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Short Paper

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Abstract

Online health information seeking (OHIS) has become the main approach to obtaining health information especially during Covid-19 pandemic. Being increasingly exposed to online health information, cyberchondria, one of the dark sides of excessive online information exposure, has attracted increasing attention. Prior research has concentrated primarily on how information overload can affect cyberchondria. As a pattern composed of cognition, emotion and behavior, cyberchondria may be affected by the subjective emotional and behavioral factors, such as fear of missing out (FoMO) as well as excessive communication online via social media. Based on the theory of stress and coping and stimulus-organism-response (SOR) framework, a research model was proposed to examine the mechanism underlying the impact of exposure to online health information on information overload and communication overload with FoMO as a moderator, which subsequently affects cyberchondria. Online survey will be conducted for data collection. Data analysis methods and the expected contribution is discussed.

Keywords: cyberchondria, online health information seeking, fear of missing out, communication overload, information overload

Introduction

As medical services have entered the development stage of online and offline integration, users' medical habits have also shifted to online, which also led to the increase of informal online health information seeking (OHIS). The number of online medical users in China has reached 298 million, accounting for 28.9% of the total number of Internet users (Liu, 2022). Owing to the anonymity, convenience, low price, social media has gradually become the premier platform for users to obtain, and exchange online health information. However, mobile social media platforms are full of unverified health information. Those unreliable, unclear, and exaggerated information will cause negative emotions such as anxiety and panic (Starcevic et al., 2021) in users who lack medical knowledge, which will lead to "infodemic" proposed by the World Health Organization (WHO) Response Strategy. Out of health distress or anxiety, users may overly or repeatedly seek health information online, which instead deepens the pain or anxiety. This vicious circle is called cyberchondria. Cyberchondria will cause negative outcome, such as lower perceived quality of life and Doctor-patient contradictions (Barke et al., 2016). People who suffer cyberchondria are more likely to fall into the massive infodemic. Thus, exploring the antecedents of cyberchondria has attracted lots attention from both academia and practitioners.

Existed research on cyberchondria mainly focuses on exploring the antecedents such as information overload(Laato et al., 2020). With social media increasingly becoming the main online health information channel, users always encounter a flood of health information generated by different users including medical experts, peer users. Additionally, the personal recommendation algorithm on social media may increase information overload and users' health anxiety consequently. Meanwhile, people who use social media frequently often have a sense of urgency for fear of missing out (FoMO) on new information. However, the impact of exposure to health information on social media and FoMO on cyberchondria has received little attention. Meanwhile, research on overload on social media has been highly concerned, but the impact of overload on cyberchondria, especially communication overload caused by the communication attributes of social media, is still a puzzle. During public health emergencies, the rapid spread of unauthenticated health information on social media can easily lead to an increase in the number of people with cyberchondria, which in turn will cause group panic, so understanding the antecedents of cyberchondria during social media usage is essential for the theoretical development and the mitigation of the negative social impact.

Moreover, although cyberchondria is defined as a latent variable composed of four observed variables(McElroy et al., 2019a), comparatively sparse research has explored how its antecedents affect its subdimensions, such as excessiveness, distress, reassurance, compulsion. Understanding how the information overload and communication overload impact the sub-dimensions of cyberchondria is essential for uncovering the underling formation of cyberchondria.

Based on the above-mentioned discussion, the current study aims to explore how exposure to online health information influence communication overload and information overload while moderated by fear of missing out, which subsequently impact cyberchondria and the sub-dimensions. The rest of the paper is arranged as follows: related research on OHIS and cyberchondria is reviewed in the second section together with the theoretical foundation. In the third section, the research framework and hypotheses are proposed, measurement development and data collection and analysis approach are presented in Section 4, the expected contributions and future research plan are discussed in the end.

