



How Do Voice Characteristics Affect Perceived Communication Quality? Evidence from Online Health Communities

Siyuan Xu¹ and Donghui Yang^{*2}

¹ Southeast University, NanJing 211189, China

² Southeast University, NanJing 211189, China
230249143@seu.edu.cn
dhyang@seu.edu.cn*

Abstract. With the widespread adoption of the Internet and the continuous development of digital technologies, online health communities (OHC) are increasingly becoming an essential channel for patients seeking expert health consultations. In this context, effectively attracting consumers and improving online communication quality are the top priorities for online health communities. Existing research has attempted to address this issue from many perspectives. However, the influence of the physicians' voice characteristics on patients' perceived communication quality is unclear. Based on social support theory, our research examines the impact of three emotional dimensions of physicians' voice—valence, arousal, and dominance—on perceived communication quality. Our research collected about 10,966 patient consultation records with voice messages from the well-known Chinese online health community Haodf. Empirical results show that the valence and dominance dimensions positively impact patients' perceived communication quality, while the arousal dimension has a negative impact. Additionally, patient gender and offline visit experience moderate the relationship between the emotional dimensions of physicians' voices and perceived communication quality.

Keywords: Social support theory, Emotional dimension model, Online healthcare community, Perceived communication quality, Offline visit experience

1 Introduction

The development of online health communities has brought considerable conveniences to people's daily lives. Patients can conduct medical consultations, make online appointments, and learn healthcare knowledge in OHCs.[1]. Compared to traditional face-to-face healthcare, online health communities offer a more private setting for communication, encouraging patients to share sensitive information. In addition to providing convenience to patients, OHCs also offer physicians an online communication platform. They can earn more rewards and reputation by serving patients[2]. According to a recent survey in 2024, 33.2% of people in China are using online health communities.

© The Author(s) 2025

M. Zhang et al. (eds.), *Proceedings of the 2025 5th International Conference on Informatization Economic Development and Management (IEDM 2025)*, Advances in Economics, Business and Management Research 330, https://doi.org/10.2991/978-94-6463-724-3_4

Despite the rapid growth, OHCs also encounter problems such as low user stickiness. In 2023, the retention rate of both physicians and patients in Chinese online health communities was less than 60%. This may be related to insufficient social support and low communication quality during online medical consultations. First, there is a severe information asymmetry between patients and physicians. Physicians may be unable to provide sufficient professional information only by text, leading to a lack of informational support. Secondly, compared to offline communication, the online consultation environment lacks sufficient linguistic and emotional expression, making it difficult for patients to achieve emotional support[3]. As a health service, online consultation is a value co-creation process between physicians and patients[4]. Scholars primarily focused on physicians' free knowledge contributions in the community, prosocial behaviour, and response speed as proxies, lacking direct exploration of how physicians provide social support in online medical consultation, especially the important effect of physicians' voice characteristics[5].

Existing research indicates that multimodal information, such as voice and image, can provide more information than text[6]. Compared to text, voice can convey more information and improve the efficiency of online communication. Moreover, voice often contains richer emotional expressions. Although voice has many advantages in online consultations, previous research fails to show solicitude for voice.

Therefore, our research aims to address the following research questions:(1) How does voice, as an essential component of online health consultation, help physicians provide more informational and emotional support to patients? (2) How does the emotional dimension of voice in online health consultation affect patients' perceived communication quality? (3) The moderating role of patient gender and offline consultation experiences on the relationship between the emotional dimension of physicians' voice and perceived communication quality.

2 Theoretical Basis

2.1 Online Health Communities (OHCs) and Perceived Communication Quality

OHCs refer to individuals interacting within health and health-related virtual communities to seek information, assistance, emotional support, and communication opportunities[7]. Numerous benefits of participating in OHCs have been identified, including increased social support, perceived empathy, helping patients maintain optimism, and reducing stress, depression, and levels of psychological trauma[8]. Compared to other online communities, OHCs aim to provide various types of social support. Existing research on online health communities can be categorized into three streams, focusing mainly on physicians, patients, and interactions between physicians and patients. Physicians play an important role as providers of knowledge and information in OHCs. Research on physicians includes topics such as their free knowledge-sharing behaviour, the impact of online consultations on offline clinic visits[9], and the influence of patients' online behaviour on physicians. Additionally, patients, as the largest group in OHCs, are equally indispensable. Existing research primarily focuses on developing

recommendation systems to provide better recommendations and Q&A services for patients, offering more social support to increase patient satisfaction, and the effect of online interaction on patients' mental health[10].

