ISSN 2616-7433 Vol. 3, Issue 2: 84-90, DOI: 10.25236/FSST.2021.030212

COVID-19 Information trust, Situation Awareness and Adoption of Health Protective Behaviors in China

Jiadong Yu

School of Psychology, Adelphi University, Garden City, New York, 11530, The United States of America

Abstract: *COVID-19 spreads across China and other countries in a matter of weeks. It is uncertain how people response towards health-protective behaviors in this pandemic. This study aims to evaluate the influence of information sources on situation awareness to adopt health-protective behaviors such as hand hygiene, face-mask use, and social distancing. In total, 288 Chinese completed a questionnaire in July 2020. Data on health-protective behaviors, trust in (formal/informal) information, understanding, perceived susceptibility, and worry were collected. Structural equation model (SEM) was used to identify associations between trust in different information sources, situation awareness and health-protective behaviors. Results suggest that trust in formal information was associated with greater reported understanding of COVID-19 (β=0.33), which in turn was associated with more social distancing (β=0.10). Trust in formal information was inversely associated with perceived susceptibility (β=-0.29), which in turn was negatively associated with social distancing (β=-0.24). Trust in informal information has a positive association with worry (β=0.12), which was positively associated with face-mask use (β=0.22).Trust in informal information was inversely associated with understanding of COVID-19 (β=-0.27), which was positively associated with hand hygiene (β=0.15). Therefore, it can be concluded that trust in formal information was more strongly associated with greater understanding of COVID-19 and social distancing, whereas trust in informal information was strongly associated with worry and face-mask use. Trust in formal information was also associated with less perceived susceptibility and less social distancing.*

Keywords: *COVID-19, information trust, situation awareness, health-protective behaviors*

1. Introduction

An outbreak of pneumonia associated with the severe acute respiratory syndrome (SARS) was reported in Wuhan, Hubei Province, China, in December 2019 [1]. This outbreak gradually spreads across China and other countries around the world in the following months. On January 30, 2020, the World Health Organization (WHO) declared this outbreak as a Public Health Emergency of International Concern (PHEIC) [2]. On February 12, 2020, the WHO named this disease as "coronavirus disease 2019" (COVID-19) [3-4]. Ultimately, on March 11, 2020, the WHO declared the COVID-19 as a pandemic. A public health emergency such as COVID-19 is best dealt with by prevention, ideally vaccination. Unfortunately, in the first year of pandemic, the vaccines are generally unavailable where interventions that do not involve the use of medications can play a major role in minimizing COVID-19 spreads [5]. Health education messages from government and social media are major sources of information for promoting self-protective messages. These self-protective messages generally emphasize on the frequency of hand hygiene, face-mask use, and social distancing measures [6].

Predictors of health behaviors in SARS have been studied in the past. In predicting the practice of health-protective behaviors (HPB), perceived susceptibility and favorable attitudes were found associated with higher rates of HPB [7], yet related other predictors remain unclear and limited. The effective models that enable reliable prediction of HPB remain mainly on one theoretical paradigm: The Planned Behavior (TPB). The core concept of TPB to predict HPB is based on the control of perceived behaviors and the intention to execute one particular behavior [8]. However, in the study, Voeten found that the source of information and health beliefs are related to SARS prevention which indicates the importance of social and affective influence where TPB did not include [9]. Based on the given information source, perceived information reliability could influence decisions which in further to inform situation awareness [10]. A more reliable source of information is more likely to be more influential. Situation awareness response to the pandemic is more oriented by formally announced information like

ISSN 2616-7433 Vol. 3, Issue 2: 84-90, DOI: 10.25236/FSST.2021.030212

a government press release and by an informal source like social media, communication from family and relatives, and observation of peers and friends [11]. During the pandemic, it mainly relies on these two different types of information sources to maintain situation awareness [12].

Perceived susceptibility plays an important role in understanding behavioral response in a public health emergency [13] and influenced by several characteristics such as demographics and trust in information sources [14]. Worry is also a cognitive process that reflects negative affectivity and interacts with perceived susceptibility [14].

Therefore, a theoretical model (figure 1) was constructed that incorporated elements of understanding of COVID-19 cause, perceived susceptibility, and social and affective influence. This model was tested against data collected in the mid-phase of COVID-19 to examine how levels of trust in formal and informal information associated with hand hygiene, face-mask use, and social distancing measure.

