

Original Paper

Risk Perceptions during COVID-19 Pandemic: Applying Knowledge on Public Compliance to Protective Measures during SARS to Understand Risk Communication

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Abstract

The outbreak of COVID-19 in 2020 has caused significant environmental and economic loss across the globe. The government's promotion of non-pharmaceutical treatment such as social distancing, hand washing, and mask-wearing can be equally important in disease control compared to the conventional use of pharmaceutical treatment. Risk perception is often used as an important mechanism to understand an individual's compliance with these protective measures. The present article examines the application of previous knowledge about public risk perception, decision making, and behavioral change to the current global pandemic and evaluates the most effective way of governmental messaging. The article analyzes empirical research conducted during COVID-19 across the globe where risk perception is found to be a strong determinant of people's adoption of public health behavior. Demographic factors can significantly alter people's understanding of risk due to the variation of individualistic view and prosociality of each nation. Cognitive biases can also affect people's efficacy beliefs and confidence levels in government which can shape their risk perception to a great extent as well. Combining studies on both SARS and COVID-19, we are able to employ past knowledge to draw conclusions on risk communication and governmental promotion of protective measures during the current global pandemic.

Keywords

risk perception, public health behavior, COVID-19, SARS, cognitive biases

1. Introduction

As of today, COVID-19 has been officially declared a global pandemic for almost five months with over 18 million confirmed cases around the globe. Since shortage in medical resources and equipment are observed and vaccination is not yet a solution under this special circumstance, governmental

messaging on non-pharmaceutical preventive methods such as the promotion of social distancing and mask-wearing has become especially important. However, the compliance and adoption of these protective measures on the general public varied greatly from nations to nations based on the public's perceived risk of the pandemic (Leppin, 2009; Dohle, 2020).

Risk perception refers to people's intuitive evaluations of hazards that they are or might be exposed to, including a multitude of undesirable effects that people associate with a specific cause (Slovic, 2006). Conventional medical studies relating to disease control have revealed strong correlations between an individual risk perception and the public's willingness to adopt preventive health behaviors (van der Pligt, 1996; Renner, 2008; Brug, 2009). Thus, governmental involvement and messaging in risk communication can be crucial in terms of disease control.

In the past, topics relating to how risk perception can affect people's adoption of altruistic behavior has been thoroughly studied (Smith, 2006). Studies have shown that people's risk perception toward the pandemic can be determined through examining factors such as the individualistic view, the impact caused by cognitive biases, and his/hers level of trust toward the government, etc. (Zwart, 2009; Smith 2006). However, less research has been conducted specifically targeting risk perception and public health behavior during the spread of COVID-19. Therefore, this paper will focus on comparing how different factors influence people's risk perception, decision making, and behavioral changes using past models and theories. Through examining diverse communities' compliance of restrictions to reduce the spread of COVID-19, the government can promote more effective messages and policies targeting diverse groups of individuals to prevent further outbreaks.

2. Method

As it has only been six months since the first case of COVID-19 in Wuhan, there still is not sufficient research that fully addresses the connection between risk perception and the effect on governmental involvement during COVID-19. However, research from the past has presented valuable information for the understanding of these topics. In this paper, we mostly collected journal articles conducted during the outbreak of Severe Acute Respiratory Syndrome (SARS) in 2002 which is also a recent global air-borne infectious respiratory disease. From the past models and surveys, we can draw some conclusions on how risk perception can affect people's adoption of preventive measures during COVID-19.

According to most studies relating to public health risk perception, scientists usually divide risk perception into two major categories: cognitive and emotional (Leppin, 2009). Risk as cognition demonstrates how personal views can affect his/her understanding of risk. Risk as emotion mainly discusses how emotions such as fear and anxiety can turn into determinants in risk perception. Furthermore, the Protection Motivation Theory (PMT) and the Health Belief Model (HBM) are also frequently used in understanding these two types of risk perceptions. PMT indicates that people are likely to deflect threats to their identities and roles they occupy and HBM suggests that a personal

threat of an illness or disease together with a person's belief in the effectiveness of the recommended health behavior or action will predict the likelihood the person will adopt the behavior (Champion, 2008, Leppin, 2009). In this paper, we adopt a new approach of Subjective Expected Utility (SEU) (Leppin, 2009). The theory itself states that people's choices are a product of assessments of probability and utility of options from both health-related approaches: PMT and HBM. This model best captures risk as cognition, and the empirical evidence for whether risk as emotion is a major determinant in COVID-19 is still not conclusive.

