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Health Communication: An Investigation on Emoji, Perceived Visual Informativeness and Social Media Engagement

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ABSTRACT

Compared with traditional channels of information dissemination, social media allow users to explore, to reveal and to share all kinds of information via web, reinforcing word spreading effect with such online interactivities. Convincing health information often contains clear data, distinct hierarchies and strong visual appeal. This study investigated how the application of emoji and design complexity affects social media engagement and the level of perceived visual informativeness of health information. We conducted an online experiment with a 2 (emoji: with versus without) X 2 (information design complexity: high versus low) between-subjects research. A total of 277 subjects participated in this study. Results show that, firstly, health information with emoji leads to higher social media engagement and perceived visual informativeness. Secondly, high complexity information was more convincing in terms of increasing perceived visual informativeness. Thirdly, a significant interaction effect was found on perceived visual informativeness between emoji and the design complexity of health information. In addition, visual symbols, such as emoji, are more meaningful in health information with higher design complexity than those without visual intervention or low complexity. The evidence from this study provides strategies for making visual information in health more persuasive and engaging.

Keywords: Emoji, Health communication, Perceived visual informativeness (PVI), Information design complexity, Social media engagement (SME)

INTRODUCTION

Online communication has reached an unprecedented level. Social media have acted as a catalyst for public health communication in the context of pandemic such as COVID-19, Monkeypox, and others. It is widely acknowledged that providing effective and efficient health information for the public is a crucial means to control the spread of these infectious diseases (King, 2015). Social networking applications and sites allow users to follow messages, to send requests, and to push notifications via dynamic communication means. Compared with traditional channels of information dissemination, social media enable users to explore, to reveal and to share all kinds of information via websites, reinforcing word spreading effect with such online

interactivities. Undoubtedly, social media have become an important channel of disseminating public health information. Governments and public health advocacy organizations often use social media to post information of health communication to motivate people to adopt healthy behaviors, or to ameliorate their unhealthy behaviors (Heldman et al., 2013).

Emoji is a diagrammatical symbol developed to complement the lack of non-verbal cues in CMC. In social media, the public usually adopt emoji to complement texts, substitute for words and punctuation or enhance emotion (Povine et al., 2007). At the present stage, emoji has been widely studied and used in multiple fields including health communication (Langdon et al., 2021; Lin & Luo, 2023; Lotfinejad et al., 2020; Sick et al., 2020). Since visual characteristics such as emoji can effectively affect people's attention, understanding, perception and behaviors, emoji might stimulate users to increase their threshold of perceived visual messages. This indicates that emoji might have influence on the interaction willingness of social media users. Also, the usage of the emoji of microbe (🦠) and masked face (😷) showed a significant increase in online communication in the beginning of COVID-19 outbreak (Broni, 2021). It is thought-provoking that whether emoji have positive influence on health communication on social media and it is worthy of academic study on how to use emoji to effectively communicate health information on social media. In this article, we use an experimental approach to examine the effectiveness of social media engagement and health communication from a visual design perspective. This study develops a definition of social media engagement for visual health communication efforts and discusses the feasibility and importance of emoji to enhance the visual perception of health communication. A clear understanding of the effects of emoji application in social media can help us to improve the design and the communication of health information, and to provide theoretical references and practical suggestions.

THEORETICAL BACKGROUND AND HYPOTHESES DEVELOPMENT

Emoji and Health Communication in Social Media

Good use of social media can make information communication dynamic, effective, and efficient. Many public health organizations have included social media into their services and switched from traditional to digital communication (Heldman et al., 2013). Social media engagement illustrates the reflections and measurement of how much users interact with online content, including like, comments, shares, and other various interactivities on the platform (Li & Xie, 2020; Fernández-Luque & Bau, 2015; Heldman et al., 2013). Previous studies have investigated the effectiveness and the meaning of using social media in health promotion and disease prevention. Murray et al. (2005) conducted a Meta-analysis of health communication indicating that social media can improve the health knowledge, social support, health behaviors and clinical results of users. Chou et al. (2013) also claim that investigations on the effects of social media in public health intervention are urgently required. Especially with rapid technological change and the deep

penetration of internet connectivity among people, further actions need to be taken for effective health communication.

