionnaire. In this cross-sectional study, authors generated an item pool, extracted from the literature relating to risk perception in COVID-19 disease. 228 people participated in the study. The initial scale, consisting of 41 Items, was produced from literature. A scale, containing 26 Items, appeared as a result of Exploratory Factor Analysis (EFA). Cronbach's alpha was used to measure the internal consistency. Data analysis was conducted at a 95% confidence level. Data were analyzed using the SPSS statistical version (V. 21). **Results**: Exploratory factor analysis of the scale, explained 45.3% of the variance observed. In addition to the analyses indicated, satisfactory results for internal consistency (Cronbach's alpha ranging from 0.72 to 0.87) and intra-class correlation (ranging from 0.79 to 0.94) were obtained. **Conclusion**: This study generated the Persian-language version of the CIRP, for Iranian individuals through psychometric testing, to measure risk perception. This questionnaire is reliable for measuring people's CIRP.

Keywords: Psychometric ; pandemic; Risk Perception; COVID-19

Introduction

Coronavirus disease was first found in Wuhan city of China, in December 2019 [1], and now it has become a pandemic. By the time of conducting this research, 2 million individuals have been afflicted with the disease in the world, and this figure is growing day by day. Based on clinical evidence, the virus is transmitted through exposure to respiratory droplets, spread in the air through coughing and sneezing, or touching items and surfaces contaminated by such droplets.[2,3] The

disease is highly contagious, and studies have shown that the virus can stay active in the air for up to three hours.[4] Some carriers have no symptoms, while they can infect others.[5] No definite treatment has been found for the disease, and according to experts and international organizations, the most efficient and economical way to fight the disease is prevention. Wearing facial masks, observing social distancing, and staying at home are the main ways of preventing COVID-19. The successful experience of China to control the disease supports this claim.[6] Studies have shown that public participation is needed for successful control of the disease. Perception of the risk, behaviors regarding protection, public trust, using media to inform the public, and hygiene education are highly important in this regard.[7] Major measures to control the spread of the disease and break the chain of infection include public information campaigns, protective measure education (e.g. washing hands and observing social distancing), and provision of medical care. It is not known to what extent people are aware of the risk of infection. The spread of the disease is completely affected by the extent people are willing to preventive measures regarding public health. This can be achieved mostly through perceiving the risk by the public.[8] Studies have shown that people's behaviors in critical situations depend on their perception of the risks and damages.[9] Risk perception is a process of subjective assessment regarding the probability of a specific event, and the methods to face the consequences. Risk perception is essential for safety and health,[10] so negative consequences are associated with a poor perception of risk.[11] Toby Wise et al. studied the level of risk perception in the United States of America (USA) and showed that a few groups of people were not concerned about health protocol, and did not observe protective behaviors.[8] Samadipour and Ghardashi used a researcher-designed tool to investigate the factors in risk perception among Iranians, and demonstrated that religious-cultural, political, cognitive, social, and emotional factors affected the subjects' perception of the risk of COVID-19.[9] Regarding the small number of online questionnaires, there have been a few studies in some countries like China, the USA, and Germany on the perception of COVID-19 risk. Studies measured risk perception and participation in preventive measures, in order to predict protective behaviors based on risk perception level.[7,10,12] There is no specially-designed tool available to measure coronavirus infection risk perception (CIRP). It is notable that a timely psychological and behavioral assessment in society is needed to determine the next intervention and risk strategies in order to control the pandemic.[13] An efficient tool is needed to measure the extent of risk perception in individuals, which is indicative of the extent of observing protocols and preventive measures. Contradictory information and statistics are commonly found in the media and news in this regard, which further highlights the need for designing a special tool. One of the challenges in the way of programming and taking managerial decisions to control the COVID-19 is the lack of a proper measurement tool. The present study attempts to design an instrument to measure the CIRP.

Methods

This cross-sectional study was conducted for 4 weeks in 2020, to investigate the psychometric properties of the CIRP questionnaire, with a working life approach. The sampling method was availability sampling.

Inclusion criteria: Willingness to complete the questionnaire, access to smartphones and cyberspace, and living in Iran.

Exclusion criteria: Unwillingness to continue cooperation and not answering all the questions. The study population was from different cities in Iran.

After that, a researcher-made questionnaire was designed and developed on the Internet. Its link was

available on social media such as (WhatsApp, Telegram).