Despite the above two streams, another stream focuses on the communication between physicians and patients. The quality of communication is an important factor that affects the service quality and a focus of attention for online service platform operators, managers, and customers[11]. High-quality online communication can enhance the service experience and increase consumers satisfaction. In the field of health care, perceived communication quality significantly influences patient loyalty and satisfaction[12].

2.2 Social Support Theory

The concept of social support was first introduced by Cobb S in 1976[13]. This theory considers that when individuals feel cared for, loved, respected, understood, responded to, and helped by others, they experience happiness and warmth, which enhances their psychological fulfillment and influences their behaviour[14]. The social support theory involves two aspects: emotional support and informational support. Informational support refers to useful information that can help individuals make decisions. Emotional support, on the other hand, involves feelings of care, respect, concern, and understanding, providing psychological support[15].

First, physicians gain social support from patients during online health communications[16]. Research has found that both material incentives(monetary gifts) and free expressions of gratitude (thank-you letters, etc.) from patients can provide emotional support for physicians, with free expressions of gratitude being more effective in enhancing physicians' happiness. Moreover, during online health communication, patients' enthusiasm and the complexity of their self-disclosure can also impact the quality of services provided by physicians[17]. Second, patients receive social support from both physicians and communities. In OHCs, as in traditional online communities, patients can communicate with others to better understand medical information and receive emotional support[18]. Active participation in the community helps improve depressive symptoms. Research also found that patients in OHC receive more social support from community interactions than from family members[14]. However, current research has not explored voice characteristics in online health communications, overlooking the impact of social support provided by this crucial factor on the quality of health communication.

2.3 Emotional Dimension Model

The emotional dimension model adopts a different classification method[19]. The Valence-Arousal Emotion Model, proposed by Mehrabian in 1980, created a theoretical dimensional space and suggested that human emotions are not discrete but can be mapped onto a two-dimensional space[20]. This model includes two dimensions: valence and arousal. Pleasure (also known as valence) represents the positive-negative

aspect of an emotional experience. This dimension is mainly used to distinguish between positive states (such as calmness and joy) and negative states (such as fear). The second dimension, arousal, is mainly used to distinguish the intensity of emotional signals. However, subsequent research found that the two-dimensional space could not distinguish between certain emotions, such as anger and fear. Therefore, dominance was introduced as the third dimension, forming the Valence-Arousal-Dominance (VAD) model[21]. Dominance refers to an individual's sense of control or power in emotional experiences.

Existing research about VAD primarily focuses on the innovation and application of AI. Additionally, many studies use professional acoustic software such as QA5 and LVA to analyze online voice, finding that managers' positive emotional states can significantly impact analysts' forecasts and future performance. Existing research has also discovered the correlation between the valence and arousal dimensions(Robinson, Storbeck, Meier, & Kirkeby, 2004). When emotions exhibit low valence and high arousal, they are easily identified as negative, known as valence-arousal consistency. However, Emotions with low valence and low arousal are difficult to evaluate as positive or negative due to the conflict between valence and arousal. Valence-arousal congruence theory proceeds from the assumption that, in addition to the positivity or negativity denoted by valence, arousal influences the evaluation of a stimulus's positivity or negativity[22]. This is because high-arousal stimuli are associated with danger (negative), whereas low-arousal stimuli are presumed safe (positive). Based on this, research has found that the consistency between valence and arousal makes entrepreneurs appear more prepared during presentations. However, no research has analyzed the impact of physicians' voice emotions on perceived communication quality and satisfaction based on VAD model.

2.4 The VAD Dimension of Physicians' Voices and Perceived Communication Quality

Current research has indicated that the social support provided by physicians is highly correlated with patient satisfaction and online communication quality. In physicians' voice characteristics, many factors relate to emotional and informational support.

