

A Study of Public Risk Perception of Media Reporting on Cervical Cancer Based on the Cognitive Mediation Model

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Abstract: An extended cognitive mediation model was tested in this study which adds risk perception as an outcome of elaboration and interpersonal communication to investigate the impact of verbal and non-verbal symbols in cervical cancer related videos on public viewing media platforms among Chinese women, which could help promote the popularization of science on cervical cancer in China, help more women understand the process of cervical cancer and learn prevention methods, thereby reducing the death caused by cervical cancer. Results of study based on survey data with a nationally sample of women (N=231) aged from 18 to 50 years old. Results showed that attention to verbal signs and attention to non-verbal sign were positively associated with elaboration. Moreover, attention to verbal signs was related positively to interpersonal communication, while attention to non-verbal signs had no association with it. Next, both elaboration and interpersonal communication were correlated positively with perceived risk. Impact of theory and practice were discussed.

Keywords: cervical cancer, risk perception, cognitive mediation model

1. Introduction

As one of the most common gynecological malignancies, cervical cancer also ranks among the top 10 most prevalent cancers in China. Cervical cancer incidence rate ranks second among Chinese female malignancies, behind breast cancer. With approximately 300,000 deaths worldwide each year, cervical cancer is one of the commonest cancers among women. Carcinoma in situ is most common between the ages of 30 and 35, and invasive carcinoma is most likely to occur between the 45 and 55 age group [1]. For the past few years, there has been a trend of gradually younger onset age. Most cases of cervical cancer cases (99%) are due to a high-risk infection with the human papilloma virus (HPV), a highly common virus transmitted through sexual contact. The high-risk etiology of cervical cancer is persistent high-risk human papillomavirus infection, making cervical cancer the only cancer that can be prevented in advance.

According to research statistics, 470,000 women worldwide were diagnosed with cervical cancer, killing some 250,000 of them [2]. The majority of cervical cancer cases are preventable through efficient methods of primary prevention (HPV vaccination) and secondary prevention (screening and treatment of precancerous lesions). Although there are already prevention and treatment measures such as vaccines and screening, many women are still unaware of the risk and significance of cervical

cancer. Through early detection and effective treatment after diagnosis, one of the most successfully treated cancers is cervical cancer. Late-stage cervical cancer is also manageable with appropriate therapeutic and palliative care. By utilizing a comprehensive approach of prevention, screening, and treatment, cervical cancer, a public health problem, can be eliminated in the future. Although cervical cancer can be detected early through vaccine prevention and screening, there are still many women who are still unaware of cervical cancer prevention and screening methods.

The risk factors for cervical cancer, which is more common in developing and undeveloped countries, include multiple sexual partners, age, smoking, immune system problems, and so on. Among them, more than one sexual partner is one of the most serious risk factors.

Cervical cancer is a worldwide health concern that remains at high risk of developing in China. The study aims to discover the process by which people receive knowledge related to cervical cancer and transform it into perception of risk direction. Among them, the focus was on the ways in which the public receives knowledge related to cervical cancer. Most women lack understanding of cervical cancer, so education and promotion of cervical cancer have become very important, which can improve women's risk perception and prevention awareness. Due to the fact that there is still a certain gap in the vaccination rate of HPV vaccine in China compared to developed countries, and in recent years, more and more multimedia platforms have emerged to popularize knowledge related to cervical cancer and HPV vaccine. Therefore, the research on the process of public perception of the risk of cervical cancer has both practical significance and great research value.

Recommendations will be provided for future cervical cancer popularization by examining the level of people's perception of cervical cancer risk in different forms of media coverage.

In this study, the desired research results will be obtained through a questionnaire survey. The questionnaire draws samples through convenient sampling.

2. Literature Review

2.1. Cognitive Mediation Model

The CMM argues that there is a causal process involved in learning news content [3]. Individuals' motivation to focus on news content leads to detailed processing, which ultimately contributes to knowledge acquisition and behaviour change [4]. In a nutshell, people are more likely to learn news information effectively when they are motivated, which means someone wants to learn from the news for some reason, and produces information processing behaviors that facilitate learning. In this model, the role of motivation is not to directly enable the audience to acquire knowledge, but rather to participate in the process of increasing knowledge, individuals are motivated to engage with news information and accomplish learning through the mediation of attention to news information and elaboration.

