SENSORY MARKETING IN ONLINE MEDICAL KNOWLEDGE SHARING: A FEELING-AS-INFORMATION THEORY PERSPECTIVE

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ABSTRACT

Online health platforms often struggle with high user turnover, making it essential to attract and retain patients. Knowledge sharing has emerged as a key strategy in this effort. However, previous studies have shown that physicians benefit from knowledge sharing through reputational gains and indirect financial returns, the mechanisms driving these effects remain unclear. This study draws on sensory marketing and feeling-as-information theory to examine how sensory cues of linguistic features in physicians' knowledge sharing influence their online service volume. Using structured and unstructured data from 307 physicians with 3,834 knowledge-sharing instances in online health platforms in China, we apply text mining and empirical modeling to test our hypotheses. Our findings indicate that haptic cues in physicians' knowledge sharing positively impact their online service volume, whereas auditory cues have a negative effect. Moreover, the influence of these sensory cues varies depending on physicians' specialties and professional capital. By integrating sensory marketing into the study of online healthcare, this research advances the understanding of how linguistic features in knowledge sharing drive physicians' financial returns.

Keywords: Knowledge sharing; Feeling-as-information theory; Sensory cues; Sensory marketing; Linguistic features

1. Introduction

Advancements in information technology have transformed how individuals access healthcare services and information (Chen & Walker, 2023). Online health platforms (OHPs) have emerged as a widely used solution, overcoming geographical and time constraints by connecting patients with physicians across the country (Deng et al., 2024). In China, the Internet healthcare market reached 196.1 billion yuan in 2020, highlighting the rapid expansion of these platforms (Internet Society of China, 2021). The adoption of OHPs has accelerated, providing a convenient alternative for individuals seeking medical services (Chen et al., 2023; Fox & Duggan, 2013). Their role became even more critical during the COVID-19 pandemic when approximately 15% of patients in China turned to these platforms for healthcare (Yang et al., 2022). By offering flexibility and accessibility, OHPs helped address regional disparities in healthcare resources, making quality medical care more widely available (Deng et al., 2025a; Goh et al., 2016).

Despite the obvious benefits of OHPs, increasing patient engagement remained a challenge due to high user attrition rates (Deng et al., 2025b; Huh et al., 2016; Song et al., 2018). To enhance platform sustainability, physicians

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have begun sharing health-related information, experiences, and insights to capture patient interest (Fan & Lederman, 2018). This knowledge-sharing involved disseminating educational and professional content that was freely accessible to the public (Meng et al., 2021). Unlike paid consultations, it served as a public service, expanding access to medical knowledge and improving health literacy (Zhang et al., 2020a). While physicians did not receive direct financial compensation for this activity, it enhanced their reputation and could attract more patients for paid consultations (Zhang et al., 2018). Data showed that nearly 40% of physicians have engaged in knowledge sharing, and more than 70% expressed a willingness to do so[2].

Yet, simply encouraging physicians to share knowledge was not enough to ensure its effectiveness. The essence of their knowledge-sharing role lay in the ability to communicate information in a way that patients can understand. However, the complexity of medical language constrained the linguistic features physicians use, thereby limiting the effectiveness of the knowledge conveyed. News reports in China highlighted a bottleneck in online knowledge sharing, where overly technical terminology, a lack of interpretation, and ambiguous phrasing made it difficult for patients to fully comprehend shared information[3]. As a result, knowledge sharing did not always achieve its intended impact. Additionally, OHPs lacked mechanisms that reinforced patient appreciation, which reduced the intrinsic motivation for physicians to continue sharing (Yan et al., 2016). The one-to-many model of free knowledge sharing further exacerbated this issue, as the "free-rider" effect diminished the sense of social reward for contributors (Zhang & Wang, 2012), ultimately discouraging long-term participation.

Thus, addressing this issue required answering two key questions: (1) what linguistic feature should physicians use to enhance the effectiveness of knowledge sharing? (2) Can knowledge sharing generate financial returns for physicians, thereby sustaining their willingness to share? To explore these questions, we reviewed two key areas of the literature. First, research on linguistic features primarily examined lexical, syntactic, pragmatic, and semantic aspects (Jiang et al., 2022). Prior studies have extensively analyzed factors such as text length (Chen et al., 2020; Ho et al., 2016; Jiang et al., 2022; Jing et al., 2024), text readability (Chen et al., 2020; Jiang et al., 2022; Luo et al., 2023; Zhang et al., 2020b), linguistic style matching (Chen et al., 2020; Jiang et al., 2022), and emotional polarity (Chen et al., 2020; Ho et al., 2016; Jiang et al., 2022; Luo et al., 2023; Majumdar & Bose, 2018; Throckmorton et al., 2015; Yang et al., 2019; Zhang et al., 2020b). However, research on semantic features, particularly content-specific keywords in the healthcare domain, remained limited. Second, most studies on linguistic features have focused on their impact on online interactions (Huang & Yeo, 2018; Kumar et al., 2022; Xu et al., 2023; Yang et al., 2019) and social support behaviors (Chen et al., 2020; Jing et al., 2024). In contrast, few studies in the information systems field have examined how linguistic features influence consumer behavior, particularly in the context of online healthcare.

