Research on gender differences in online health communities

Xuan Liu[1], Min Sun[1], Jia Li[*]

School of Business, 130 Meilong Rd., East China University of Science and Technology, Shanghai 200237, China

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ABSTRACT

With the growing concern about health issues and the emergence of online communities based on user-generated content (UGC), more and more people are participating in online health communities (OHCs) to exchange opinions and health information. This paper aims to examine whether and how male and female users behave differently in OHCs. Using data from a leading diabetes community in China (Tianmijiayuan), we incorporate three different techniques: topic modeling analysis, sentiment analysis and friendship network analysis to investigate gender differences in chronic online health communities. The results indicated that (1) Male users' posting content was usually more professional and included more medical terms. Comparatively speaking, female users were more inclined to seek emotional support in the health communities. (2) Female users expressed more negative emotions than male users did, especially anxiety and sadness. (3) In addition, male users were more centered and influential in the friendship network than were women. Through these analyses, our research revealed the behavioral characteristics and needs for different gender users in online health communities. Gaining a deeper understanding of gender differences in OHCs can serve as guidance to better meet the information needs, emotional needs and relationship needs of male and female patients.

1. Introduction

With the booming of user-generated content (UGC) on the Web, the Internet has provided an ever increasingly popular platform for the general public to actively contribute their opinions, and through this channel, interact with others within a more convenient and ubiquitous manner [1]. For example, people can not only acquire information but also exchange their views and share personal experiences on multitudes of platforms, such as online communities, blogs, forums and many other social networking sites. Group of users with common interests or goals participate in online communities to exchange information [2], express opinions [3], seek emotional support [4] and establish social relationships with others [5]. By the end of June 2015, the number of Internet users using Internet forums and BBS (Bulletin Board System) was 12.07 million in China, which accounted for 18.0% of the total number of Internet users. As all online forums and knowledge sharing sites are collaborating with search engines, the usage of online communities in China has even reached 80.3% [6].

For health communities, the increasing popularity of Health 2.0 technologies in the last decade has offered patients improved access to therapeutic information, medical knowledge, and emotional comfort [7]. A 2012 survey showed that 72% of American Internet users reported that they examined others' experiences about health or health-related issues on the Internet [8]. Patient engagement is now widely recognized as a key factor of a high-quality healthcare system. Such engagement indicates that patients have enough knowledge, ability and willingness to participate in their own health management and disease treatment process and helps patients attain better health outcomes, better treatment experiences, and lower costs in their health management [9]. Online health communities are effective tools to engage and uplift patients because they are patient-focused, create perceived self-efficacy, allow for meaningful community engagement, and empower patients [10]. Not surprisingly, people are taking an active role in managing their health outside of clinical settings. In addition to the basic disease diagnosis and treatment, community members will discuss other topics such as the problems related to daily life, drug side effects, and related symptom descriptions [11]. As an important health information resource, OHC can assist patients in making health management decisions, meeting their health information needs, and offering and gaining peer support more effectively [12,13]. Moreover, OHCs are helpful in empowering patients through personal participation and providing access to both information and emotional support [14].

Gathering people with similar characteristics into a group and studying the behavioral differences between different groups is helpful to gain a deeper understanding of the various groups and obtain

commercially meaningful guidance. From the biological and social attributes of people and a practical sense, the division of people by gender is the most natural way to maximize the differences between groups. Customer segmentation by gender is an efficient, audience-oriented, and commercially viable segmentation method to differentiate markets and services [15]. Gaining a better understanding of gender differences in OHCs is important to understand patient needs related to information, emotional support and relationship building in OHCs. It is also beneficial for meeting the demands of male and female patients with their concerned topics and optimizing the human-computer interface for health-related websites to achieve systematic community order [16].

This paper is organized as follows. The next Section reviews studies of online gender differences and gender differences in OHCs. In *Methodology Section* we propose our research framework and methodology. Then, we report our secondary data set and experimental results in Section 4. Finally, in Section 5 we conclude the paper by summarizing the contributions of this study and discussing the future research suggestions.