Firstly, according to the emotion regulation perspective, individuals should pay more attention to regulating positive or negative emotional expressions in effective social interactions[23]. Positive emotional expressions contribute to establishing good relationships with others, and good relationships can improve communication quality. The valence dimension in the VAD model measures the positivity of emotions, so our research considers that the valence dimension of physicians' voices positively impacts patients' perceived communication quality. Secondly, physicians with poor emotional control and prone to anger and anxiety may lead patients to doubt their professionalism and result in more complaints. In the VAD model, the arousal dimension primarily measures the energy and excitement levels in emotions, with higher arousal indicating stronger emotions. Finally, a more dominant and authoritative tone makes people feel more convinced. A dominant and authoritative tone conveys confidence and professionalism, enhancing persuasiveness[24]. The third dimension of the VAD model,

dominance, emphasizes the feeling of control or power. A higher dominance score can make physicians appear more authoritative, enhancing the credibility of information in online health communication.

Based on the impact of VAD dimension of physicians' voices on perceived communication quality, our research proposes the following hypothesis:

H1: The valence dimension of physicians' voices positively impacts patients' perceived communication quality.

H2: The arousal dimension of physicians' voices negatively impacts patients' perceived communication quality.

H3: The dominance dimension of physicians' voices positively impacts patients' perceived communication quality.

2.5 The Moderating Effect of Patient Gender

Influenced by educational methods, social culture, and physiological characteristics during growth, men and women develop different gender role orientations, leading to distinct behavioural patterns and cognitive styles[25]. In daily life, females often exhibit a more emotional nature. They are more sensitive to emotions, while males tend to be more rational and approach problems more objectively. Based on the above research, we suggest that women, who are more sensitive to emotion, can better detect emotional changes in others' speech. Thus, women are more likely to be influenced by the arousal and valence dimensions in physicians' voices than men. Additionally, psychological research indicates that because men are often assigned more authoritative roles in modern society, they show stronger reactions to authority and are more easily influenced by authoritative figures[26]. Therefore, male patients are more likely influenced by the dominance dimension in physicians' voices.

H4: The positive impact of the valence dimension in physicians' voices on perceived communication quality is more significant for female patients compared to male patients.

H5: The negative impact of the arousal dimension in physicians' voices on perceived communication quality is more significant for female patients compared to male patients.

H6: The positive impact of the dominance dimension in physicians' voices on perceived communication quality is more significant for male patients compared to female patients.

2.6 The Moderating Effect of Offline Visit Experience

The development of online health communities offers patients a wide range of medical consultation channels. Compared to offline services, online consultations are more convenient[27]. However, existing research rarely focuses on the impact of offline behavior on online activities, especially in healthcare. During offline interactions, physicians have conducted basic examinations and provided information on relevant diseases and treatments. Furthermore, face-to-face interactions can more effectively convey information in an offline communication environment[28]. In offline communication, body

language, facial expressions, and direct dialogue can provide patients additional emotional support[29]. As a result, patients with offline visit experiences have already gained enough emotional support. When patients subsequently choose online health communities for medical consultations, the social support provided by physicians' speech may be less prominent.

H7: Offline visits negatively moderate the positive impact of the valence dimension in physicians' speech on patients' perceived communication quality.

H8: Offline visits negatively moderate the negative impact of the arousal dimension in physicians' speech on patients' perceived communication quality.

H9: Offline visits negatively moderate the positive impact of the dominance dimension in physicians' speech on patients' perceived communication quality.

3 Research Design

3.1 Sample and Data Collection

Data were collected from “Haodf,” one of Chinese largest online health communities. Data from Haodf is open to all users, we can access physicians' information and patient consultation records within the platform's authorized limits. Many studies use this platform as the data source[30]. Data collection began in July 2024 and lasted three months, during which 622,10 consultation records were collected, including 10,966 records with voice data.

Then, we use the FRCRN neural network to enhance and denoise the raw audio, removing various noises and background sounds. Next, we extract features from the denoised speech with the wav2vec 2.0 general speech processing model and analyze the scores of each consultation speech across the three VAD dimensions. Wav2vec 2.0 is a general speech-processing model; it can handle different tasks and perform well across multiple languages. Finally, we process the patient's response with the BERT model, extracting positive emotional expressions in the patient's response and the communication rounds between the doctor and patient. Additionally, we also count words expressing gratitude and understanding in patients' responses.