In experiments, risk measures are determined by multiple different factors. Usually, the studies use the combined evaluation of the perceived risk, perceived fatality of disease, and the rating of fear/worry with regard to the disease (Brug, 2009). In a review conducted after SARS by Dyhurst (2020), the link between risk perception and the public's adoption of protective behavior was examined across over 30 journal articles. The results gave insights into whether risk perception during SARS was a purely cognitive or a combination of both cognitive and emotional phenomenon. Furthermore, the researchers also explored the importance of demographic factors in understanding how people from different regions cooperate with each policy differently (Dohle, 2020).

The present article also employs data from more recent studies. In one particular study, researchers, after surveying people in 10 different countries around the world (United Kingdom, United States, Australia, Germany, Spain, Italy, Sweden, Mexico, Japan, and South Korea), presented data relating to how an individual's cultural and geographic diversity can affect their compliance to different government policies. Subjects of the survey answer questions on a 7 point scale to understand the major factors or motivations that drive their behavioral change during the pandemic (Dryhurst, 2020). In the next section, we will discuss how the results from this study and other previous research will help the government to gain knowledge about the role of different predictors and public health risk perception.

3. Result

The review conducted soon after SARS has demonstrated that risk perception can be both cognitive and cognitive-emotional based on different times during the outbreak (Leppin, 2009). This shows that it is necessary to consider both the risk as cognition which are mostly demonstrated through values and risk as emotions where feelings, fears and anxiety can influence risk perception. Furthermore, studies also revealed strong correlation between demographic factors and the variation in people's understanding of risk in the spread of infectious disease. After collecting data on people's aspects of concern for SARS, the researchers found differences in terms of demographic pattern and people's risk perception. The survey revealed that Chinese people, in comparison with Europeans and North Americans are more likely to be concerned about national stability and economic development and less concerned about disease risk. This finding suggests that Chinese people might adopt these protective

measures due to their worries about the nation's well-being and financial status while Europeans and North Americans tend to focus more on individual's potential risk of the infection (Leppin, 2009).

Not only were the predictors different from conventional studies, Diclement (2008) also found that biases can also be inevitable in understanding health risk. The influence of biases can vary greatly due to demographic reasons based on individual, cultural and contextual factors. Biases are helpful in predicting the general's individual and collective behavior (Weinstein, 2010).

After examining researches from the previous infectious disease, some of the conclusions in fact, can be used to understand the present ongoing pandemic. After using a linear regression model across all ten countries and calculating the average risk perception, we found a strong positive relationship between risk perception and people's adoption of protective behaviors (Dryhurst, 2020). This indicates that the theories and models drawn from previous research relating to public risk perception can be applied in help understanding the current situation of COVID-19. Additionally, in examining different nations across the globe, the survey revealed that among all the possible predictors of explaining why people adopt the protective policies, individualistic view and pro-sociality are the two most significant factors in all countries except South Korea. The difference in individualistic view and value can be determined by their personal backgrounds and socioeconomic status such as education, age, job/occupation, etc. Thus, demographic factors should be taken into account when considering the formation of individualistic views. Therefore, combined with each nations' different governmental structure and individual's political ideology, we can understand how the two factors can affect people's awareness of the risk.

Table 1. Predictors in People's Adoption of Protective Measures and the Impact in Each Country

Weight (%)		UK	US	Australia	Germany	Spain	Italy	Sweden	Mexico	Japan	South Korea
Individualistic view	4.78	****	****	****	****	****	****	****	****	****	//
Prosociality	3.19	****	****	****	****	****	****	****	****	****	//
Direct experience	2.34	****	****	//	****	****	****	//	****	****	****
Personal efficacy	1.62	//	//	//	****	//	//	****	//	//	//
collective efficacy	1.54	****	//	//	//	//	//	//	****	****	//
social	1.21	****	//	****	****	****	//	****	//	****	//

amplification											
Gender	0.70	****	//	//	****	****	//	//	//	//	//
Personal	0.60	//	//	****	//	****	//	//	//	//	//
knowledge											

// represents little or no association, **** means the predictions are significant.

The ranking of predictors is based on the level of importance in explaining people's motivation for behavioral change

4. Discussion

According to conventional studies, we concluded that risk perception can be both cognitive and cognitive-emotional at different times during an outbreak. This suggests that we should take both socio-cultural and psychological factors into account when evaluating people's decision making process. The adoption of the conventional model, HBM and PMT, reinforced the importance of value and the person's socio-economic status in understanding their behavioral change. This can be strongly related to some of the other findings we discovered in past research. The research data supported that people from different parts of the world reported risks that threaten different aspects of their life. Demographic factors play a crucial role in explaining an individual's world value due to the impact of their cultural background and traditions. Earlier research indicates that Chinese people tend to worry more about the nation's overall security and stability during pandemic and westerners tend to focus more on individual risk. These distinctions in thoughts and views due to demographic factors led to variations in values and caused different levels of behavioral change.