2.2. Dual Coding Theory

The DCT postulates the existence of two linked cognitive subsystems: one dedicated to the processing of visual symbols of non-verbal things and events, known as non-verbal code, and the other used for the processing of language, known as verbal code [5]. At the same time, human beings have two different kinds of ideograms: "pictorial units" for mental images and "linguistic units" for linguistic entities. The former is organised on the basis of part-whole relationships, while the latter is organised on the basis of associations and hierarchies [6]. These two symbolic systems may overlap in information processing, but are more likely to be done independently, and Paivio's empirical study, which was based on recall responses, found that audience response times were slowest for word-to-word recognition, followed by picture-to-word, and fastest for picture-to-picture cognitive responses [5]. This suggests, in part, that humans process visual images better than verbal logogen for the same

information. Therefore, based on the DCT, the survey results will be discussed and interpreted separately, dividing the content of media messages into a semantically coded linguistic-symbolic part and a visually coded non-linguistic-symbolic part.

2.3. Risk Perception

Risk perception belongs to the realm of cognitive psychology and is an important indicator of public psychological panic. In a broad sense, risk perception refers to the personal awareness of various objective risks in the external world, and is a subjective judgement that people make about the characteristics and severity of a particular risk. Specifically, “risk” is different for each person and can have a unique meaning. As this paper is related to cervical cancer, the specific meaning of “risk perception” follows the definition of disease risk perception (i.e., risk perception is the individual’s perceived susceptibility to contracting a disease) [7].

2.4. News Attention

Attention is the mental concentration of an individual on a particular topic in the media, accompanied by the distribution of the audience’s cognitive abilities [8]. In the CMM, attention to the media is a prerequisite for elaboration [4]. Essentially, to generate elaboration, the individuals must first notice the content so that it can activate relevant thinking and generate conscious thought.

Individuals think associatively about the content they are exposed to by first noticing the content in order to activate related thinking and generate conscious thought. Public associative thinking about the content of information is the additional process of connecting information to an individual’s existing knowledge structure to gain new insights. The elaboration about the content of the information is an additional process of connecting the information to the individual’s pre-existing knowledge structure in order to gain new insights. It is reasonable to assume that the public’s attention to the media reports is a necessary prerequisite for generating elaboration.

In addition, attention on all platforms is related to interpersonal communication [9]. Based on the fact that the public absorbs a certain amount of information through the media, when it comes to topics related to their lives or interests, it promotes communication with others, thus enabling them to cope further with the information obtained from the news and to relate it to their existing knowledge. At the same time, in political communication, interpersonal communication can regulate the relationship of media use to knowledge (i.e., attention can have a direct effect on interpersonal communication) [10], and they further suggest that this process can be supported across disciplines and extended to the field of health communication.

Thus, the hypothesis is formulated as follows:

H1: Attention to verbal signs is positively correlated with elaboration.

H2: Attention to non-verbal signs is positively correlated with elaboration.

H3: Attention to verbal signs is positively correlated with interpersonal communication.

H4: Attention to non-verbal signs is positively correlated with interpersonal communication.

2.5. Elaboration

Elaboration means the process of relating new information to other information in memory, including prior knowledge, personal experience, or combining two new pieces of information in a fresh way [4]. Because cervical cancer is a issue close to women, elaborating on news reports (especially negative ones) related to cervical cancer can be more stressful, which in turn raises the perceived risk. Nan and Madden’s experiment validated this idea to some extent [11], as spending time reading blogs with negative information about HPV (i.e., HPV is ineffective against cervical cancer and can lead to

blindness) can result in an enhanced risk perception of HPV vaccination and a reduced willingness to receive vaccine against HPV.

Thus, the hypothesis is formulated as follows:

H5: Elaboration is positively correlated with perceived risk.

2.6. Interpersonal Communication

Interpersonal communication takes an essential part in the dissemination of health topics [12], and it's the most common tool used by individuals seeking health information [13]. Interpersonal communication is strongly linked to risk perception [14,15], it plays an important role in shaping an individual's perception of breast cancer.

Therefore, the hypothesis is formulated as follows:

H6: Interpersonal communication is positively correlated with perceived risk.