To further explore whether knowledge sharing can generate financial returns, we drew on insights from marketing literature. In recent years, sensory marketing has gained significant attention for its role in shaping consumers' perceptions. It referred to the use of human senses to create the brand's experiential scene, create exclusive marketing content, enhance the attractiveness of the product or service, and effectively mobilize consumer desire to promote transactions. The means used to stimulate the senses of consumers were called sensory cues. It explained how consumers evaluated products or services based on sensory cues, which enhanced understanding of complex product information (Krishna, 2012; Krishna & Schwarz, 2014). Businesses incorporated multisensory elements in advertisements to immerse consumers in a product or service, fostering emotional connection (Elder & Krishna, 2010). In this context, sensory words used in advertisements represented a form of content-specific keywords, which were a key semantic feature. Similarly, physicians' knowledge sharing served as a critical channel for patients to learn about health conditions and treatment options. Like advertisements, effective knowledge sharing depended on clear and engaging communication to ensure patients fully understand the information provided. However, the technical nature of medical knowledge often created a barrier, making it difficult for patients to comprehend (Wu et al., 2021). This highlighted the importance of how physicians structured and conveyed their knowledge, as it may directly influence their potential financial returns. In our study, the use of visual, auditory, and haptic words in knowledge sharing was considered to elicit sensory imagery from users, referred to as sensory cues. Given these considerations, an important research question arose: How does the sensory word of knowledge sharing, a kind of linguistic feature, contribute to physicians' success in online medical services?

To address this research question, we applied feeling-as-information theory as the theoretical framework to examine how linguistic features in physicians' knowledge sharing shaped patient perceptions, aided decision-making, and influenced service engagement. Unlike previous studies, we integrated sensory marketing into the online healthcare context, proposing that sensory cues in physicians' knowledge sharing could help patients who may have limited medical knowledge make more informed judgments while also driving financial benefits for physicians. We

[2] https://www.lifetimes.cn/article/4DmjvB1K0yv
[3] https://fddi.fudan.edu.cn/b3/31/c18985a635697/page.htm

randomly collected a dataset of 3,834 knowledge-sharing posts from 307 physicians in the JD online medical platform in China. Our findings revealed that haptic cues significantly increased physicians' online service volume, while auditory cues had a negative effect, and visual cues showed no significant impact. Furthermore, the influence of haptic and auditory cues varied depending on physicians' specialties and professional capital.

This study made several contributions to the literature. First, we demonstrated that physicians can enhance their financial returns by strategically incorporating linguistic features into free knowledge sharing. While previous research has primarily examined physicians' internal and external motivations for knowledge sharing (Li et al., 2023; Yan et al., 2016) or the role of linguistic features such as emotion in online interactions, we showed that physicians can influence patients' decisions to purchase paid consultations by adjusting their linguistic approach in free content. Second, we applied feeling-as-information theory to uncover the mechanisms through which linguistic features in physicians' knowledge sharing shaped patient perceptions. By extending this theory that was commonly used in marketing research to the online healthcare context, we revealed that sensory-related words evoked mental imagery, drawing patients' attention and serving as reference points for future purchasing decisions. This perspective differed from existing marketing studies that focus on emotional semantics rather than sensory-driven cognitive processing. Third, by introducing sensory marketing into online healthcare, we highlighted the critical role of sensory cues in physicians' financial success. We argued that these cues enhanced patients' comprehension of complex medical information, improved the efficiency of knowledge transfer, and ultimately influenced patient decision-making.

The paper was organized as follows. First, we reviewed the literature about linguistic features and the feeling-as-information theory. Next, we proposed our research hypotheses. We then provided the data acquisition process, empirical model construction, and illustrated our findings. Finally, we discussed the findings and explored theoretical and practical implications.

2. Theoretical background

2.1. Linguistic feature

Linguistic features in text can be categorized into lexical, syntactic, pragmatic, and semantic aspects (Clark et al., 2013), all of which have been examined in online contexts. Lexical features pertained to word usage, including average word length and vocabulary richness. For instance, word count, often associated with wordiness and expressiveness, has been identified as a key characteristic of computer-mediated deception (Ho et al., 2016), and, in online healthcare, served as an indicator of the completeness of health information (Chen et al., 2020). Syntactic features related to the sentence structure and grammatical rules, including word frequency and readability. In e-commerce, fake reviews tended to include an excessive number of modifiers, such as adjectives and adverbs, to enhance product descriptions (Luo et al., 2023). Pragmatic features focused on word choice within specific contexts. In online healthcare contexts, shared language use fostered social acceptance and improves communication effectiveness (Jiang et al., 2022). Semantic features captured the meaning behind the words, with sentiment polarity (Yang et al., 2019; Zhang et al., 2020b) and content-specific keywords, such as social words (Ho et al., 2016), being widely studied. However, sensory words, which also fell under content-specific keywords, have received less attention.