Literature Review and Theoretical Background

Online Health Information Seeking (OHIS)

Online health information seeking (OHIS) is defined as individuals accessing health information or receiving guidance for health-related problems via the Internet, and those with amounts of health issues are active online health information seekers (Y. M. Kim, 2015). In the context of pandemics, with the explosion of health-related information, OHIS has become a crucial information behavior for the public and a prevailing research topic. Previous research has demonstrated that OHIS is associated with many different factors, such as emotional states and education (Myrick & Willoughby, 2019). However, research on the effects of OHIS on individual health outcomes is contradictory. OHIS has reassuring features, that could reduce health anxiety and improve the health management way for those with health care disorders

(Forgie et al., 2021). While excessive OHIS will result in negative consequences. For instance, health information seekers may find information overload when more health information exposure than the capacity to process and handle the information (Swar et al., 2017). Furthermore, the perceived information overload can trigger information anxiety and information avoidance, which would adversely affect the physical health of information seekers (Soroya et al., 2021). In addition, it was evidenced that OHIS is related with the increase of health anxiety level, and may lead to clinical health anxiety as well (te Poel et al., 2016). Given the potential negative influences of OHIS, health information seekers are likely to suffer from cyberchondria (H. Zheng et al., 2021).

Cyberchondria

The concept of cyberchondria proposed by (Starcevic & Berle, 2013)in 2013, describing cyberchondria as being anxious about health condition and repeatedly searching for health information, but caught in the vicious cycle of "anxiety - searching". In the past decade, scholars have mainly focused on its definition, antecedents, and intervention. However, its definition has not yet been unified. Some conceptualize cyberchondria as excessive anxiety followed by compulsive or repeated OHIS (Fergus & Spada, 2018). The others define cyberchondria as excessive searching behavior affected by negative emotion (Honora et al., 2022). Both emphasize the two core factors of cyberchondria: anxiety and excessive OHIS. In empirical research, the measurement of cyberchondria is usually divided into four dimensions, including excessiveness, compulsion, distress, and reassurance (McElroy et al,2019). However, few studies have been interested in how antecedents affect its subdimensions. To fill this research gap, we intend to explore the impact of information overload and communication overload on the sub-dimensions of cyberchondria. Existing research generally believes that it describes a unique pattern composed of behavior, emotion, and cognition. It has been proved that obsessive-compulsive symptoms (Fergus & Russell, 2016) and intolerance of uncertainty (Baerg & Bruchmann, 2022) are significantly positively correlated with cyberchondria. In terms of behavior, however, there are few studies on whether and how users' information behavior affects cyberchondria. It is known that information trust (Laato et al., 2020) and information overload (Honora et al., 2022) have significant positive effects on cyberchondria respectively, but the verification of users' online communication and FoMO from the perspective of social media lacks attention.

Theory of Stress and Coping

Lazarus and Folkman proposed the stress and coping theory in 1984 (Lazarus & Folkman, 1984). The two core elements of this theory are pressure sources and pressure. When both internal and external stimuli, such as physical and psychological state, social living environment exceed individuals' coping capacity and coping resources, pressure will be generated. That is, an imbalance between the perceived needs and the available resource. This theory has been applied to the field of psychology, management, and information science. Brenda (2020) found that the severity of the pandemic evaluation can directly predict the perceived pressure through regression analysis. Based on the stress and coping theory, when individuals are exposed to online health information, they will produce certain emotional and behavioral responses such as anxiety, panic, and continuous information-seeking behavior after they assess that such stressors exceed their personal coping ability and coping resources.

The Stimulus–Organism–Response (SOR) Framework

The S-O-R (Stimulus-Organism-Response) framework is proposed by Mehrabian & Russell in 1974. This model posits that the characteristics of environment act as a stimulus (S), affecting individuals' internal condition (O), and then driving behavioral response (R). It has been applied to many interdisciplinary studies, such IS. Luqman et al. (2017) used the stimulus-organism-response framework to investigate the factors influencing non-continuous use behavior. Since the outbreak of COVID-19, there have been many studies using the S-O-R model to explore individual information behavior. L. Zheng et al. (2020) confirmed that the lockdown measures had a buffer effect on social anxiety in pandemic regions under the SOR framework. Given the critical roles of social media environments and the online communication experiences in influencing users' OHIS behaviors, this study adopts the SOR framework as the theoretical foundation. Exposure to online health information, as a stressor, is an external stimulus to individuals, while cyberchondria is an individual's response to the stressor. The individual's assessment of coping ability and resources refers to the organism of perceived information overload and communication overload.