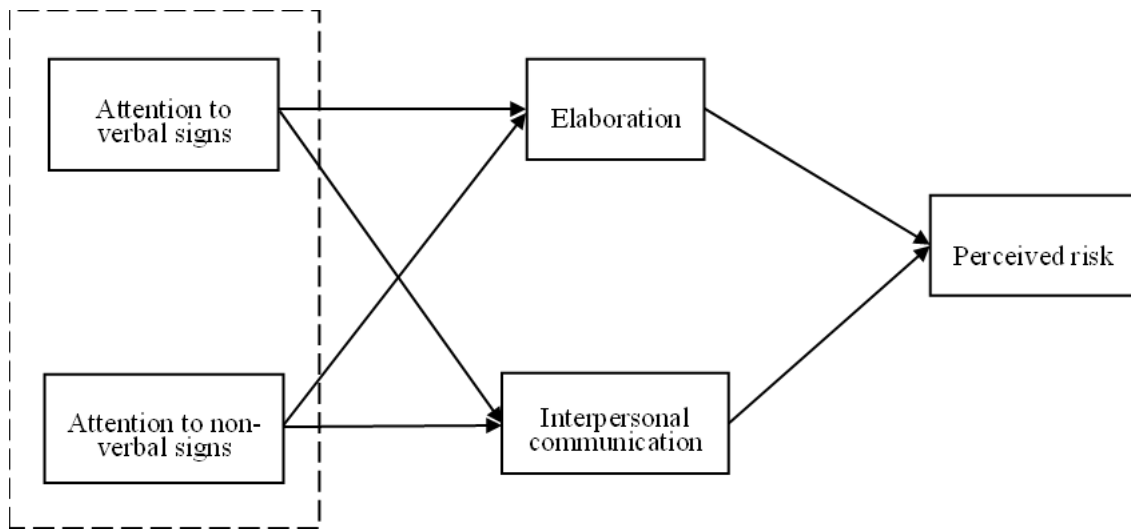


Figure 1: Proposed extended cognitive mediation model.

3. Methods

3.1. Sample

A survey was conducted by questionnaire in China. The respondents were asked to read a report, and when they had finished browsing, a self-administered questionnaire was used to measure their level of attention to verbal and non-verbal symbols, elaboration, as well as risk perception, and interpersonal communication.

A total of 237 respondents participated in the survey. After excluding ineligible data, 231 valid sample data were recovered in total. From the demographic profile of the respondents, their average age is 33.06 years old (Mdn = 33, Min = 18, Max = 50, SD = 9.08). A 47.68% of the sample had a Bachelor's degree; 29.11% had a College degree; 14.35% completed high school or Technical School; 8.44% had a Master's degree or higher; 0.42% had less than junior high school.

3.2. Measures

3.2.1. Attention

Attention was measured via two items that were adapted from Ho and Chuah [16] and Eveland [4], where respondents scaled the statements below on a scale of 1 (strongly disagree) to 7 (strongly agree):

(a) When checking out the reports, I pay more attention to the verbal signs; (b) When checking out the reports, I pay more attention to the non-verbal signs.

3.2.2. Elaboration

Elaboration was measured on three items that were adapted from Eveland [4], where respondents ranked the statements below on a scale of 1 (strongly disagree) to 7 (strongly agree): (a) After I encounter news about cervical cancer, I am likely to stop and think about it; (b) When reading or watching the news about cervical cancer, I carefully analyze the information given; (c) I often relate what I learnt from the news on cervical cancer to my existing knowledge.(Crobach's alpha=0.804)

3.2.3. Interpersonal Communication

Interpersonal communication was gauged by four items that were adapted from Ho, Scheufele, and Corley [17], where respondents were asked on a scale of 1 (Least frequent) to 7 (Most frequent): 'How frequently do you discuss issues relate to cervical cancer, either face-to-face or online, with your family members?' This question was also asked for th category of 'friends,' 'Co-workers and acquaintances,' and 'Health professionals (doctors, etc.).' (Crobach's alpha=0.840)

3.2.4. Perceived Risk

Perceived risk was assessed through four items that were adapted from Nan et al [11] and Rimal et al [18], where respondents rated the statements below on a range of 1 (Strongly disagree) to 7 (Strongly agree) : (a) I think I'm more likely to get cervical cancer compared to my peers; (b) I think I might get cervical cancer in the future; (c) I consider cervical cancer to be serious; (d) I know what happens when I get cervical cancer.(Crobach's alpha=0.807)

Table 1: Summary of measurement items.

Variable	Items
Attention	Please check out the report below first: https://m.thepaper.cn/newsDetail_forward_10036609 On a scale of 1 to 7 (1 = Strongly disagree, 7 = Strongly agree), to what extent do you agree or disagree with the following statements? a) When checking out the reports, I pay more attention to the verbal signs. b) When checking out the reports, I pay more attention to the non-verbal signs.
Elaboration	On a scale of 1 to 7 (1 = Strongly disagree, 7 = Strongly agree), to what extent do you agree or disagree with the following statements? a) After I encounter news about cervical cancer, I am likely to stop and think about it. b) When reading or watching the news about cervical cancer, I carefully analyze the information given. c) I often relate what I learned from the news on cervical cancer to my existing knowledge.

Table 1:(continued).