Linguistic features in online contexts influenced various user behaviors, which can be broadly categorized into consumption behavior, online interaction behavior, and social support behavior. Consumption behavior, referred to how linguistic features affect purchasing decisions, was often studied in the context of sellers' self-description (Zhang et al., 2020b). Online interaction behavior focused on user engagement metrics, such as retweets (Huang & Yeo, 2018; Kumar et al., 2022), likes (Xu et al., 2023; Yang et al., 2019), and comments (Xu et al., 2023; Yang et al., 2019), highlighting how different types of language influenced platform engagement. Another key outcome was social support behavior, which examined how linguistic features facilitated user support within online platforms. For instance, Chen et al. (2020) proposed a model explaining how linguistic features in OHPs posts signaled the need for social support, and Jing et al. (2024) explored how patients' self-disclosure strategies affected the level of support received from physicians. This study focused on how linguistic features in physicians' knowledge sharing impacted their online service volume, a critical factor directly related to financial returns. Unlike research on interaction and social support behaviors, knowledge sharing represented a form of physicians' online self-disclosure, where service volume served as a measurable financial outcome. Additionally, while prior research on consumption behavior has examined how linguistic features influenced purchasing, it has not fully explained the underlying mechanisms. To address this gap, this study applied feeling-as-information theory to explore how sensory cues in knowledge sharing influence patient decision-making. Table A.1 in Appendix A summarized the existing literature on linguistic features, and Figure 1 illustrated how this study was positioned within the research landscape.

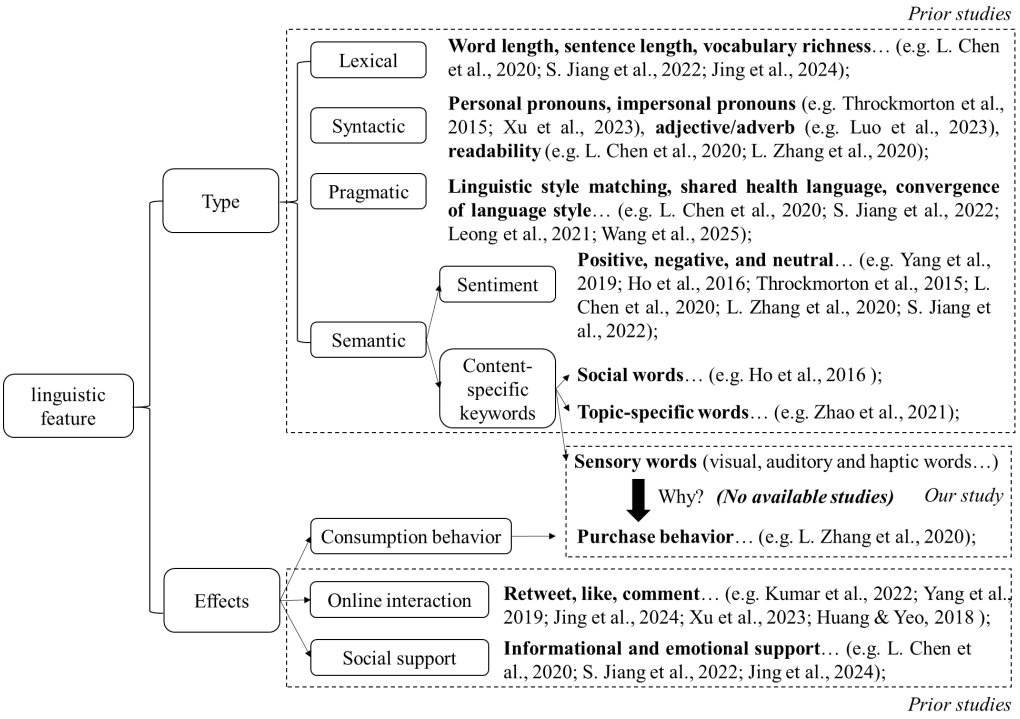

Figure 1: positioning of our study in the existing literature

We also reviewed the literature on physician knowledge sharing to understand why the financial returns to physicians from this practice were a key focus. Physicians used OHPs to share medical knowledge, providing insights on topics such as disease diagnosis, treatment options, and health management (Deng et al., 2025a; Yan et al., 2016). Most research in this area explored the motivations behind physicians' engagement in knowledge sharing, emphasizing a combination of intrinsic and extrinsic factors (Li et al., 2023; Yan et al., 2016). On one hand, physicians gained personal satisfaction and social value from sharing their expertise. On the other hand, knowledge sharing can lead to financial benefits, either through platform incentives or by enhancing their professional reputations (Guo et al., 2017). Research has shown that the information support physicians provided by knowledge sharing helped meet patients' task-oriented needs and positively impacted their evaluations of the service (Akter et al., 2013; Tan & Yan, 2020; Wu et al., 2018). However, the mechanisms by which knowledge sharing generated financial returns for physicians, beyond platform incentives, were not well understood. This study aimed to explore how linguistic features in knowledge sharing may contribute to these financial returns for physicians.

2.2. Feeling-as-information theory

Feeling-as-information theory, an extension of mood-as-information theory (Schwarz & Clore, 1983), examined how a range of emotions, beyond basic feelings like happiness or sadness, influenced cognition and decision-making (Van Lange et al., 2011). It posited that individuals used various subjective feelings, such as moods, emotions, metacognitive experiences, and bodily sensations, as cues to inform their judgments. Positive emotions, for example, signal lightness and optimism, suggesting that things were progressing well, while negative emotions triggered feelings of danger or discomfort, motivating individuals to seek solutions. This theory has been widely applied in marketing and information systems research to explore the emotional factors that drove users' decisions (Avnet et al., 2012; Chen et al., 2025; Kramer & Yoon, 2007; Liu et al., 2021).