Research Framework and Hypotheses

Exposure to Online Health Information

Exposure to online health information refers to the extent to which users encountering health information via different online platforms. The convenience of information release and reception on social media enables massive unverified health information to spread rapidly during pandemics. After algorithm recommendation, it is easy to form information cocoon and social echo-chambers. When users are trapped in contradictory information flows where too many users' personal experiences conflict with the official information, people may encounter information overload. For another, the rapid iteration of information on social media enables people to quickly receive abundant information and thus cause information overload. According to a survey in China, online information exposure is positively related to cyberchondria, in which perceived information overload plays a part of mediating role (H. Zheng & Jiang, 2022). Therefore, we propose that:

H1: Exposure to online health information is positively related to perceived information overload.

Besides information overload, online health information exposure may cause communication overload. During pandemics, social media platforms often emerge with many user-generated health information, such as health status sharing and emotional complain. Affected by communication attributes, users are more inclined to scan posts but read comments carefully to obtain information, ask questions and seek reassurance based on personal real experience. So, the content of social media posts is often short and concise, while the number of comments is more explosive. The content and number of replies are often out of the user's control. In addition to comments, another form of communication on social media is direct messages from friends, where users exchange health information, they encounter on social media to each other out of concern for the health status of relatives and friends. Whether users are confronted with comments or private messages, communication overload can occur if the results of the interaction exceed the user's initial communication needs. Therefore, we propose that:

H2: Exposure to online health information is positively related to perceived communication overload.

Perceived Information and Communication Overload

According to the cognitive load theory (Sweller, 2011), the buffer for processing information is limited, so people may encounter information overload. Information overload can also be understood as the amount of information that has become stress on the recipient rather than useful resource. When individuals directly encounter excessive subjective and unprofessional experiences of others in the process of OHIS, they may have doubts about their health and take continuous searching behavior which will in turn deepen their negative emotions. Since 2020, the impact of information overload on health behaviors during pandemics has received attention. Laato et al. (2020) demonstrate that information overload has a positive impact on cyberchondria and unverified information sharing. Honora et al. (2022) proved that information overload has a negative impact on vaccination intention through cyberchondria. Based on the available literature, this paper proposes hypotheses:

H3: Perceived information overload is positively associated with cyberchondria.

Communication overload occurs when excessive communication exceeds communication capacity (Chen & Lee, 2013; Pang et al., 2023). The concept of communication overload originates from social media overload, which refers to the social demand exceeding the processing capacity of users(Fu et al., 2020). Social media overload is one of the typical negative consequences of users' problematic use of social media. Information overload and communication overload are both sub-dimensions of social media overload. Research has proved that social media overload can lead to negative behavioral consequences such as reducing self-regulation ability in learning (Whelan et al., 2020). During pandemics, individuals take self-isolation measures to prevent infection and social media become an important channel for people to keep in touch with others, and participate in online activities, which indirectly leads to increased time of communicating online. When individuals encounter personal experiences that are unknown to their health or inconsistent with official reports in the process of communication, it can cause an increase in skepticism and anxiety. If this situation is sustained, these groups will have difficulty distinguishing the real health information and can easily assume that they have a disease (Gardikiotis et al., 2021). Therefore, we propose:

H4: Perceived communication overload is positively associated with cyberchondria.