Interpersonal communication	On a scale of 1 to 7 (1 = Least frequent, 7 = Most frequent), how frequently do you discuss issues relate to cervical cancer, either face-to-face or online, with...? a) Family members b) Friends c) Co-workers and acquaintances d) Health professionals (doctors, etc.)
Perceived risk	On a scale of 1 to 7 (1 = Strongly disagree, 7 = Strongly agree), to what extent do you agree or disagree with the following statements? a) I think I'm more likely to get cervical cancer compared to my peers. b) I think I might get cervical cancer in the future. c) I consider cervical cancer to be serious. d) I know what happens when I get cervical cancer.

4. Results

The data were analysed by using IBM SPSS Statistics version 26.

Table 2 shows that there was a significant two-by-two correlation between a total of five variables, namely attention to verbal signs, attention to non-verbal signs, elaboration, interpersonal communication, perceived risk.

Attention to verbal signs was significantly and positively connected to elaboration ($r = 0.374$, $p < 0.01$), and interpersonal communication ($r = 0.200$, $p < 0.01$).

Attention to non-verbal signs was significantly and positively connected to elaboration ($r = 0.300$, $p < 0.01$) and interpersonal communication ($r = 0.159$, $p < 0.01$).

Elaboration was significantly and positively correlated with perceived risk ($r = 0.333$, $p < 0.01$).

Interpersonal communication was significantly and positively connected to perceived risk ($r = 0.327$, $p < 0.01$).

Table 2: Inter-correlation among the variables.

		Mean	SD	1	2	3	4
1	Attention to verbal signs	4.40	1.69				
2	Attention to non-verbal signs	4.21	1.60	.458**			
3	Elaboration	4.7	1.39	.374**	.300**		
4	Interpersonal communication	4.34	1.34	.200**	.159*	.239**	
5	Perceived risk	4.30	1.32	.316**	.256**	.333**	.327**
Note. * $p < .05$; ** $p < .01$; $N = 231$.							

Figure 2 shows the results of the path analysis.

From the path coefficients in figure1, it can be seen that: attention to verbal signs positively affects elaboration ($b = 0.30$, $p < 0.001$), interpersonal communication ($b = 0.16$, $p < 0.05$); attention to non-verbal signs positively affects elaboration ($b = 0.16$, $p < 0.05$) but is not related to interpersonal communication ($b = 0.09$, $p > 0.05$); elaboration positively affects perceived risk ($b = 0.27$, $p < 0.001$); and interpersonal communication positively affected perceived risk ($b = 0.26$, $p < 0.001$).

Therefore, H1, H2, H3, H5 and H6 were supported and H4 was not.

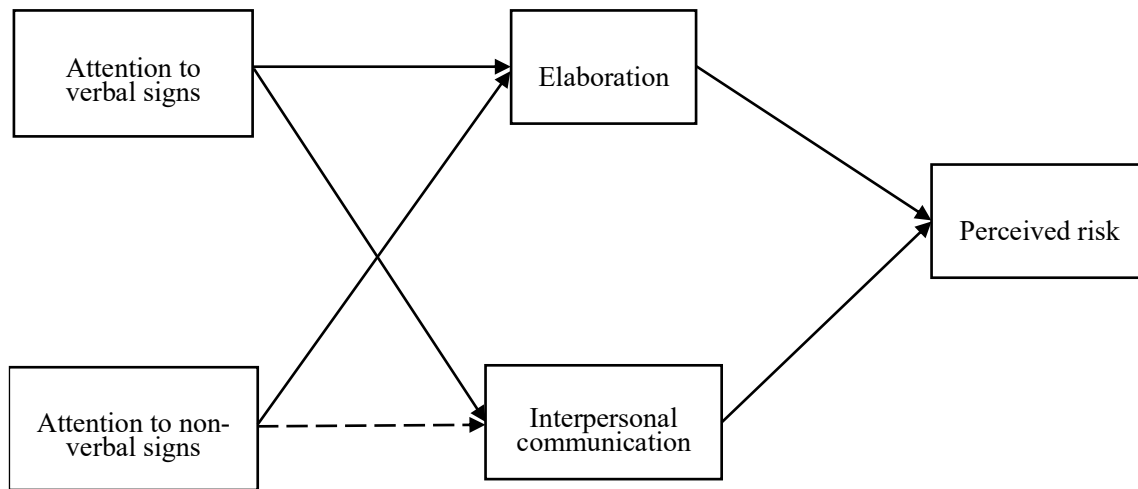


Figure 2: shows the results of the path analysis.

Note. * $p < .05$; *** $p < .001$; $N = 231$. To make the model more concise, the dashed line in the graph represents the path coefficients that are not significant and the solid line represents the path coefficients that are significant.