Table A.2 in Appendix A summarized the relevant literature on feeling-as-information theory. Current applications of feeling-as-information theory primarily focused on understanding new technologies, human interaction, and consumer behavior. Regarding new technologies, research has examined whether virtual multisensory interactions, such as those found in metaverse games (Chen et al., 2025), augmented reality (Zanger et al., 2022), and robotics (Xiong et al., 2025), can evoke real-world experience and influence user behavior. In terms of interpersonal interactions, studies have explored the emotional dynamics within organizations. For instance, Manville et al. (2023) examined how changes in newcomers' perceptions of abusive supervision and their negative impact on supervisors affected their perceived insider status. These studies highlighted how emotion shaped organizational behaviors, as discussed in feeling-as-information theory (Jiang et al., 2020; Masterson et al., 2021). The theory was also widely

applied in marketing to explain consumer behavior. Quach et al. (2021) found that a mixed emotional appeal was more effective than pure happiness in generating positive word of mouth when using third-person narration. Similarly, Shin et al. (2019) examined the impact of review concreteness, a semantic feature, on individuals' perception of information value. These studies were relevant to our research because they explored consumer behavior through the lens of linguistic features. However, while these consumer behavior studies focused primarily on sentiment in semantic features, they largely overlooked the role of sensory-specific keywords in semantic features.

The study of consumer behavior from a sensory perspective was primarily centered on sensory marketing, which explored how consumers relied on sensory cues to evaluate products and services and make purchasing decisions (Choi et al., 2024; Krishna, 2012; Krishna & Schwarz, 2014). Sensory inputs such as sight, sound, and touch conveyed signals that triggered emotional responses. For instance, advertisements that engaged consumers' sensory perceptions can increase their intent to purchase (Elder & Krishna, 2010). Research has shown that rough haptic sensations can reduce cooperation in social interactions (Ackerman et al., 2010), while pleasant smells can enhance product evaluations (Spangenberg et al., 2006). Bosmans (2006) found that ambient scents evoked emotional responses and influenced judgments, with pleasant scents having a stronger effect on product evaluation than other environmental factors. In contrast, the absence of sensory information can impede decision-making and elicit negative emotions (Krishna et al., 2017; Laroche et al., 2005). This was particularly relevant in online marketing, where virtual environments often lacked sensory experiences like touch, limiting consumers' ability to fully assess products (Liu et al., 2021).

We argued that the way in which a product was described through language, such as in advertisements or jingles, also fell under sensory marketing. Medical service, as a special product, required patients to fully understand the physician's expertise before making a purchase. Recent online knowledge sharing served as a crucial channel for patients to learn about physicians, similar to advertising. Given the specialized nature of medicine, many diseases required a multisensory approach involving "observation, auscultation, inquiry, and pulse". Thus, we hypothesized that sensory language in physicians' knowledge-sharing can create immersive experiences for patients, evoke positive feelings, and ultimately influence purchasing decisions. We used feeling-as-information theory to explain how sensory words in knowledge sharing can foster positive emotional responses, guiding patients' decisions to engage with physicians' services.

3. Hypothesis development

3.1. The effect of sensory cues on knowledge sharing

In online healthcare, information asymmetry often led patients to rely on multiple sources to make informed decisions, with physician knowledge sharing being a key factor influencing their judgment and purchasing behavior (Chen et al., 2022). For this reason, it was crucial that physicians effectively communicated their knowledge to patients. However, medical knowledge was typically specialized and abstract, which can put patients at a disadvantage (Wu et al., 2021). If physicians failed to present this information in clear, engaging, and accessible language, the effectiveness of knowledge sharing was significantly reduced. Drawing on feeling-as-information theory, sensory cues can significantly influence consumers' perceptions and decision-making. Sensory marketing, which utilized sensory cues to create memorable experiences, has been shown to shape consumer behavior by enhancing emotional responses and influencing purchasing decisions (Pelletier & Collier, 2018). The use of symbolic and emotional language can capture attention, improve the flow experience, and boost associative memory (Fu et al., 2024). Moreover, authentic and engaging narratives helped establish a connection between brands and consumers, driving action (Karampournioti & Wiedmann, 2021). Given the emotional impact of sensory cues, we hypothesized that when physicians incorporated descriptive sensory language into their knowledge-sharing, they could more effectively communicate medical information, elicit emotional responses, and leverage the positive effects of knowledge-sharing to influence patients' purchasing decisions.