The Moderated Roles of FoMO (Fear of Missing Out)

Although exposure to online health information may influence perceived information and communication overload, it is possible that not all individuals are identically influenced by this effect. According to the theory of stress and coping, this relationship may be differed for individuals with different levels of cognition and coping (Lazarus & Folkman, 1984). In the context of pandemics, individual cognition, and coping manifest as FoMO. Therefore, it is necessary to explore the moderated roles of FoMO that may influence the association between the online health information exposure and perceived information and communication overload. FoMO refers to "a pervasive apprehension that others might be having rewarding experiences from which one is absent, which is characterized by the desire to stay continually connected with what others are doing" (Przybylski et al., 2013). FoMO is a new mental illness in digital era, empirical studies have concluded that FoMO is related to problematic social networking sites addiction (Li et al., 2022).

In the context of pandemics, individuals encounter lots of health information on social media. In this case, the FoMO will generate easily and influence the information behavior of individuals. On the one hand, FoMO would lead individuals to compulsive social media use and increase information flow (Zhang et al., 2022), making them inevitably exposed to more information. Consequently, the relationship between health information exposure and perceived information overload is stronger for those with high degrees of FOMO. On the other hand, FoMO is regarded as a type of social anxiety, a concern that one might miss a chance for interpersonal interaction, a novel experience, or some other favorable events (Przybylski et al., 2013; Wang et al., 2018). Individuals high in FoMO may expose to large amount of information about others, and more likely to maintain a strong and continuous connection with others by spending more time online and checking their devices more frequently (Zhou & Tian, 2023). As a result, it is more susceptible for them to experience perceived communication overload. Consequently, for those with high levels of FoMO, the influence of online information exposure on perceived communication overload might be stronger. Therefore, this study proposes:

H1a. The relationship between exposure to online health information and information overload are stronger for individuals with higher levels of FoMO.

H2a. The relationship between exposure to online health information and communication overload are stronger for individuals with higher levels of FoMO.
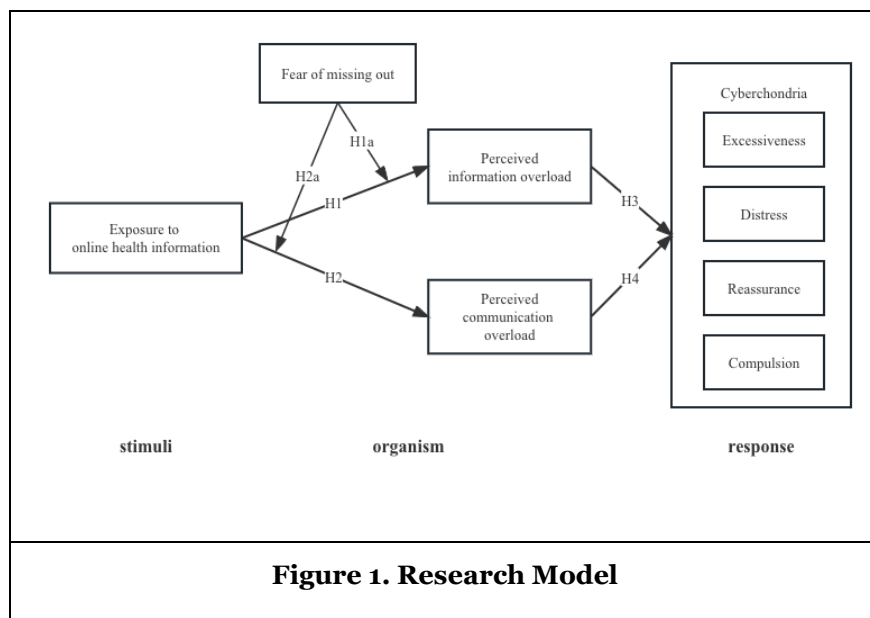
Figure 1. Research Model

Methodology

Measurement Development

All the constructed listed in the proposed research model will be measured with prior validated items via a systematic literature review on related research. To ensure the validity of the questionnaire content, we consulted experts and made changes. After the initial adjustment of the questionnaire content, a sample of 11 participants were interviewed to ensure that they could really understand all the questionnaire items. Then we further refined the questionnaire. The final questionnaire consists of three sections. The first section is the questionnaire instruction, briefly describe the investigator and the purpose of the survey. The second section is to collect demographic information, including the gender, age, education level, health status, access to health information, family living situation. The third section is a scale used to measure the relevant conditions of the participants. All items will be measured with the 7-point Likert scale (1 = strongly disagree; 7 = strongly agree).