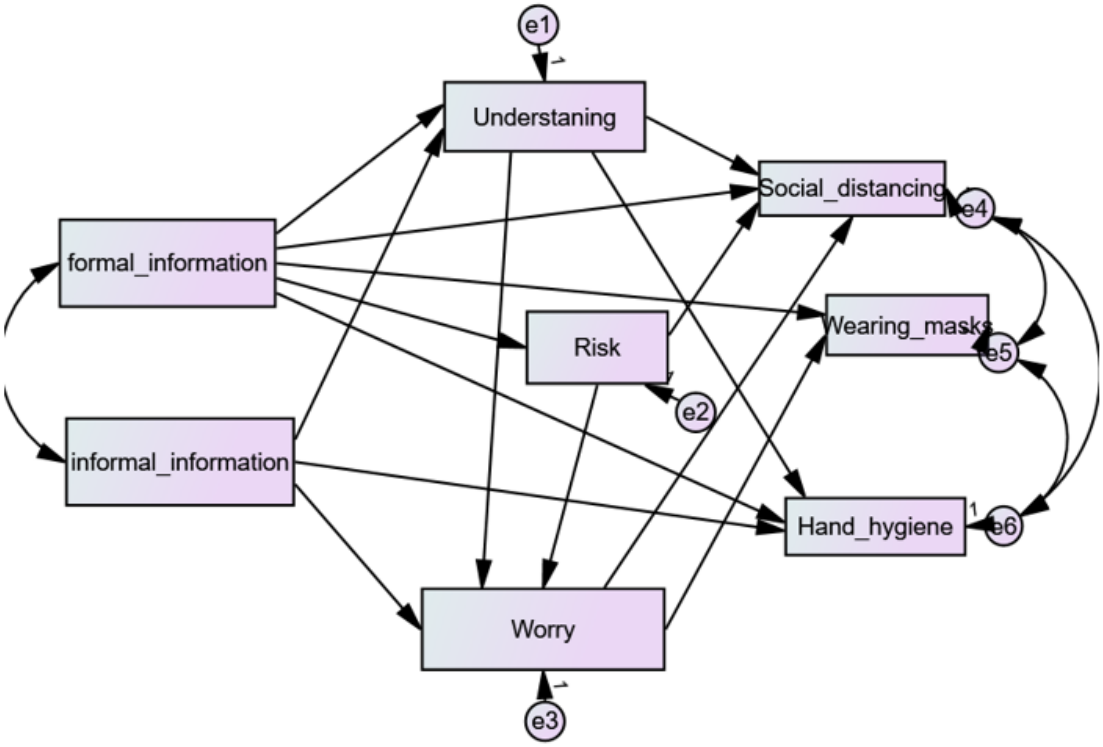

Figure 1. A hypothesized model for health proception against COVID-19 pandemic

2. Methods

2.1 Participants

There were 288 participants recruited by anonymous link and quick response code in China from July 2 to July 6, 2020. Informed consent was obtained from participants prior to the study. Participants will receive updated information about COVID-19 at the end of the survey from the New York Times as compensation for their participation. A total of 228 valid respondents were retained by excluding those who did not complete the survey, a response rate of 79.2%. Respondents consisted of 84 males (37%), 132 females (58%), 9 respondents decline to answer about their gender and 3 respondents selected others. Their age ranged from 18 to 65 years with 15% being under 25 years, 48% being 26-35 years, 20% being 36-45 years, 11% being 46-55 years and 6% being 56-65 years.

2.2 Measures

A questionnaire designed on Qualtrics was composed of 29 items to measure constructs including 3 items for the understanding of COVID-19 cause, 3 items for worry about contracting COVID-19, 3 items for perceived susceptibility, 6 items for the degree of trust in information about COVID-19 from formal and informal sources, 11 items for preventive behaviors against COVID-19 and 3 items for demographic characteristics. Expect the items for demographic characteristics, for each other item, the participants

ISSN 2616-7433 Vol. 3, Issue 2: 84-90, DOI: 10.25236/FSST.2021.030212

were asked to indicate on a 5-point Likert-type scale their agreement or disagreement ranging from "1=strongly disagree" to "5=strongly agree" in the questionnaire.