3.2 Variable Measurement

Patients' perceived communication quality is the dependent variable in this study, measured by the interaction rounds between physicians and patients. We also use the positive emotions expressed in patient responses and the number of words expressing gratitude and understanding to measure patients' perceived communication quality. Additionally, words expressing gratitude and understanding in patients' responses can also reflect the care they feel. The independent variables in our research are the three dimensions of the doctor's voice in online medical communication. We select an emotional dimension recognition model based on wav2vec 2.0 to score the emotional dimensions in the doctor's voice. Based on existing research, this study constructed three categories of control variables: physician characteristics, patient characteristics, and voice characteristics. Table 1 presents the measurement methods for all variables.

Table 1. Definition of research variables

Variables		Measurement & Description
Dependent variable	Communication quality(Com_qua)	(1) Interaction depth
		(2) Positive emotion
Independent variable	Valence(V) Arousal(A) Dominance(D)	(3) The number of words expressing gratitude and understanding in patients' responses
		Positive state or negative state
		Signal strength
Moderating variable	Patient gender(Pat_G)	Sense of control
	Offline visit experience(OVE)	Coded as 1 for female, 0 for male
Control variable		Coded as 1 for OVE, 0 for without OVE
physician characteristics	Physician title (D_Title)	Coded as 1=Physician, 2=Attending Physician, 3=Associate Chief Physician, 4=Chief Physician
	Hospital level (Hos_Level)	Coded as 1 for tertiary hospital, 0 for other
patient characteristics	Physician gender(Phy_G)	Coded as 1 for female, 0 for male
	Disease description length (D_length)	The total number of words in the patient's disease description.
	Online consultation volume(OCV)	The number of patients who select the physician
	Speech rate (SpeechR)	The average speech rate (words/second) of the physician
Voice characteristics	Pitch range (Pit_Rag)	The distance between the maximum and minimum pitch values in a physician's voice (semitones).
	Number of speech(Num_spe)	The quantity of speech used in one consultation

4 Hypothesis Testing and Analysis

4.1 Model Construction

Given that the dependent variable in this study (perceived communication quality) is a continuous variable, we used linear regression for hypothesis testing and constructed this research model.

We investigated the impact of three emotional dimensions in physicians' voices on perceived communication quality and the moderating effects of patient gender and offline visit experience. In Formula, we primarily focus on β_1 to β_9 , which capture the three emotional dimensions of physicians' voices and the moderating effects of patient gender and offline visit experience. Additionally, we controlled for eight factors at the patient, doctor, and voice levels.

4.2 Relationship Between Emotional Dimensions in Physicians' Voices and Perceived Communication Quality

The results are presented in Table 2. Data analysis found that the standardized regression coefficients of valence dimension in physicians' voices and perceived communication quality were significantly positive ($\beta = 0.080$, $p < 0.01$). So did arousal dimension ($\beta = -0.057$, $p < 0.01$) and dominance dimension ($\beta = 0.099$, $p < 0.01$). This indicates that the valence dimension and dominance dimension in physicians' voices positively relate to perceived communication quality, thus verifying H1 and H3. The arousal dimension in physicians' voices negatively relates to perceived communication quality, thus verifying H2. When communicating with patients online, physicians can adjust their mood and mental state to make their voice sound more optimistic and calm.

Table 2. Regression Analysis of emotional dimensions in physicians' voices and perceived communication quality

variable	perceived communication quality		
	Model 1	Model 2	Model 3
control variable			
D_Title	-0.016	-0.020**	-0.019**
OCV	0.043***	0.044***	0.043***
D_length	-0.015	-0.016*	-0.017**
Physician gender	-0.009	-0.007	-0.019
Hos_Level	-0.039***	-0.031***	-0.035***
Num_spe	-0.046***	-0.056***	-0.038***
Pit_Rag	-0.026**	-0.009	-0.03***
SpeechR	0.03***	0.052***	0.006
Valence	0.080***		
Arousal		-0.057***	
Dominance			0.099***
R^2	0.016	0.012	0.018
F	19.362***	15.022***	22.591***

Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.