5. Discussion

Assuming that “H4: The level of attention to nonverbal symbols in media coverage of cervical cancer among the public is positively correlated with the level of interpersonal communication among the public.” This has not been verified. When the audience discusses issues related to cervical cancer with surrounding people, a significant relationship was not found between frequency of discussion and attention to non-verbal symbols when disseminating knowledge about cervical cancer. When the audience is discussing topics related to cervical cancer with those around them, the information reception that nonverbal symbols may bring is not intuitive and cannot directly attract people’s attention, thus transforming it into relevant knowledge to discuss with the interpersonal relationships around them. The information obtained from discussions on topics related to cervical cancer cannot be frequently crossed with nonverbal symbols, which may pose certain obstacles to the acquisition of relevant knowledge. This makes it necessary to weaken the use of nonverbal symbols in the popularization of knowledge related to cervical cancer for the general population of non relevant practitioners [19].

When the audience pays more attention to related factors such as images, text, and sound, it will generate more associations with cervical cancer related information reported by the media. The popularization of health science related knowledge involves not only relevant practitioners, but also the popularization of science among the general public. This audience needs to spend more energy on handling professional knowledge, in order to connect with old knowledge and generate a risk perception of cervical cancer related information. This also aligns with the cognitive mediation model. When media reports combine language symbols and non language symbols more comprehensively, guiding the audience’s attention to the content through a complete and comprehensive science popularization can naturally trigger associative thinking about cervical cancer related knowledge in the hands, thereby raising awareness of cervical cancer risks and improving the efficiency in spreading knowledge about cervical cancer.

The public may believe that the relevant information conveyed by language symbols has higher credibility and can be quickly converted into their own language through brain processing, thus engaging in relevant discussions with surrounding interpersonal relationships, that is, converting from

official language to one's own language. So the widespread dissemination of information related to cervical cancer is closely related to the frequent use of language symbols. The popularization of knowledge related to cervical cancer requires extensive popularization, and more scientific and understandable language symbols can enable people to discuss cervical cancer related topics more frequently.

When the public processes information related to cervical cancer and receives relevant knowledge about cervical cancer, it generates risk perception, which is the cognitive mediation model used in this study. When our science popularization aims to achieve good results and make the audience perceive the risk of cervical cancer, it is necessary to frequently associate relevant knowledge with the audience. When the public processes relevant information and combines existing knowledge to generate associations, which in turn generate a sense of direction, they will recognize the importance of preventing cervical cancer, thereby improving the success rate and efficiency of cervical cancer related knowledge popularization.

When the public frequently communicates cervical cancer related topics with their surroundings, knowledge about cervical cancer can be obtained from their interpersonal relationships. Although not all cervical cancer related knowledge obtained through interpersonal communication may be scientific, it can influence the perception of cervical cancer risk to some extent. The scientific nature of knowledge dissemination in interpersonal communication can have a positive or negative impact on risk perception, which is also a topic of exploratory research. In the process of popularizing information related to cervical cancer, adding more exploratory topics and disseminating scientific knowledge can effectively and positively affect public awareness of cervical cancer risk.

6. Conclusion

On the basis of the cognitive mediator model used, this study explores the investigates of public attention levels to linguistic and nonverbal symbols on cervical cancer related topics and the frequency of interpersonal communication, as well as the impact of the level of correlation thinking on cervical cancer related topics and the frequency of interpersonal relationship discussions on risk perception in the dissemination of cervical cancer related knowledge through media exposure. The more attention the public pays to verbal and non-verbal symbols when they are exposed to media reports about cervical cancer, the more they think about the associations with the information. When the public is exposed to media reports about cervical cancer, the more attention is paid to verbal symbols, the more frequent interpersonal communication with the public is. The more the public thinks about the relevance of media reports on cervical cancer, the more the public is aware of the risk of cervical cancer. Moreover, public perception of cervical cancer risk increases with more frequent interpersonal communication about cervical cancer. However, there is no inevitable correlation between the level of attention to nonverbal symbols and the level of interpersonal communication among the public when exposed to media reports on cervical cancer. When improving the efficiency of knowledge popularization in the field of cervical cancer, the first thing to pay attention to is the scientificity and comprehensibility of language symbols, making it easier for the audience to accept and transform relevant knowledge, thereby improving the level of associative thinking and interpersonal communication for related knowledge. There are also shortcomings in this study as the sample size of the questionnaire was relatively small, and the long-term behavior of the audience after being popularized on media platforms has not been tracked and surveyed, making it difficult to improve the research framework. It is not possible to draw long-term conclusions from the study.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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