Data analysis was performed in two stages. In the first stage, reliability and validity analysis was conducted in SPSS (ver. 26) to evaluate the consistency of each measured items. In the second stage, the proposed structural equation model and related hypotheses were evaluated by using Analysis of Moment Structure (AMOS, ver.26)

2.3 Statistical analysis

Reliability analysis was used to evaluate the consistency of measured items for each latent variable. The items of understanding of COVID-19 (3 items), perceived susceptibility (3 items), trust in formal information (3 items), trust in informal information (3 items), hand hygiene (4 items), social distancing (4 items), face-mask use (3 items) in Table 1 had Cronbach's Alpha (α) coefficients of over 0.74 with no increasing result if any of these items were deleted. This Cronbach's Coefficient Alpha exceeds Nunally and Bernstein's [15] recommendation which supports the use of these items. Composite reliability (CR) for each latent variable was also calculated to assess the consistency of the measure. All CR value in Table 2 exceeds Hair's [16] recommendation of 0.6 also indicating higher internal consistency.

Table 1. Reliability analysis

	Mean	Std. Deviation	Alpha if item deleted
There is a chance that COVID-19 spreads in my community	2.16	1.068	.775
I may have contacted with people who get infected with COVID-19	1.98	.950	.769
There is a chance for me to contract COVID -19 in next month	1.35	.683	.771
I understand how people get infected with COVID-19	4.15	1.017	.753
I understand symptoms after people get infected with COVID-19	3.88	1.173	.752
I know there are people who get infected with COVID-19 have no symptoms	3.96	1.192	.756
I am concerned about contracting COVID-19	3.97	1.176	.757
My family and relatives are concerned about contracting COVID-19	3.97	1.172	.747
My friends expressed concern about contracting COVID-19 once	3.95	1.207	.747
I trust reports from government leaders about COVID-19	4.36	.886	.751
I trust national television information about COVID-19	4.37	.858	.752
I trust government or local health website information about COVID-19	4.38	.839	.753
I think the best source of information about COIVD-19 is to watch others and listen to what they say	3.35	1.266	.765
Compared to TV news, I would prefer to believe the opinions from my colleagues, friends, and neighbors about COVID-19	2.46	1.203	.783
I trust news about COVID-19 on social media (Wechat, Weibo)	3.41	1.152	.762

ISSN 2616-7433 Vol. 3, Issue 2: 84-90, DOI: 10.25236/FSST.2021.030212

I will wash hands after cough or touching nose	4.02	1.045	.754
I will wash hands after returning home	4.57	.813	.749
I will wash hands using hand sanitizer or liquid soap	4.52	.815	.754
I will wash hands after touching things like doorknob	4.25	.940	.751
I will keep social distancing due to COIVD-19	4.36	.792	.753
I will avoid using public transportation due to COIVD-19	4.21	1.016	.759
I will avoid going to crowed places due to COIVD-19	4.38	.762	.750
I will avoid eating out due to COIVD-19	4.21	.908	.751
I will wear a mask when contacting others	4.62	.621	.756
I will wear a mask when using public transportation	4.84	.452	.754
I will wear a mask in crowed places	4.82	.489	.755

Table 2. Validity analysis

	Cronbach's alpha	Composite reliability	Average variance extracted
Formal information	.943	.948	.859
Informal information	.659	.667	.406
Perceived susceptibility	.769	.786	.558
Understanding	.812	.817	.599
Worry	.876	.881	.714
Hand hygiene	.806	.820	.539
Social distancing	.804	.818	.534
Face-mask use	.812	.847	.656

To assess the validity of measures, the average variance extracted (AVE) was used to assess the validity of each latent variable [17]. If the value of AVE is greater than 0.5 for a latent variable, it indicates a good convergent validity for the variable [18]. The AVE value of most constructs exceeded 0.5 except trust in informal information. If AVE value is less than 0.5, but composite reliability is higher than 0.6, the convergent validity of the construct is still adequate [18]. CR value of trust in informal information exceeds 0.6 which indicates it is adequate for the measure.