4.3 Moderate Role of Patient Gender

According to the regulatory effect analysis method, multiple-level linear regression analysis was conducted using SPSS 26.0. The results are presented in Table 3. Assumption 4 was verified first. In model 5, the interaction item of valence dimension and patient gender had a significant moderating effect ($\beta = 0.023$, $p < 0.05$); thus, H4 was verified. However, according to Model 7 and Model 9, the moderating effects of patient gender on the relation between arousal dimension, dominance dimension and perceived communication quality were not statistically significant ($\beta = -0.006$, $p = 0.531$; $\beta = 0.011$, $p = 0.256$). Therefore, research hypotheses H5 and H6 were not supported.

Table 3. Analysis on the moderate role of patient gender

variable		perceived communication quality					
		Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
control variable							
	D_Title	-0.016**	-0.017*	-0.021**	-0.021**	-0.019**	-0.02**
	OCV	0.042***	0.042***	0.043***	0.043***	0.042***	0.042***
	D_length	-0.016**	-0.016*	-0.016*	-0.016*	-0.017*	-0.017*
	Physician gender	-0.01	-0.011	-0.008	-0.008	-0.019	-0.019
	Hos_Level	-0.038***	-0.037***	-0.031**	-0.031**	-0.034**	-0.034**
	Num_spe	-0.046***	-0.046***	-0.056***	-0.056***	-0.038***	-0.038***
	Pit_Rag	-0.026**	-0.026**	-0.009	-0.009	-0.029***	-0.030***
	SpeechR	0.03***	0.03***	0.052***	0.052***	0.006	0.005
IV	Valence	0.080***	0.078***				
	Arousal			-0.056***	-0.056***		
	Dominance					0.099***	0.099***
RV	Patient gender	0.009	0.009	-0.009	-0.009	-0.009	-0.009
	V*PG		0.023**				
	A*PG				-0.006		
	D*PG						0.011
Interactive items	R ²	0.016	0.016	0.012	0.012	0.018	0.018
	F	17.515***	16.439***	13.618***	12.415***	20.416***	18.678***

Standard errors in parentheses. *p < .1, **p < .05, ***p < .01.

4.4 Moderate Role of Offline Visit Experience

The results are presented in Table 4. Assumption 7 was verified first. In model 11, the interaction item of valence dimension and patient gender had a significant moderating effect($\beta = -0.024$, $p < 0.05$); thus, H7 was verified. However, according to Model 13, the moderating effect of offline visit experience on the relation between arousal dimension and perceived communication quality was not statistically significant ($\beta = 0.007$, $p = 0.456$). Therefore, research hypothesis H8 was not supported. Finally, hypothesis 9 was tested. Model 14 was the main effect model, and the dominance dimension significantly affected perceived communication quality($\beta = 0.101$, $p < 0.01$). In model 15, the interaction item of valence dimension and patient gender had a significant moderating effect($\beta = -0.021$, $p < 0.01$); thus, H9 was verified.

Table 4. Analysis on the moderate role of offline visit experience

variable		perceived communication quality					
		Model 10	Model 11	Model 12	Model 13	Model 14	Model 15
control variable							
D_Title		-0.017*	-0.017*	-0.022***	-0.022***	-0.021***	-0.022***
OCV		0.043***	0.043***	0.044***	0.043***	0.043***	0.043***
D_length		-0.017*	-0.017*	-0.018**	-0.018**	-0.02***	-0.02***
Physician gender		-0.009	-0.007	-0.007	-0.007	-0.018	-0.017
Hos_Level		-0.039***	-0.04***	-0.031***	-0.031***	-0.035***	-0.035***
Num_spe		-0.047***	-0.047***	-0.057***	-0.057***	-0.039***	-0.04***
Pit_Rag		-0.026***	-0.026***	-0.010	-0.010	-0.031***	-0.031***
SpeechR		0.030***	0.031***	0.052***	0.052***	0.005	0.005
IV	Valence	0.079***	0.079***				
	Arousal			-0.056***	-0.056***		
	Dominance					0.101***	0.103***
RV	OVE	0.014	0.013	0.012	0.012	0.022**	0.023**
	V*OVE		-0.024**				
	A*OVE				0.007		
Interactive items	D*OVE						-0.021***
	R ²	0.016	0.016	0.012	0.012	0.019	0.019
	F	17.622***	16.589***	13.686***	12.491***	20.877***	19.440***

Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.