First, we generated an item pool, extracted from the literature relating to the risk perception. The initial scale consisted of 41 items. Each item was rated on a 5-point Likert scale of 1 to 5 (strongly agree to strongly disagree) and higher scores indicated a better status of the respondent.

A panel of 10 public health professionals assessed the initial questionnaire. The panel was asked to comment on individual items regarding accuracy, clarity, and style. They commented independently on the necessity and relevance of the items, in order to calculate Content Validity Ratio (CVR) and Content Validity Index (CVI).

The CVR in this study for the total scale was 0.81, indicating a satisfactory result. The CVI was 0.82, which showed that the scale had a good content validity. After confirming the face and content validity of the questionnaire, SPSS statistical software was used for exploratory factor analysis (EFA), to obtain subscales, and data analysis.

To determine the subscales and the questions in each subscale, factor analysis was conducted using the main element and Varimax rotation methods. The items with factor load of <0.4 were eliminated, and after determining the subscales, the internal consistency of the subscales was determined using Cronbach's alpha. The internal consistency of a subscale would be supported if Cronbach's alpha >0.7.

To measure the adequacy of sampling and justifiability of factor assessment, Kaiser-Mayer-Olkin (KMO), and Bartlett Sphericity tests were used.

Data analyses were conducted with the confidence level of 95%. To describe the quantitative data, M±SD was used, and to show the qualitative ones, N(%) was used.

Results

A total of 228 occupational individuals participated in the online survey in Iran, from 19 March 2020 to 13 April 2020.

Totally, 228 participants took part in the study, including 145 women (63.60%) and 83 men (36.40%). The mean age of the participants was 34.51±9.43, the majority of the participants were married (n=195; 85.52%), and 33 were single (14.47%).

Most of the participants had a high school diploma or higher degrees (n=175; 76.75%), 220 (96.5%) lived in cities and 8 (3.5%) lived in rural areas. 189 (47%) individuals were employees, and 39 (10%) were self-employed. Before factor analysis, the adequacy of sampling and justifiability of factor analysis was checked using KMO and Bartlett's sphericity tests. With KMO=0.82 (>0.8), adequacy of sampling was supported and, factoring was justifiable with P<0.01 in Bartlett's sphericity test. Afterward, exploratory factor analysis was conducted using main element methods and Varimax rotation.

The results of the exploratory factor analysis indicated 15 Items had a factor load of <0.4 then they were removed from the final tool (Table (1)

Only 26 items remained in the tool. Table 1 lists factor loads of the items in the tool based on the subscalesTo investigate the internal consistency, Cronbach's alpha was used (Table 2). As shown by the results, the internal consistency of awareness, attitude, and performance is equal to 0.82, 0.87, and 0.72, respectively, which supports the internal consistency of the subscales. The mean score for awareness, attitude, and performance is also equal to 11.64±2.14, 68.26±8.09, and 26.98±4.79, respectively (Table 3).