The conceptual model (Figure.1) was tested using structural equation modeling (SEM) with protective behaviors, understanding, worry and perceived susceptibility entered the model as observed variables where trust in formal information and trust in informal information entered as latent variables. SEM is a method for simultaneously estimating and testing the relationships between observed variable and latent variables in statistical data. SEM is usually theoretically based after specifying the hypothesized model and could provide the accommodation with measurement errors of the constructs in the model.

In the hypothesized model, the disturbances of the three protective behaviors outcomes were assumed to be correlated where disturbances represent the unexplained variances of the latent variables [17]. In previous studies, it has shown that hand hygiene, social distancing, and face-mask use during a pandemic could be influenced by some causes which were not fully explored in this study such as previously existing health conditions [19]. During the COVID-19 pandemic, these three protective health behaviors occurred at the same time which is reasonable to assume that these three behaviors were correlated and influenced by some causes.

Before testing the full structural model, the adequacy of the measurement model was tested. To test the full structural model, maximum likelihood estimation (MLE) was used to estimate covariance, factor

ISSN 2616-7433 Vol. 3, Issue 2: 84-90, DOI: 10.25236/FSST.2021.030212

loadings, measurement errors, disturbances, and standardized parameters simultaneously [17]. Standardized parameter (β) with ρ-values less than 0.05 were considered as statistically significant. Multiple model fit indices including Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Squared Error of Association (RMSEA) were used to evaluate the model fit. CFI and TLI value greater than 0.9, RMSEA value less than 0.05 indicate a good model fit [20].

3. Results

Trust in formal information ("Formal information ") and informal information ("Informal information") were both correlated with the understanding of COVID-19 cause ("Understanding") while trust in formal information was also correlated with perceived susceptibility and trust in informal information was correlated with worrying about contracting COVID-19 ("Worry"). In turn, Understanding, perceived susceptibility, and Worry were all significantly associated with social distancing. In addition, Worry was also significantly associated with face-mask use while Understanding was also significantly associated with hand hygiene.

The SEM model (figure. 2) fitted well to the data with CFI=0.991, TLI=0.973, and RMSEA=0.043. Standardized coefficients indicated three primary features in this model; the first one is the association between Formal information and social distancing, the second one is the association between Informal information and face-mask use, the third one is the association between both Formal and Informal information and hand hygiene. The first feature of the model is seen on paths via trust in formal information and perceived susceptibility (β=-0.29) and perceived susceptibility and social distancing (β=-0.24), via trust in formal information and Understanding (β=0.33) and Understanding and social distancing (β=0.10). these associations constitute the first feature. The second feature of the model was seen via a different path associated with trust in informal information and face-mask use. Trust in informal information has a positive association with Worry (β=0.12) which was positively associated with face-mask use (β=0.22). The last feature of the model was seen paths from trust in formal information and informal information through Understanding to hand hygiene. Trust in informal information was inversely associated with Understanding (β=-0.27) while Understanding was positively associated with hand hygiene (β=0.15).