4.5 Additional Analysis

According to valence-arousal consistency theory, the combination of valence and arousal may cause different effects on perceived communication quality. So we try to investigate the interaction effect between valence and arousal on perceived communication quality to enrich our findings. The results shown in Table 5 reveal that the coefficient of valence*arousal is negative. Therefore, as the valence dimension increases, the negative impact of the arousal dimension on patients' perceived communication quality decreases. From another perspective, as the arousal dimension increases, the positive effect of the valence dimension decreases. These findings are consistent with the valence-arousal consistency theory. When emotions exhibit low valence and high arousal or high valence and low arousal, they are easily identified. Existing research indicates that less cognitive effort is required for integration when the evaluation of valence matches that of arousal. Therefore, when physicians send voice messages to patients, they should maintain consistency between the valence and arousal dimensions, which can reduce patients' cognitive load and help them better understand the content of the voice messages.

Table 5. The Interaction of valence and arousal

variable		perceived communication quality	
		Model 16	Model17
control variable			
	D_Title	-0.015	-0.014
	OCV	0.042***	0.043***
	D_length	-0.015	-0.015
Physician gender		-0.003	-0.002
	Hos_Level	-0.038***	-0.038***
	Num_spe	-0.052***	-0.052***
	Pit_Rag	-0.013	-0.013
	SpeechR	0.054***	0.053***
IV	Valence	0.095***	0.097***
RV	Arousal	-0.077***	-0.081***
	V*A		-0.023**
Interactive items	R^2	0.021	0.021
	F	23.045***	21.489***

Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.

5 Conclusions

In this study, we propose a research model based on social support theory. Several critical findings can be drawn from this study based on our research questions. Firstly, we found that the valence dimension of physicians' voices positively influences patients' perceived communication quality. Secondly, our research indicates that the arousal dimension has a negative impact on patients' perceived communication quality. Finally, the dominance dimension positively affects patients' communication quality.

Furthermore, patient responses to physician's voices vary based on gender. From the perspective of the voice signal receiver, we investigate how patient gender affects the relationship between the emotional dimensions of physicians' voices and perceived communication quality. It is found that female patients are more sensitive to the valence dimension in physicians' voices.

Moreover, the offline visit experience also affects the relationship between the emotional dimensions of physicians' voices and perceived communication quality. Compared to online consultations, patients receive richer service experiences and more social support during offline consultations. Therefore, patients with offline visit experiences receive less social support from physicians' voices and are less sensitive to changes in emotional dimensions of physicians' voices.