Visual elements were a key component of sensory marketing and were typically categorized into top-down semantic features, such as text content, and bottom-up visual features, such as shape and size (Wolfe, 1994). This study specifically focused on text-based visual cues. Haase and Wiedmann (2018) developed a sensory perception framework that identified highly expressive words used to describe products or brands, demonstrating the significant relationship between visual cues and consumer attitudes, word-of-mouth recommendations, and purchase intentions. We extended this idea to the context of online medical knowledge sharing, arguing that visual cues similarly had a positive impact. Text-based visual descriptions can make medical explanations more vivid and comprehensible. For example, physicians may use color references (Fong et al., 2022; Hultén, 2011) to highlight differences between healthy and unhealthy organs, helping patients better visualize and retain the information. A common example was the description of a smoker's lungs as blackened or darkened, illustrating how the once-pink tissue became stained and mottled in shades of black, brown, and gray. Additionally, visual cues can capture and maintain the reader's

attention. Words such as “observe”, “focus”, or “scan” directed the patient’s attention to critical details, reinforcing their importance. Thus, we proposed the following hypothesis:

H1a: Visual cues in physician knowledge sharing positively correlate with online service volume.

We proposed that auditory cues in physician knowledge sharing had a positive effect on online service volume. Drawing on the concept of auditory imagery, where sound was mentally evoked in the absence of actual auditory stimuli (Hubbard, 2010), we suggested that verbal elements, such as speech and text, can trigger auditory imagery in patients. Research showed that auditory cues can improve consumer attitudes toward advertisements, encourage word-of-mouth recommendations, and increase purchase intention (Wu & Chen, 2024). First, like visual cues, auditory cues can help make complex medical information more relatable and easier to understand. For example, a physician might describe an irregular heartbeat as "skipping a beat, like a drum out of rhythm", providing a familiar auditory analogy that aided patient comprehension. Second, auditory cues can alleviate negative emotions such as fear and anxiety (Haase & Wiedmann, 2018). For instance, a physician might reassure a patient by saying, “The buzzing of the MRI machine is nothing to worry about-it's just part of the process.” This explanation normalized the experience and reduced patient stress. Therefore, we proposed the following hypothesis:

H1b: Auditory cues in physician knowledge sharing positively correlate with online service volume.

Haptic marketing, a key component of sensory marketing, emphasized the role of touch in conveying the true nature of objects (Krishna, 2012). In online environments, where direct physical interaction was not possible, the vicarious haptic effect allowed consumers to experience a sense of touch through text, images, video, or other digital technologies, shaping their psychological ownership and product evaluation (Luangrath et al., 2022). The intensity of this effect depended on the stimulus source. In this study, we focused on how haptic cues in physician knowledge sharing can evoke vicarious haptic perceptions in patients. Research indicated that language conveying haptic sensations can activate somatosensory representations, enhancing users’ sense of touch (Boulenger et al., 2020). In online healthcare, haptic cues helped simplify complex medical terminology by linking it to familiar physical sensations. For example, a physician might describe nerve pain as "feeling like pins and needles or electric shocks down your leg," enabling patients to connect abstract medical concepts to their own experiences. Moreover, haptic cues can make complex or invasive procedures more comprehensible, reducing patient anxiety and uncertainty. Since a core goal of medical knowledge sharing was to educate patients on disease prevention, treatment, and management that required step-by-step guidance, haptic descriptions can make these processes more tangible and actionable. Based on this, we proposed the following hypothesis:

H1c: Haptic cues in physician knowledge sharing positively correlate with online service volume.

3.2. The moderating effect of physicians’ characteristics

Sensory experiences in online settings differed based on the nature of the product being marketed (Schifferstein, 2006). Products that depended heavily on sensory input were particularly affected by the absence of physical interaction in virtual environments (Zhou et al., 2019). A similar logic can be applied to physicians’ knowledge sharing across medical specialties, where differences in disease focus and physician specialty may shape the effectiveness of sensory cues. To explore this variation, we first used internal medicine, which was characterized by a cognitive approach focused on interpreting biochemical indicators, as the baseline for comparing the influence of sensory cues across other medical departments.

First, compared with internal medicine, surgical specialties typically involved direct physical interventions and observable changes in the body, making visual and haptic cues particularly salient. In contrast, the use of auditory cues did not differ significantly between surgical and internal medicine contexts. Visual and haptic inputs were central to surgical practice, where procedures depended on precise, hands-on techniques. Prior research highlighted the importance of these sensory cues in surgical training and performance (Cope et al., 2015). Surgeons often used vivid visual language to describe conditions or procedures, helping patients visualize what to expect. Haptic cues, such as references to physical sensations or touch, were closely tied to intraoperative experience, postoperative care, and recovery guidance. These sensory elements enhanced communication by making complex procedures more tangible and accessible to patients.

Second, in obstetrics and gynecology, as well as pediatrics, visual, auditory, and haptic cues played an especially important role due to the elevated anxiety levels typically experienced by patients and caregivers in these specialties (Wong et al., 2024). Obstetrics and gynecology focused on maternal health, with patients often undergoing significant physical and emotional changes, particularly during pregnancy, when concerns about health and uncertainty can heighten anxiety. Similarly, in pediatrics, patients were the primary decision-makers and frequently experienced heightened worry about their children’s well-being. Drawing on embodied cognition theory, which emphasized how bodily experiences shaped cognition and emotions (Barsalou, 2008; Landau et al., 2010), patients and caregivers in these contexts were more responsive to sensory-rich communication. Incorporating visual, auditory, and haptic cues can enhance embodied understanding, reduce anxiety stemming from information asymmetry, and ultimately increase

patient trust and engagement, leading to a higher likelihood of purchasing online medical services.