Many symbols are created to represent facial expressions. More and more attentions are paid to the emoji influence on science and health related themes (Lotfinejad et al., 2020). These influences are a result of the visual appeal, expressiveness, and usability of emoji, as well as the proven use of these features for healthcare communication. Emoji plays a role of improving perceive risk, self-protection efficacy and preventive behavior intention in health communication during the pandemic (Lin & Luo, 2023; Lin & Luo, 2022). Szeto et al. (2022) summarized emoji in healthcare communication before and during the COVID-19 pandemic. Other studies also found good use of emoji has positive effects in pediatric health care (Sick et al., 2020; Jaeger et al., 2018), adult emotional and psychological assessment (Marengo et al., 2019; Ricard et al., 2018), medication compliance (Langdon et al., 2021; Waughtal et al., 2021), and public health tracking and interventions (Huesch et al., 2017; Al-Rawi et al., 2020; Van Dam et al., 2019). Current threats and ongoing outbreaks are forcing many people to virtual formats and telemedicine as safer alternatives (Szeto et al., 2022). Huesch et al. (2017) also discovered that many health tweets triggered people's interaction using emoji. People nowadays obtain medical and health information than traditional reading sources due to public awareness raising by the Internet and social media (Fernández-Luque & Bau, 2015). The application of emoji in health communication not only is feasible and applicable, but also can be utilized and re-utilized to meet the needs because of their potential popularity (Szeto et al., 2022). Based on above evidences, we boldly presume emoji's multiple roles in health communication:

H1: In terms of improving PVI and social media engagement, health information with emoji is more convincing than if emoji are not applied to health information.

Information Design and Complexity

Numerous studies have been investigated into fields such as information design, visual complexity, and design complexity. The aim of information design is meaning making so recipients can take action on goals (Yi & Lin, 2018). Visual complexity is the amount of visual elements and principles that are displayed (Lindgaard et al., 2006; Pieters et al., 2010) and it can be measured by the number of visual variations (Tuch et al., 2009) such as line, shape, color, value, form, texture, and space. However, design complexity is a more subjective guarantee of structural change in order to overcome the shortcomings of the visual complexity approach. Pieters et al. (2010) positioned design complexity to be the organization and application of design principles and the amount of visual information. As a matter of fact, information design often involves the combination of graphics, images, typography, and other design elements. Designers combine basic elements (e.g., color, graphics, layout design, etc.) to create a visual effect that is aggregated into more complex, higher-order design factors and interpreted by the audience (Orth & Malkewitz, 2008). Based on the above three concepts, we define Information

Design Complexity as: the state of and the intricate degree of visual representation in colors, schemes, hierarchical levels, and other visual elements. However, medical and health knowledge is often difficult to be understood by the general public due to a certain degree of professionalism. The mission of information design and its complexity control is to transform the knowledge of disease prevention and treatment to help the public understand the content even if they do not have professional medical knowledge (Yi & Lin, 2018). In health communication, then, the complexity of information design may allow a way to detect recipients' understanding of the information, their attitudes, and their subsequent behavioral intentions.

As the key to accessing online health information, the visual complexity of the information is interpreted through a holistic view which reflects the initial impression of the online health messages and significantly influences users' evaluation (Tuch et al., 2012; Lavie & Tractinsky, 2004). Lazard and Mackert (2014) proofed that design complexity should be regarded as an influential variable for health communicators since the first impression of the representation can effectively reach users, and it can be a persuasive design strategy. Above studies all suggested that in the process of health communication, the receivers' evaluation and perception of messages can be considered in information design (Pieters et al., 2010). Thus, the complexity of information design is an important variable for designers and health communicators to interpret health information in the process of health communication. In this study, the design complexity variables of health information were measured in terms of the visual hierarchy and visual richness of information design, while ensuring the same amount of information. We therefore developed the second hypothesis as:

H2: Compared to low design complexity, health information with high design complexity is more effective in enhancing perceived visual informativeness (PVI).

Perceived Visual Informativeness (PVI)

Researchers and public health professionals have long used visual features to communicate health in print and multimedia messages (King et al., 2014). The perception of information design affects how people interpret and process information, which in turn has an impact on the effectiveness of the information (Jensen et al., 2012; Cho & Boster, 2008). Perceived Visual Informativeness (PVI) is a framework that complements existing image research in health communication and seeks to advance research in the field towards a more theoretical understanding of specific types of visual messages (King et al., 2014). King (2015) further claimed that PVI is able to predict an individual's intention to perform health-related behaviors, such as skin self-examination. PVI is also proved to be helpful in creating positive attitudes and intentions about clinical trial participation (Occa et al., 2021). The establishment of PVI helps to predict the effectiveness of people's perceived information and thus further anticipate the effectiveness of the actual information (Dillard et al., 2007). These experiments show the importance of PVI variable in health communication and public health research studies.