References

1. Chen, C. and D. Walker, A Bitter Pill to Swallow? The Consequences of Patient Evaluation in Online Health Question-and-Answer Platforms. *Information Systems Research*, 2023. **34**(3): p. 867-889.
2. Yang, J., B. Luo, and F.-S. Tsai, Continuance Intention of Online Healthcare Communities: The Mediation Mechanism of Social Interaction Ties. *Journal of Organizational and End User Computing*, 2022. **37**(7).
3. Wu, H., et al., How online health community participation affects physicians' performance in hospitals: Empirical evidence from China. *Information & Management*, 2021. **58**(6).
4. Zhang, M., et al., Value creation for online collaboration between doctors and medical institutions: empirical evidence from online health communities. *Internet Research*, 2024. **34**(5): p. 1714-1743.
5. Introne, J. and S. Goggins, Advice reification, learning, and emergent collective intelligence in online health support communities. *Computers in Human Behavior*, 2019. **99**: p. 205-218.
6. Bakker, I., et al., Pleasure, Arousal, Dominance: Mehrabian and Russell revisited. *Current Psychology*, 2014. **33**(3): p. 405-421.
7. Peng, C.-H., D. Yin, and H. Zhang, More than Words in Medical Question-and-Answer Sites: A Content-Context Congruence Perspective. *Information Systems Research*, 2020. **31**(3): p. 913-928.
8. Huang, K.-Y., I. Chengalur-Smith, and A. Pinsonneault, SHARING IS CARING: SOCIAL SUPPORT PROVISION AND COMPANIONSHIP ACTIVITIES IN HEALTHCARE VIRTUAL SUPPORT COMMUNITIES. *Mis Quarterly*, 2019. **43**(2): p. 395-+.
9. Wang, L., et al., Understanding Physicians' Online-Offline Behavior Dynamics: An Empirical Study. *Information Systems Research*, 2020. **31**(2): p. 537-555.
10. Zhou, J., et al., UNINTENDED EMOTIONAL EFFECTS OF ONLINE HEALTH COMMUNITIES: A TEXT MINING-SUPPORTED EMPIRICAL STUDY. *Mis Quarterly*, 2023. **47**(1): p. 195-226.
11. Akter, S., J. D'Ambra, and P. Ray, Development and validation of an instrument to measure user perceived service quality of mHealth. *Information & Management*, 2013. **50**(4): p. 181-195.
12. Shen, M.J., et al., The Effects of Race and Racial Concordance on Patient-Physician Communication: A Systematic Review of the Literature. *Journal of Racial and Ethnic Health Disparities*, 2018. **5**(1): p. 117-140.
13. Cobb, S., SOCIAL SUPPORT AS A MODERATOR OF LIFE STRESS. *Psychosomatic Medicine*, 1976. **38**(5): p. 300-314.
14. Wang, W., P. Shukla, and G. Shi, Digitalized social support in the healthcare environment: Effects of the types and sources of social support on psychological well-being. *Technological Forecasting and Social Change*, 2021. **164**.
15. Zhao, Y. and L. Zhang, Getting better? Examining the effects of social support in OHCs on users' emotional improvement. *Information Processing & Management*, 2024. **61**(4).
16. Szameitat, D.P., et al., Acoustic correlates of emotional dimensions in laughter: Arousal, dominance, and valence. *Cognition & Emotion*, 2011. **25**(4): p. 599-611.
17. Wang, X., et al., Talk more about yourself: a data-driven extended theory of reasoned action for online health communities. *Information Technology & Management*, 2024. **25**(3): p. 233-246.
18. Zhuo, X. and W.-T. Wang, Why are physicians willing to contribute knowledge? Evidence from online health communities. *Computers in Human Behavior*, 2024. **152**.
19. Lee, K.M., et al., An Indirect Measure of Discrete Emotions. *Emotion*, 2020. **20**(4).

20. Allison, T.H., et al., Can you hear me now? Engendering passion and preparedness perceptions with vocal expressions in crowdfunding pitches. *Journal of Business Venturing*, 2022. **37**(3).
21. Mori, H., H. Kasuya, and Isca. Voice Source and Vocal Tract Variations as Cues to Emotional States Perceived from Expressive Conversational Speech. in *Interspeech Conference 2007*. 2007. Antwerp, BELGIUM.
22. Wang, X., et al., Audio Mining: The Role of Vocal Tone in Persuasion. *Journal of Consumer Research*, 2021. **48**(2): p. 189-211.
23. Mikolajczak, M., et al. USING AN EMOTION REGULATION FRAMEWORK TO PREDICT THE OUTCOMES OF EMOTIONAL LABOR. in *6th International Conference on Emotions and Organizational Life*. 2008. Fontainebleau, FRANCE.
24. Burgoon, J.K. and J.L. Hale, The fundamental topoi of relational communication. *Communication Monographs*, 1984. **51**(3): p. 193-214.
25. Ren, H., L. Wang, and J. Wu, The faster or richer the response, the better performance? An empirical analysis of online healthcare platforms from a competitive perspective. *Decision Support Systems*, 2024. **184**.
26. Chen, Q., J. Jin, and X. Yan, Understanding physicians' motivations for community participation and content contribution in online health communities. *Online Information Review*, 2023. **47**(3): p. 604-629.
27. Chen, S., et al., Exploring the Online Doctor-Patient Interaction on Patient Satisfaction Based on Text Mining and Empirical Analysis. *Information Processing & Management*, 2020. **57**(5).
28. Ye, Q. and H. Wu, Offline to online: The impacts of offline visit experience on online behaviors and service in an Internet hospital. *Electronic Markets*, 2023. **33**(1).
29. ElKefi, S. and O. Asan, How technology impacts communication between cancer patients and their health care providers: A systematic literature review. *International Journal of Medical Informatics*, 2021. **149**.
30. Yin, Q., et al., Exploring the Peer Effect of Physicians' and Patients' Participation Behavior: Evidence from Online Health Communities. *International Journal of Environmental Research and Public Health*, 2022. **19**(5).

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