2. Literature review

We conducted an extensive literature review to identify prior studies related to online gender differences and gender differences in online communities. To cover not only the medical literature but also the social sciences literature, searches were conducted using one-stop sites such as Google Scholar (scholar.google.com) and Baidu Scholar (xueshu.baidu.com). For studies related to online gender differences, we combined three search concepts: "online gender differences" OR "gender differences in social media" OR "gender differences on the Internet". For studies related to gender differences in online communities, we combined two additional search concepts: "gender and online health" OR "gender and online support groups". We included studies in English published in peer-reviewed journals that met the following criteria. First, intervention studies were required to focus on an Internet-based artifact such as a portal website, a search engine, an online community, an e-commerce website, or a social media website. Second, we required that the measured outcomes be behavior observed online, such as website visit behavior, contribution behavior, linkage behavior, purchase behavior, or attachment behavior. Third, the study had to present a comparison between male and female users, and the corresponding outcome measures had to be reported.

2.1. Online gender differences

From the literature, we observed that gender differences in online environments have generally been studied in four contexts: Internet use, information needs, emotional expression and relationship establishment.

2.1.1. Internet use

As of June 2016, the proportion of male and female Internet users in China was 53:47 [17]. In the Web 2.0 environment, the gender differences among Internet users are more important since they reflect the social roles men and women play in not only real life but also virtual life. According to their own interests and material and emotional needs, men and women have different patterns in using the Internet and expressing online ideas [18–22].

2.1.2. Information needs

Depending on Internet user interests, personalities and information needs, men and women discuss different topics and they might have different communication styles when expressing their opinions in online communication [23–26]. For example, a previous study found that women often talked about their private lives, such as family and close friends, whereas men appeared to prefer discussing public life related to

topics such as government and business in online civic participation [27]. In terms of communication styles, women have been found to use more psychological and social process related words, whereas men tend to use more words that refer to specific objects, attributes, and objective topics [28].

2.1.3. Emotional expression

Emotion-rich posts containing user-generated opinions have a great influence on consumer attitudes and behaviors [29], and the sentiment analysis method has been heavily applied to the relevant studies of gender emotional differences. Previous studies confirmed that males were more concerned about information seeking on the Internet, whereas females tended to express more and stronger emotions online compared with males [30]. What's more, Zhang et al. [31] developed an algorithm to examine gender specific emotional differences and found that females were more likely to express both positive and negative emotions than males in web forum communication. Clipson et al. [32] found that women of all ages showed a greater interest in a wider range of online communities, and they placed greater emphasis on the emotional, spiritual, and social communication than did males in online social network.

2.1.4. Relationship establishment

A previous study found that community members with similar experiences and compassion were more likely to promote strong relationships with each other [33]. Male users built new friendship more easily, whereas female users were more oriented towards engagement in behavior consistent for relationship maintenance in online communities [20,34–36]. In a study of gender differences in social networks, Thelwall et al. [37] found that women usually played contributor roles because they showed a strong preference for helping others and publishing positive comments on social networking sites. Wright and Scanlon [38] found that friendships between women and women were more powerful and valuable than were friendships between men and women or men and men.

2.2. Gender differences in online health communities

The male and female demands in health care are often quite different. Gender differences in health care have been examined in various aspects such as perspectives on quality of care, care-seeking behaviors, and resource utilization [39,40,11]. The growth of OHCs enables researchers to investigate the different gender demands. With the growth of OHCs, more and more people acquire health knowledge and talk about health issues online to manage their own health. Gender differences in online health settings are determined by human physiological characteristics, social characteristics and behavioral differences as well as the interactions among these factors.

Previous studies indicated that males and females exhibit behavior differentiated when seeking information or help for health-related concerns [23,41]. Lieberman [30] investigated an online cancer discussion group and found that men were less likely to participate in online cancer groups than were women, and he argued that the silence of men in psychosocial support groups could be explained by disrespect for self-disclosure.

Furthermore, the information needs and emotional needs of men and women in health communities are also different. Seale et al. [26] conducted a keyword analysis in online cancer forums to identify gender specific participation topics, and found that the posting content from women was oriented much more towards the exchange of emotional support than was that of men, and their use of superlatives related to feelings in their postings indicated greater emotional expressivity. Mo et al. [42] divided communication content into four topics: information provision or seeking, emotional encouragement or support, personal opinion and personal experience. They revealed that gender differences in communications in single-sex online health