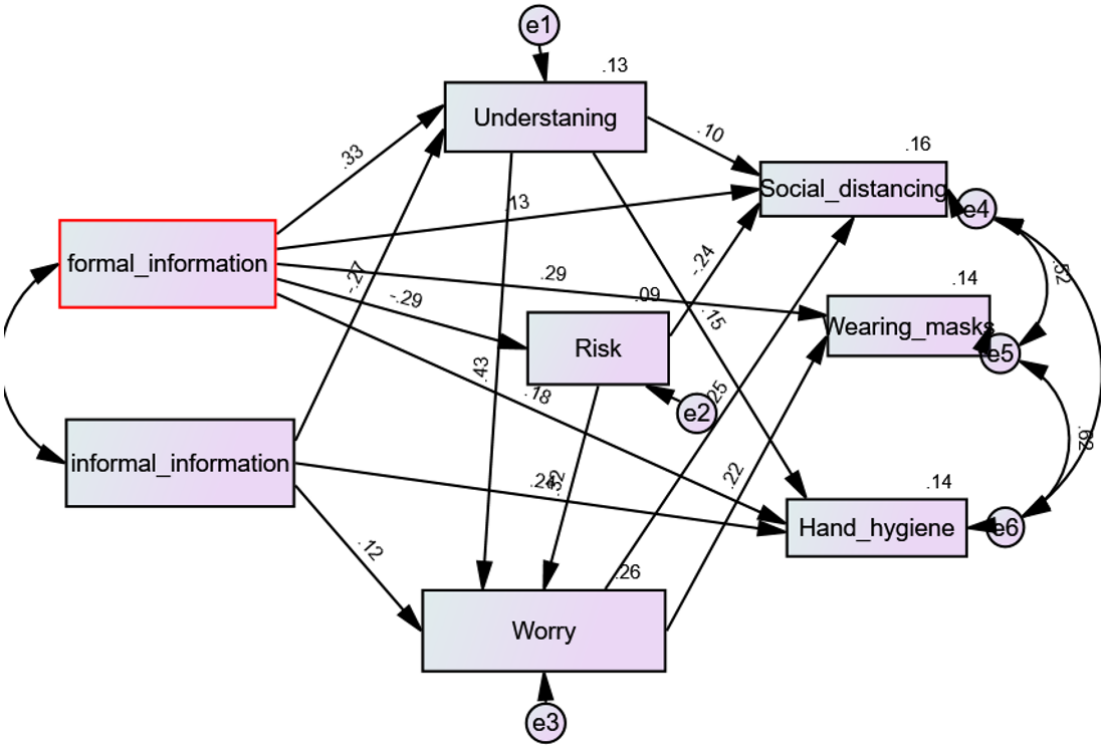

Figure 2. Structural equation model for health procteion against COVID-19 pandemic

Overall, this model explained 16.2% of the variance in social distancing, 14.0% of the variance in face-mask use, and 13.9% of the variance in hand hygiene.

ISSN 2616-7433 Vol. 3, Issue 2: 84-90, DOI: 10.25236/FSST.2021.030212

4. Discussion

The hypothesized model of associations between trust in (formal/informal) information, situational awareness variables (understanding, perceived susceptibility, and worry) and different types of health-protective behaviors (hand hygiene, face-mask use, and social distancing) were tested in this study. This model suggested that both formal and informal sources of information affect situational awareness on HPB.

When comparing trust in different sources of information, it seems that trust in formal information was associated with more understanding of COVID-19 cause in comparison with trust in informal information which in turn associated with more social distancing and hand hygiene. Rubin found that information from formal sources increased the use of tissue and hand sanitize among the British during the H1N1 pandemic [21]. This finding is consistent with the previous study conducted to evaluate the effect of formal information sources on the adoption of hand hygiene.

The model tested in this study also suggested that trust in formal information was associated with less perceived susceptibility which in turn associated with less social distancing. Previous studies conducted suggested that trust in formal information was significantly associated with perceived confidence [22]. Social distancing was also more likely to be adopted when perceived health threats are high [23]. Therefore, this is consistent with other studies reflecting that trust in formal information would lower the perception of risk which would not ensure HPB.

Trust in informal information seems to be associated with more worry about contracting COVID-19 which in turn was associated with more social distancing and face-mask use. As mentioned before, there is a negative association between trust in informal information and understanding of COVID-19 cause. Trusting in social media involves comparison influences where there is a chance that a person views oneself less likely to experience negative events but more likely to experience positive events, therefore reducing the understanding of COVID-19 cause [24]. On the contrary, while in comparison with others' behaviors in a public health emergency, it would motivate worry and anxiety which can produce more productive actions [25]. Worry was positively associated with understanding and perceived susceptibility which is theoretically consistent [26]. Worry was also strongly associated with social distancing which is consistent with British data [21].

A few limitations of the study are that the sample size is relatively small to generalize the findings of this study for a larger population. This study is also limited as a cross-section study which relies on hypothesized modeling to indicate causality. The findings of this study are prone to error potentially and need to be confirmed in longitudinal studies.

5. Conclusion

The findings suggest that both information sources have associations with situation awareness, but trust in formal information was more strongly associated with greater understanding of COVID-19 and social distancing, whereas trust in informal information was strongly associated with worry and face-mask use. Findings also suggest that trust in formal information was associated with less perceived susceptibility, which in turn associated with less social distancing.

References

[1] Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y.,...& Cheng, Z. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. The lancet, 395(10223), 497-506.