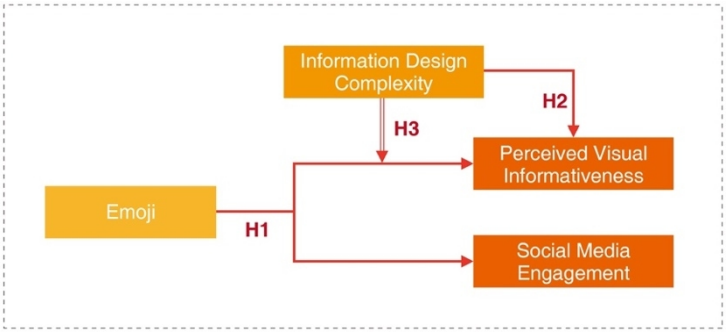

Figure 1: Conceptual overview and framework of the study.

Visual elements contain various visible components such as color, image, and font (Gerend & Sias, 2009; Juni & Gross, 2008; Seo, 2020). These components may alter the effectiveness of functional communication through various visual stimuli rather than plain text (Houts et al., 2006). Seo (2020) proves in a Meta-analysis of visual persuasion that health-related visual symbols can increase the persuasiveness of a piece of information. This result echoes Dual Coding Theory that our memory has two channels that process verbal and non-verbal stimuli, with which suggesting different types of stimuli assist recipients encode information more effectively (Paivio, 2014). In this study, we proposed emoji, as non-verbal stimuli, are more likely to increase users' interests and interactivity. The third assumption was:

H3: The effect of emoji application on PVI depends on the level of information design complexity.

Figure 1 represents the conceptual framework of this study.

METHODS AND MATERIALS

In order to investigate our three hypotheses, we conducted an online experiment with a 2x2 between-subject design. Emoji were manipulated to be present or absent, and information design complexity was manipulated (high versus low level). A seven-point Likert scale is used in this investigation. There were 277 subjects (145 females and 132 males) with age ranging from 17–59 years old ($M = 25.55$, $SD = 5.556$) responded via Credamo online panel. Around 84.1% of participants held a bachelor's degree (or higher).

We designed four Facebook posts as stimuli for this online experiment. Each post contains the same title, epidemic data on the day of the experimental test, and newsletters from various regions. Four emoji (😁, 😱, 😨, 😢) as visual supplements were placed at the end of the title and the text, whereas the text was the same without emoji in the control condition. Two more emoji (😨 and 😢) were added to complement the stimulus text and measure the information design complexity in order to extend our two previous studies (see Lin & Luo, 2023; Lin & Luo, 2022). Differ from the low design complexity information that presented with different font weights texts, high

design complexity information in this study contains more visual hierarchy, different colours, and various font sizes and styles.

Two manipulation checks were conducted in this study: 1) show or hide emoji, and 2) the complexity level of sample information high and low. The value of a dependent variable depends on recipients' evaluation on PVI, which was adapted from the study of King et al. (2014). A total of 11 checking items on visual elements were included to see if they were explanatory, clear, comprehensive, eligible, informative, understandable, indispensable, inspiring, impressive, worth remembering, and preferable than text ($\alpha = 0.923$). Higher scores indicated greater perceived visual informativeness. A three-item scale adapted from Alt (2018) was used to evaluate respondents' SME with this type of health information. The items contain whether the participant reads, comments or likes such information via social media and shares it with others ($\alpha = 0.763$). Higher scores indicate more willingness to interact with health information.

RESULTS AND DISCUSSION

Manipulation Checks

Manipulation checks were conducted on emoji (with or without) and information design complexity (high or low level) in health information using a series of Independent Sample *t*-tests. The results showed that subjects in the emoji condition recognized the presence of emoji in the information ($M = 4.85$, $SD = 2.018$, $p = 0.00$) whereas subjects in the health information without emoji ($M = 2.63$, $SD = 2.054$) could not. Also, subjects who received information with high design complexity ($M = 4.36$, $SD = 1.916$) were more likely to perceive design complexity than subjects in the low-complexity condition ($M = 3.84$, $SD = 1.782$, $p = 0.02$). These manipulation checks therefore provided evidence of construct validity.

Main Effects

The results indicated that the application of emoji in health information had a significant main effect ($F_{(1,275)} = 28.881$, $p = 0.000$, $\eta^2 = 0.095$) in answering RQ1. Compared with health information without emoji, subjects were more likely to increase social media engagement in conditions with emoji ($M_{emoji} = 5.315$, $SD = 1.223$ versus $M_{no\ emoji} = 4.467$, $SD = 1.404$). This result supports H1. According to the results of two-way ANOVA, there is a significant main effect of emoji in response RQ2 ($F_{(1,273)} = 5.858$, $p = 0.016$, $\eta^2 = 0.021$). The presence of emoji in health information performed better than their absence for increasing people's PVI ($M_{emoji} = 5.053$, SD=0.098 versus $M_{no\ emoji} = 4.695$, $SD = 0.111$). On the other hand, information design complexity only had a marginally significant effect on the PVI ($F_{(1,273)} = 3.845$, $p = 0.051$, $\eta^2 = 0.014$). These results support H2. The main effect of emoji performance on both SME and PVI holds validity (see Table 1). In sum, the application of emoji can increase perceived visual informativeness and can influence users' willingness to interact with health information in social media.