Table 1. Rotation Matrix of Factor Loads regarding Explorative Analysis

No	Question	Awareness (knowledge)	Attitude (perspective)	Behavior (performance)
1	How much do you know about the Coronavirus disease transmission cycle?	0.64	0.36	0.05
2	How much knowledge and information do you have on Coronavirus disease regarding health protocols for prevention in shopping and other cases?	0.59	0.34	-0.03
3	How much do you know about the symptoms of Coronavirus disease?	0.64	0.35	-0.09
4	How effective do you think public health is in preventing Coronavirus disease?	0.27	0.41	-0.08
5	How effective do you think personal hygiene is in preventing Coronavirus disease?	0.22	0.42	-0.13
6	How effective do you think travel avoidance is in preventing Coronavirus disease?	0.06	0.52	-0.07
7	How effective do you think staying at home is in preventing Coronavirus disease?	0.07	0.46	-0.03
8	How long do you have to stay out of home to work and earn money?	-0.19	-0.01	0.60
9	How much do you increase your awareness and knowledge about the Coronavirus disease prevention during the day?	0.25	0.54	-0.13
10	Do you think praying and trusting in God is effective in preventing the Coronavirus disease or healing patients'?	-0.38	0.21	-0.09
11	Do you think exercise is effective in preventing coronavirus disease?	-0.37	0.26	-0.08
12	Do you think fresh fruits and vegetables are effective in preventing Coronavirus disease?	-0.39	0.32	-0.21
13	How much have you been to gatherings and ceremonies (weddings, mourning, etc.) in the last month?	0.12	0.04	0.31
14	How much do you adhere to the social customs of parties during this period?	0.34	0.03	0.26
15	How much have you cared about staying home (quarantined) in the last month?	-0.02	0.43	0.38
16	How often did you use shared personal supplies at home during this month?	-0.07	0.34	0.22
17	How much personal hygiene have you observed in the last month?	0.04	0.63	0.06
18	How much have you paid attention to environmental health (outside home) in the last month?	-0.00	0.65	0.07
19	How much has your in-person shopping been in these days (the recent month)?	-0.12	0.18	0.61
20	Has your online shopping increased in recent months due to the Coronavirus disease outbreak?	0.02	0.24	0.14
21	How much have you been to bank these days (the recent month)?	0.15	0.14	0.55
22	How much are you using the ATM these days (one month)?	-0.07	0.17	0.58
23	How much have you been making cash purchase these days (recent month)?	0.31	0.04	0.58
24	How much are you using the bank card these days for shopping?	-0.26	0.09	0.41
25	How often have you visited a doctor for symptoms of Coronavirus disease in the past month?	-0.04	0.04	-0.24
26	Has the outbreak of Coronavirus disease caused you to avoid contact with animals?	-0.03	0.27	-0.09
27	How much have you disinfected the purchased goods in the last month?	0.01	0.62	0.11
28	How much have you disinfected your home, clothes, and other supplies in the last month?	-0.12	0.65	0.83
29	How much have you been to mosques or religious sites in the last month?	0.23	-0.02	0.15
30	Have you visited relatives and acquaintances during holidays?	0.18	0.17	0.29
31	How much do you use masks and gloves outdoors?	-0.02	0.64	0.05
32	How much social distance (minimum one meter and maximum two meters) do you observe with people?	-0.07	0.65	0.16
33	How long do you consider staying home during the time of Coronavirus disease outbreak?	-0.04	0.31	0.46
34	How committed are you to changing your life style during the Coronavirus disease outbreak?	0.05	0.68	0.19
35	How probable is that a person with Coronavirus disease would recover?	0.15	0.03	-0.02
36	How much do you wash your hands properly and thoroughly during the day?	-0.16	0.56	-0.04
37	How much did you separate your personal supplies from others?	0.00	0.55	0.03
38	How much have you observed shopping protocols in the last month?	0.03	0.70	0.19
39	How much do you use personal transportation during this period?	0.14	0.11	0.02
40	How much do you use public transportation (taxis, buses, subways, etc.) during this period?	0.07	-0.06	0.25
41	Do you think cash and non-cash fines (for people, who do not comply with quarantine) are effective in controlling Coronavirus disease?	0.03	0.29	0.01

Table 2. Cronbach's Alpha of the Subscales

Subscales	Cronbach's alpha
Awareness (knowledge)	0.82
Attitude (perspective)	0.87
Behavior(performance)	0.72

Table 3. Mean and Standard Deviation of Perceived Risk of Coronavirus

Variable	Items	M±SD
Awareness (knowledge)	1,2,3	11.64±2.14
Attitude (perspective)	4,5,6,7,9,15,17,18,27,28,31,32, 34,36,37,38	68.26±8.09
Behavior(performance)	8,19,21,22,23,24,33	26.98±4.79