According to more recent studies conducted after the outbreak of COVID-19, risk perception is tested positively related to people's compliance to protective behavior. This allows us to apply previous studies relating to risk perception to the current ongoing global pandemic. The comparison across the globe in terms of understanding people's willingness to accept behavioral change reveal vital information on how governmental structure and prosociality can affect the results. Countries with higher prosociality where the idea of community and group is stressed more than individuals tend to have higher risk perception and are more likely to adopt altruistic behaviors. In comparison, countries with lower prosociality tend to have lower risk perception due to their focus on individual risk of being infected which, in turn, led to a lower adoption of protective measures. This finding also corresponds to earlier research where China can be considered to be a more prosocial country compared to some European and North American countries, and Chinese people adopt these non-pharmaceutical treatments at a relatively earlier time during this outbreak. Therefore, recent studies reinforced the previous conclusions on geographic diversity causing differences in procialiating, leading to variations in compliance (Caprara, 2012).

Nevertheless, biases should be thoroughly examined as well because risk perception can predict protective behavior only when people believe that protective actions are available and they have confidence that they have the abilities to engage. Biases tie closely to people's confidence/trust level to the government's ability of controlling the disease; it can directly affect people's acceptance to protective measures. Efficacy belief is used to describe one's perceived capability of executing a certain behavior and effectively reflects confidence in the ability to exert control over one's own motivation, behavior, and social environment. Therefore, understanding individual efficacy and collective efficacy will contribute to evaluating the probability of the adoption of non-pharmaceutical treatment (Zwart, 2009). Individuals with higher belief efficacy tend to have higher confidence levels in government, which can cause optimistic bias and lower overall risk perception. On the other hand, people with lower confidence levels in government tend to hold pessimistic views on government's capability in disease control and generally result in higher risk perception and a higher adoption of protective behavior (Weinstein, 2010). Efficacy belief is also found to have a positive correlation to people's risk perception during COVID-19. Additionally, this finding can be closely related to conclusions about prosociality because governmental structure and trust can affect collective behavior in the community to a great extent (Leppin, 2009). Therefore, biases can be useful indicators on the acceptance of public health behavior within the background context of each nation's governmental system.

However, there are a few limitations to this research. Firstly, there is still room for improvements on understanding the connection between risk perception and people's motivation for behavioral change. Even though scientists have perceived cognitive biases and heuristics and social/cultural paradigm as two main factors in determining people's cooperation in adopting protective measures, there might still be other factors that might influence people's intention for behavioral changes.

Furthermore, since most of the conclusions drawn in this paper are yielded from SARS and other infectious diseases, we are still not exactly sure if these conclusions can be generalized to COVID-19. Most of the research used are conducted from 2003 to 2007 and technological advancement, cultural changes, and improved understanding of different subject areas might lead to different results today.

Another limitation of this paper falls in the research that was used to understand how individuals' personal background and socioeconomic status can affect their risk perception. The data collected in the survey took place in mid-March and mid-April 2020, which was still in the early phase of the pandemic (Dryhurst, 2020). Since situations in each nation can change drastically in the course of four months and different regions reached their peaks at different points in time, there might be some possible twists in terms of understanding the effects now compared to when the research was conducted.

To sum up, demographic factors not only lead to variations in individualistic views and prosociality, but also serve as an explanation for people's different levels of risk perception. Therefore, based on all the research and studies, governments can draw their conclusions on evaluating the most efficient

promotion of protective measures based on the prosociality of the nation. In order to practice effective disease control, governments should use different risk communication messages targeting various communities and groups to improve willingness to adopt altruistic behavior. In less prosocial countries, these messages should intend to increase people's risk perception by highlighting the effectiveness of protective measures at a societal level. For instance, by reinforcing collaborations and communications within communities, people will tend to pay more attention and gain more information about the virus itself. With higher perceived risk, it will be relatively easier for government nudges for altruistic behaviors and reduce the infection rate. Future research can focus more on providing information about how collective and individual risk perception can affect the promotion of altruistic behavior during a global pandemic differently. It can also be beneficial to examine if models and theories of risk perception in other fields or subject areas can be applied to health risk perception, which can also significantly improve understanding of cognitive behavior and disease control as a whole.

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