Third, in dermatology and venereology, visual and haptic cues were especially influential, while auditory cues showed no significant difference compared to internal medicine. These specialties relied heavily on visual observation and haptic descriptions, with less dependence on auscultation. Accurate diagnosis often depended on clearly identifying visible skin conditions and understanding the patient's sensory experience (Ko et al., 2019; Lowenstein et al., 2019). Visualized evidence provided diagnostic support, while its conditions usually also emphasized the subjective feelings of the patients. Descriptions such as "a red lump" or "rough patches" helped patients visualize and relate to their symptoms more effectively. By using vivid visual and haptic language, physicians can enhance diagnostic clarity and foster greater patient engagement with online services.

Finally, in the context of otolaryngologic disorders, auditory cues played a central role in the communication of symptoms, diagnosis, and treatment, distinguishing these specialties from others. In contrast, visual and haptic cues were less prominent and showed no significant difference from their use in internal medicine. Most relevant diseases, such as hearing loss, tinnitus, vertigo, drainage, and ear pain (O'Handley et al., 2012), were inherently auditory in nature. Similarly, laryngeal disorders often involved voice-related symptoms, such as hoarseness (Reiter et al., 2015). For example, using sound simulations can help patients recognize and distinguish types of tinnitus, supporting self-diagnosis and enhancing their understanding of treatment pathways. Overall, physicians across specialties were likely to emphasize different sensory cues based on the nature of the conditions they treat. Tailoring these sensory strategies allowed them to convey complex medical knowledge more effectively. Table 1 provided a summary of the role of each sensory cue across various departments.

Table 1. The moderating role of the specialty

Specialty (base line – internal medicine)	Visual cues (+)	Auditory cues (+)	Haptic cues (+)	Key characteristics
Surgery	Stronger	No significant difference	Stronger	Emphasizes hands-on procedures and haptic feedback during treatment and recovery
Obstetrics and gynecology	Stronger	Stronger	Stronger	Includes emotionally and physically sensitive patients, and sensory-rich communication reduces anxiety and improves engagement
Pediatrics	Stronger	Stronger	Stronger	
Dermatology and venereology	Stronger	No significant difference	Stronger	Emphasizes visual inspection and haptic description of skin conditions during diagnosis and symptom explanation
Otolaryngology	No significant difference	Stronger	No significant difference	Emphasizes auditory perception and sound-based cues during symptom recognition and clinical assessment

Therefore, we propose the following hypothesis:

H2a: Visual cues in knowledge sharing can play a stronger role in surgery, obstetrics and gynecology, pediatrics, and dermatology and venereology than in internal medicine.

H2b: Auditory cues in knowledge sharing can play a stronger role in obstetrics and gynecology, pediatrics, and otolaryngology than in internal medicine.

H2c: Haptic cues in knowledge sharing can play a stronger role in surgery, obstetrics and gynecology, pediatrics, and dermatology and venereology than in internal medicine.

The impact of sensory cues on online service volume may also be moderated by a physician's professional capital, which referred to the expertise and experience physicians accumulate through education and clinical practice (Guo et al., 2017). In prior research, professional capital was often measured by job title. In China, physician job titles were classified into four levels: chief physician, associate chief physician, attending physician, and resident physician. These titles were awarded based on rigorous training and examinations, with higher titles generally indicating greater expertise and experience (Fan et al., 2022). The effectiveness of marketing was closely linked to the perceived quality of the product being promoted. Similarly, we argued that physicians with higher professional capital were more effective in endorsing their services. Their expertise and reputation enhanced the credibility of the sensory cues embedded in their knowledge sharing, increasing patient trust and willingness to seek their care. Therefore, we proposed the following hypothesis:

H3a: Visual cues in knowledge sharing play a stronger role for physicians with high professional capital compared to those with low capital.

H3b: Auditory cues in knowledge sharing play a stronger role for physicians with high professional capital compared to those with low capital.

H3c: Haptic cues in knowledge sharing play a stronger role for physicians with high professional capital compared to those with low capital.

Drawing on the aforementioned hypotheses, we present a conceptual model in Figure 2.

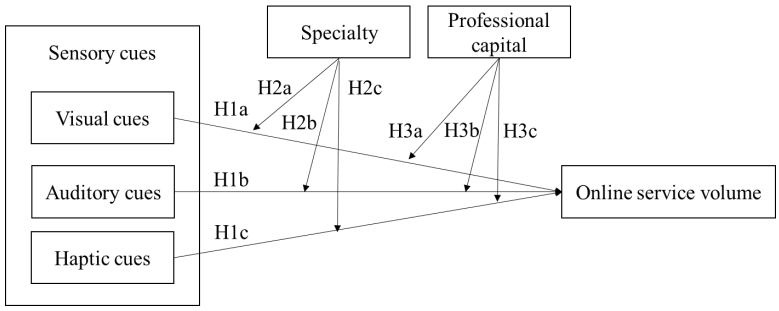

Figure 2: Conceptual model

4. Research context and data

We collected a dataset from the JD online healthcare platform in China. It was one of the first platform-based Internet hospitals and was licensed for online healthcare in China. More than 130,000 physicians have joined this platform by December 2020. It integrated online consultation services and knowledge sharing, allowing patients to conveniently ask for consultation directly while browsing articles published by physicians. Therefore, the role of knowledge sharing by physicians became even more important. Figure 3 gave an example of physicians' knowledge sharing in this platform and the consumption channels that attracted patients to purchase through knowledge sharing. We used crawler software to collect data. We randomly collected 3,834 articles shared by 307 physicians in January 2024 and re-collected them in January 2025. The data included the textual contents for knowledge sharing, physician information (e.g., professional title, department, hospital, etc.), and service information (e.g., online consultation volume, price, etc.).