Discussion

Perception of risk is important in making the right decisions during the pandemic crises, in order to motivate preventive behaviors.[16] On the other hand, studying the level of CIRP is not easy, given the unique and different characteristics of people in different cities with different cultures. For instance, Iranians need a special-designed tool based on the Iranian culture to measure the level of the CIRP. Accordingly, a tool was designed to measure the CIRP. Results demonstrated that the questionnaire with 26 items and three subscales of awareness or knowledge of people, attitude or perspective in society, and performance of behavior of people in terms of preventing the disease, was a valid tool to measure the CIRP. The obtained Cronbach alpha supported the consistency of the tool used, to measure the CIRP. Samadipour et al. supported the validity of the researcher-designed tool, measuring the Iranians' perception of COVID-19 risk, with five factors (viz. cognitive, emotional, social, political, religious, and cultural).[9] Taghrir et al. (2020) investigated the perception of risk in Iranian medical students with regard to COVID-19, using a researcher-designed tool with three subscales of knowledge, preventive behavior, and perception of the risk.[19] Samadipour et al. (2020) reported that cultural-religious, political, cognitive, social, and emotional factors affected Iranians' perception of COVID-19 risk, and the strongest correlation was found between religious and cultural factors.[9] Our results showed that the internal consistency of the subscales of awareness, attitude, and performance was equal to 0.82, 0.87, and 0.72, respectively ($\alpha > 0.7$), which means the subscales have a good internal consistency. In addition, the minimum mean score obtained for awareness (knowledge) was equal to 11.64±2.14, and the highest mean score obtained for attitude (perspective) was equal to 68.26±8.09; the mean score of behavior (performance) was equal to 26.98±4.79. Therefore, given the low mean score of knowledge in the participants, we need to promote knowledge and awareness through free services by public institutes, health organizations, charities, NGOs, and other creditable bodies, using different types of media like papers, magazines, brochures, flyers, radio, TV, social networks, and educational video clips. Taghriri et al. reported that only 43% of college students had received training about COVID-19. Awareness in 79% of the individuals was at a high level. In addition, 94.2% of college students showed appropriate preventive behaviors.[19] One of the reasons for different results can be differences among societies under the study. Therefore, in the present study, participants were from 28 different provinces and were not similar in terms of education, job, etc. Taghriri et al. focused on medical sciences students, who were expected to have a higher health and prevention knowledge than ordinary people in society. Many studies have reported that knowledge and awareness are effective in one's perception of risk. Still, some studies on disasters like floods, famine, and earthquakes have reported a weak and even negative relationship between awareness and perception of the risk.[22] The reason for inconsistent results can be the different nature of hazards and the levels of readiness. Some health behaviors demonstrated by the study population were: disinfecting surfaces at home, disinfecting the item bought from stores, avoiding unnecessary use of ATM machines or services at

banks, avoiding visiting religious sites or mosques, limiting relatives' visits during the New Year holidays, respecting quarantine regulation, and less use of public transportation system. A study in the Netherlands on the SARS epidemic showed a correlation between the perception of risk and adopting preventive behaviors[18], which is consistent with our results. Other studies have shown that neglecting the seriousness of COVID-19 had the strongest negative correlation with the risk perception model.[9] A study by Kwok et al. (2020) showed that people in Hong Kong respected personal health codes and travel bans up to 70%, while actual acceptable social distancing was low.[10] De Bruin et al. (2020) showed that during the early weeks of COVID-19 spread in the USA, 90% washed their hand, 58% avoided contact with individuals at a higher risk, 57% avoided crowded spaces, and 37% canceled their trips.[17] Perception of risk is a dynamic concept and one of the complicated and vogue issues of social vulnerability. It needs more attention during the current crisis. Decisions made during crises and disasters are always affected by the population's perception of the risk.[14,15] Studies in Vietnam have demonstrated that people in central and southern Vietnam had a higher perception of the risk, compared to the ones in the north of the country. The first cases were reported in these regions, and the higher the penetration rate of social media, the wider the perception of risk.[20] Officials are recommended to use modern technology and online platforms to promote Iranians' perception of risk. Emotional factors are also important; if they are directed on the right path, they improve one's perception and performance. Chester et al. showed that religion and religious beliefs have a key role in the perception and management of risk.[21] Given that the perception of risk affects the acceptance of health protocols and the adoption of preventive behaviors, public informing measures to improve the perception of risk in society are of great importance. In addition, teaching preventive behaviors has a key role in expanding healthy behaviors. Timely psychological and behavioral assessments in society to investigate the situation and plan for future interventions are also recommended.

Conclusion

This tool is developed to assess the CIRP. Results indicate trivial inconsistencies in the three subscales of awareness, attitude, and behavior of people in society, with regards to the CIRP. It is notable that some people have poor performance in terms of attitude, awareness, and observing health protocols, despite the fact that they perceive the risk very well. This questionnaire is a valid tool to assess the CIRP.

Conflict of interest

There is no Conflict of interest declared.

Acknowledgment

Authors Contribution

Mohsen Poursadeghian: conceived of the presented idea. Investigate and supervised the findings of this work.

Maryam Feiz-Arefi: developed the theory and performed the computations.

Mahboubeh abdullahi & mohammad hossein delshad: contributed to the design and implementation of the research, the analysis of the results.

Amin Babaei-Pouya: translation and edit.

Mostafa kamali: the writing of the manuscript All authors discussed the results and contributed to the final manuscript

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