Table 1. Between-subject effect test related to research questions 1–3.

	Source	DF	MS	F	P	Partial η^2
Social media engagement (SME)	Emoji	1	49.672	28.881	0.000**	0.095
Perceived visual informativeness (PVI)	Emoji	1	7.825	5.858	0.016*	0.021
	Information Design complexity	1	5.136	3.845	0.051+	0.014
	Emoji x Information Design complexity	1	20.457	15.315	0.000**	0.053

*$p < 0.05$, **$p < 0.01$.

Interaction Effects

Besides main effect of emoji and information design complexity, we also found a significant interaction effect between emoji and information design complexity on recipients' PVI ($F_{(1,273)} = 15.315$, $p = 0.000$, $\eta^2 = 0.053$) (see Table 1). Emoji has a significant impact on receiving health information with high design complexity. In the conditions of high design complexity, recipients who received information with emoji were more likely to perceive visual informativeness than those who received information without emoji ($M_{emoji} = 5.487$, $SD = 0.154$ versus $M_{no\ emoji} = 4.55$, $SD = 0.121$). On the contrary, for those subjects who received health information with low complexity, the presence of emoji had no effect. That emoji only increased participants' PVI in the context of health information with high design complexity supports H3 (see Figure 2).

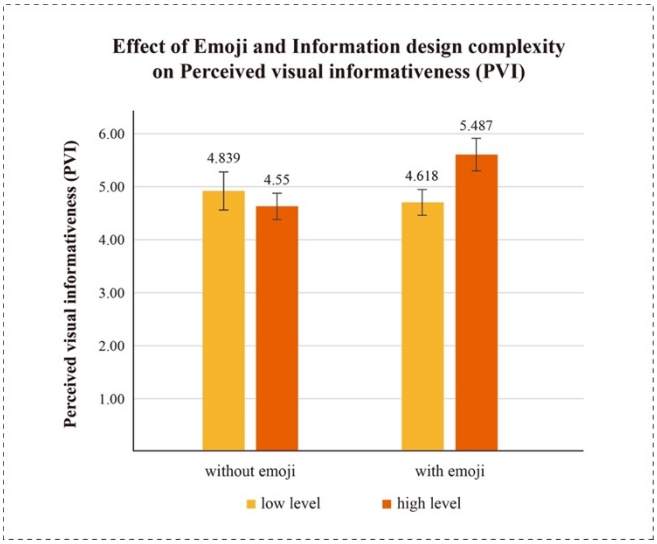

Figure 2: Conceptual overview and framework of the study.

CONCLUSION

Internet is rapidly expanding and is being used for health purposes by a great number of people. A better understanding of social media can strengthen greater decision-making capacity to health departments and health communication organizations. Good use of emoji can provide effective and efficient conversations for health communication on social media due to their fast travel through internet and ease of understanding via visual expression (Szeto et al., 2022; Boender et al., 2022).

In the current study, we used an online experiment to examine the role of emoji in health communication on social media. We compared the effects of using and not using emoji for health messages on social media communication, and investigated users' perception in relation to information design complexity. We found that health information with emoji on social media increased users' SME and PVI. This result illustrates that emoji can play multiple roles in health communication on social media. The public often prefer effective visual content in tweets. Those visual elements can reinforce attitude building and behavioral changing for better health promotion (Szeto et al., 2022; Huesch et al., 2017). This result also reinforces the need for visual strategies for health information communication during the pandemic to engage the public and to shape their visual memory and decisions (Lin & Luo, 2023; Lin & Luo, 2022; King & Lazard, 2020). We also found that the moderating role of information design complexity can determine PVI between the interaction of emoji and information design complexity. Emoji had a significant effect on health information with high design complexity, but had no significant effect on messages with low design complexity. That is to say, recipients can perceive more visual information when emoji are simultaneously shown on social media messages with high design complexity. This finding again echoes core ideas of Dual Coding Theory (Seo, 2020; Paivio, 2014). Health information with both verbal and non-verbal messages are more persuasive than those with a single type of message because verbal and non-verbal messages interweave each other and influence people's perceptions. However, unlike the combination of textual and visual information, emoji and text can form cohesive narratives so as to create fluent reading experiences. This research helps health communication practitioners and information designer to better understand how emoji could be a useful visual communication element on social media. To better examine the moderating effect of information design complexity, three or more levels can be manipulated in the near future.

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