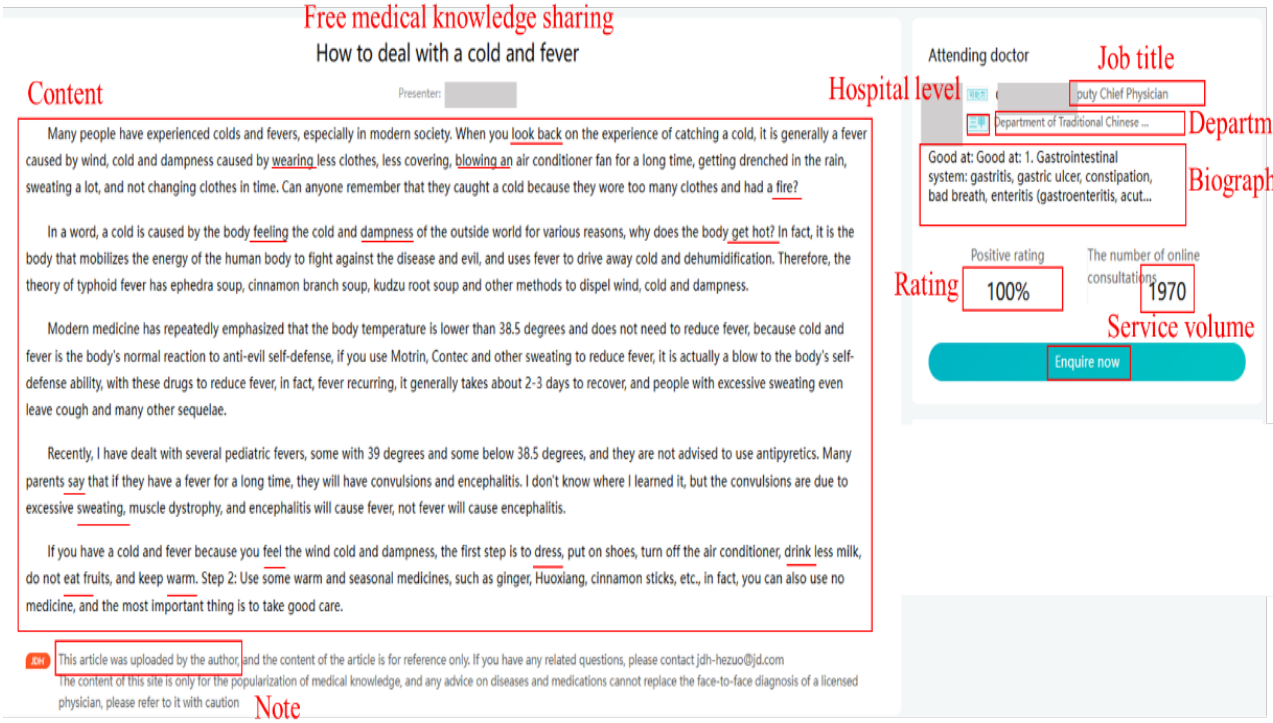

Figure 3: Functions supporting knowledge sharing for physicians

4.1. Variable measures

To extract the features of interest from the texts, we used *TextMind* software (Gao et al., 2013). The *TextMind* was based on the Linguistic Inquiry and Word Count (LIWC) program, which was a popular text analysis package for classifying various categories of words in the text content and calculating the word frequencies. LIWC contained rich dictionaries that defined words such as personal pronouns, auxiliary verbs, emotional words, social words, and sensory words. LIWC became increasingly popular in scientific research, and its Chinese variant *TextMind* has been used for Chinese text features mining (Jiang et al., 2022). The most relevant dictionaries in our study were sensory words (visual, auditory, and haptic-related words), emotional words (positive and negative emotional words), social words (social interactions and interpersonal relationship-related words), and personal pronouns (first and second personal pronouns). Additionally, we also identified medical specialized words. Table 2 listed representative words for visual, auditory, and haptic words.

Table 2. Representative words for different senses

LIWC Category	Examples
See	View, Beautification, Bright, Vivid, Clean, Flashy, Glowering, Dull…
Hear	Clamorous, Yawn, Listen, Hear, Breathless, Hoarse, Tweet, Silent…
Feel	Tight, Touch, Numb, Grasp, Burn, Smooth, Sharp, Schmaltzy, Cold, Pruritic, Resilient…

Table 3 provided the key variables with their definitions and summary statistics. Our core dependent variable was the increase in online service volume during a year. The independent variables were the percentage of visual, auditory, and haptic words in the article. Furthermore, as the language style used by physicians with different specializations or professional capital for knowledge sharing may vary, the department and title of the physician were also considered. The correlation matrix was shown in Table 4, which revealed that there was no strong correlation between the variables. Meanwhile, the VIF results (VIF<10) showed no serious multicollinearity, and it would not significantly impact our results.