[2] World Health Organization. Statement on the second meeting of the International Health Regulations Emergency Committee regarding the outbreak of novel coronavirus (2019-nCoV). https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov)

[3] World Health Organization. WHO Director-General's remarks at the media briefing on 2019-nCoV on February 11, 2020. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200219-sitrep-30-covid-19.pdf?sfvrsn=6e50645_2

[4] World Health Organization. WHO Director-General's remarks at the media briefing on 2019-nCoV on March 11, 2020. https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020

ISSN 2616-7433 Vol. 3, Issue 2: 84-90, DOI: 10.25236/FSST.2021.030212

[5] Greenhalgh, T., Schmid, M. B., Czypionka, T., Bassler, D., & Gruer, L. (2020). Face masks for the public during the covid-19 crisis. Bmj, 369.
[6] Centers for Disease Control and Prevention (2020) How to Protect Yourself & Others. https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html
[7] Tang, C. S., & Wong, C. Y. (2003). An outbreak of the severe acute respiratory syndrome: predictors of health behaviors and effect of community prevention measures in Hong Kong, China. American Journal of Public Health, 93(11), 1887-1888.
[8] Godin, G., & Kok, G. (1996). The theory of planned behavior: a review of its applications to health-related behaviors. American journal of health promotion, 11(2), 87-98.
[9] Voeten, H. A., De Zwart, O., Veldhuijzen, I. K., Yuen, C., Jiang, X., Elam, G., ... & Brug, J. (2009). Sources of information and health beliefs related to SARS and avian influenza among Chinese communities in the United Kingdom and The Netherlands, compared to the general population in these countries. International Journal of Behavioral Medicine, 16(1), 49-57.
[10] Calman KC (2002) Communication of risk: choice, consent, and trust. Lancet 360: 166-168.
[11] Slaughter L, Keselman A, Kushniruk A, Patel VL (2005) A framework for capturing the interactions between laypersons' understanding of disease, information gathering behaviors, and actions taken during an epidemic. J Biomed Inform 2005: 298–313.
[12] Endsley MR (1997) Toward a theory of situation awareness in dynamic systems. Hum Factors 37: 32–64.
[13] Rubin GJ, Amlot R, Page L, Wessely S (2009) Public perceptions, anxiety, and behaviour change in relation to the swine flu outbreak: cross sectional telephone survey. BMJ 339: b2651
[14] Slovic P (1999) Trust, emotion, sex, politics, and science: surveying the risk assessment battlefield. Risk Anal 19: 689–701.
[15] Nunnally J, Berstein I (1994) Psychometric Theory. McGraw-Hill, New York
[16] Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. (2006). Multivariate data analysis. Uppersaddle River.
[17] Kline, R. B. (2015). Principles and practice of structural equation modeling. Guilford publications.
[18] Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of marketing research, 18(1), 39-50.
[19] Fishbein, M., & Ajzen, I. (1974). Attitudes towards objects as predictors of single and multiple behavioral criteria. Psychological review, 81(1), 59.
[20] Hooper, D., Coughlan, J., & Mullen, M. (2008, September). Evaluating model fit: a synthesis of the structural equation modelling literature. In 7th European Conference on research methodology for business and management studies (pp. 195-200).
[21] Rubin GJ, Potts HWW, Michie S (2010) The impact of communications about swine flu (influenza A H1N1v) on public responses to the outbreak: results from 36 national telephone surveys in the UK. Health Technol Assess 14: 183–266
[22] Liao Q, Cowling B, Lam WT, Ng MW, Fielding R (2010) Situational Awareness and Health Protective Responses to Pandemic Influenza A (H1N1) in Hong Kong: A Cross-Sectional Study. PLoS ONE 5(10): e13350. doi:10.1371/journal.pone.0013350
[23] Brug J, Aro AR, Oenema A, De Zwart O, Richardus JH, Bishop GD. SARS risk perception, knowledge, precautions, and information sources, the Netherlands. Emerging Infect Dis. 2004;10(8):1486.
[24] Helweg-Larsen M, Shepperd JA (2001) Do moderators of the optimistic bias affect personal or target risk estimates? A review of the literature. Pers Soc Psychol Rev 5: 74–95.
[25] Bandura A (1986) Social Foundataions of Thought and Action: a Social Cognitive Theory. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.
[26] Brewer NT, Weinstein ND, Cuite CL (2004) Risk perception and their relation to risk behavior. Ann Behav Med 27: 125–130