Exposure to online health information. The items of this measurement are adapted from previous studies (H. Zheng & Jiang, 2022). The respondents were asked about a series of questions: "how often did you encounter health information on social media?" (1 = never; 5 = always). Social media include short video social platform (e.g., TikTok), comprehensive social platform (e.g., Weibo), acquaintance social platform (e.g., WeChat), question and answer websites (e.g., Zhihu). The four items were averaged as an index to represent the level of exposure to social media health information.

Fear of missing out was put forward by Beyens et al. It is composed of 9 items. Example of the scale included "I sometimes wonder if I'm taking too much time to focus on ongoing events". *Perceived information overload* and *perceived communication overload* was proposed by Whelan et al. including seven items. Sample items included "I am often distracted by the excessive amount of information on social medial" and "I waste a lot of my time responding to messages that are not directly related to what I need to get done". *Cyberchondria* was assessed using Short-Form Version of the Cyberchondria Severity Scale (CSS-12) develop by (McElroy et al,2019) The scale has four dimensions, consisting of: excessiveness (e.g., I will look it up online if I experience an unexplained physiological sensation), distress (e.g., I think I am fine until I read about a terrible situation on the internet), reassurance (e.g., I seek advice with my general practitioner after investigating symptoms or experienced medical situations on the internet), and compulsion (e.g., Investigating symptoms or experienced medical situations on the internet diverts my attention away from reading news/ sports/ leisure articles).

Data Collection and Analysis

Online questionnaire survey will be used for data collection. The aimed respondents are those who use social media as the main channel for health information seeking. To improve the representative of survey respondents, the questionnaire will be distributed with the help of a professional survey company. The survey will compose of a pilot study and a final survey stage. During the pilot study, 50 questionnaires will be collected firstly for pre-survey. According to the rule-of-thumb by (Hair et al., 2019), the sample size is recommended to be at least 10 times of the items. Thus, a total of 300 valid questionnaires will be collected in formal data collection.

The PLS-SEM analysis will be used to assess the measurement model and structural model, to explore antecedents of cyberchondria during pandemics in this study. As the aim for current research is fundamentally exploratory, i.e., to explore the antecedents of cyberchondria based on the stress and adaption theory and SOR framework, thus PLS-SEM will be chosen to assess the measurement model and the structural model.

Furthermore, given the possibility of insignificant hypotheses paths, the fuzzy-set qualitative comparative analysis (fsQCA) method will be adopted to identify the various configurations that lead to cyberchondria. FsQCA is an analytic technique based on set theory and typology, which is used to find out the detail complex cause-effect relationships. It is able perform a necessary conditions analysis to identify the necessary factors that lead to the outcome of cyberchondria, and the different configurations that result in the same outcome as well. Therefore, to identify the various configurations that result in cyberchondria, we will employ the fsQCA to find out the necessary and sufficient causality in this study.

Expected Contributions and Future Plan

The research has the following expected contributions. Firstly, it explored the moderation effect of FoMO on perceived information and communication overload and cyberchondria. It also deeply analyzes how the antecedents affect the subdimensions of cyberchondria. This study verifies the positive impact of information overload and communication overload on cyberchondria and highlights the important impact of overload on the mechanism of cyberchondria in pandemics. In addition, existing research on cyberchondria mainly focuses on the interaction between people and systems and interaction between people and information, which ignores the interaction between people and people. This study confirms for the first time the impact of communication attributes of social media platforms on cyberchondria, which broadens the research on the antecedents of cyberchondria. Therefore, the findings would help practitioners understand the social media behaviors that lead to cyberchondria. The results can expand the scope of antecedents of cyberchondria and provide a theoretical basis for future research. The empirical test of the research framework will be conducted in the future.

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