To test our research hypotheses, we used a series of models to examine the effects of sensory cues on online service volume. In equation (1), we examined the effect of visual, auditory, and haptic cues on online service volume. In equations (2) and (3), we conducted a heterogeneity analysis of specialty and professional capital.

$$ServiceNum_{ij} = \beta_0 + \beta_1 VisualCue_{ij} + \beta_2 AuditoryCue_{ij} + \beta_3 HapticCue_{ij} + \beta_4 Department_{ij} + \beta_5 ProCapital_{ij} + \beta_6 Controls_{ij} + \varepsilon_{ij} \quad (1)$$

$$ServiceNum_{ij} = \beta_0 + \beta_1 VisualCue_{ij} + \beta_2 AuditoryCue_{ij} + \beta_3 HapticCue_{ij} + \beta_4 Department_{ij} + \beta_5 VisualCue_{ij} \times Department_{ij} + \beta_6 AuditoryCue_{ij} \times Department_{ij} + \beta_7 HapticCue_{ij} \times Department_{ij} + \beta_8 Controls_{ij} + \varepsilon_{ij} \quad (2)$$

$$ServiceNum_{ij} = \beta_0 + \beta_1 VisualCue_{ij} + \beta_2 AuditoryCue_{ij} + \beta_3 HapticCue_{ij} + \beta_4 Procapital_{ij} + \beta_5 VisualCue_{ij} \times Procapital_{ij} + \beta_6 AuditoryCue_{ij} \times Procapital_{ij} + \beta_7 HapticCue_{ij} \times Procapital_{ij} + \beta_8 Controls_{ij} + \varepsilon_{ij} \quad (3)$$

Table 3. Definitions and summary statistics

Variables	Description	Observation	Mean	S.D.	Min	Max
ServiceNum	Increment in the number of patients served by physician *i* during the observation period	3,834	4.525	2.541	0	11.667
ProCapital	Dummy variable: 1 for resident physician and attending physician; 2 for associate chief physician; 3 for chief physician	3,834	1.716	0.666	1	3
HosRank	Dummy variable: 1 for Level 3rd, 0 for others	3,834	0.711	0.453	0	1
ArticleNum	Natural logarithm of one plus the number of articles published by physician *i*	3,834	4.679	1.942	0	6.738
Department	Dummy variable: 1 for the department of internal medicine; 2 for the department of surgery; 3 for the department of obstetrics and gynecology; 4 for the department of pediatrics; 5 for the department of dermatology and venereology; 6 for the department of otolaryngology	3,834	2.252	1.291	1	6
GraphPrice	Graphic consultation service prices (in hours) of physician *i*	3,834	1.665	1.511	0	12.5
VisualCue	Percentage of visual words in articles	3,834	0.426	1.730	0	25
AuditoryCue	Percentage of auditory words in articles	3,834	0.230	1.854	0	40
HapticCue	Percentage of haptic words in articles	3,834	0.699	2.182	0	50
MedWord	Percentage of medical words in articles	3,834	1.872	3.934	0	50
SocialWord	Percentage of social words in articles	3,834	3.761	5.521	0	50
PosWord	Percentage of positive words in articles	3,834	1.500	3.060	0	33.333
NegWord	Percentage of negative words in articles	3,834	1.325	3.383	0	50

Table 4. Correlation matrix

	VIF	1	2	3	4	5	6	7	8	9	10	11	12	13
ServiceNum		1												
ProCapital	1.11	-0.278***	1											
HosRank	1.91	0.388***	-0.071***	1										
ArticleNum	1.47	0.037**	-0.265***	0.213***	1									
Department	1.48	-0.345***	0.090***	-0.448***	-0.320***	1								
GraphPrice	1.77	0.022	0.004	0.556***	0.367***	-0.128***	1							
VisualCue	1.01	0.025	-0.053***	-0.028*	-0.008	0.020	-0.044***	1						
AuditoryCue	1.04	-0.055***	0.014	0.057***	-0.031*	0.011	0.001	-0.011	1					
HapticCue	1.07	-0.028*	-0.065***	-0.098***	-0.039**	0.190***	-0.003	0.038**	-0.010	1				
MedWord	1.10	-0.030*	0.062***	-0.111***	-0.246***	0.139***	-0.083***	-0.007	-0.033**	0.112***	1			
SocialWord	1.09	-0.056***	-0.117***	0.034**	0.109***	-0.038**	0.025	0.019	0.175***	-0.094***	-0.132***	1		
PosWord	1.03	-0.062***	0.036**	-0.084***	0.043***	0.028*	-0.041**	-0.021	-0.010	-0.001	-0.052***	0.103***	1	
NegWord	1.02	0.051***	-0.060***	0.002	0.064***	-0.073***	-0.048***	-0.035**	-0.020	0.003	-0.048**	-0.032**	-0.029*	1

Note: ***p<0.01, **p<0.05, *p<0.1.

4.2. Hypothesis Testing Results

Ordinary least squares regression was used to estimate the outcome. Table 5 presented the regression results using mean-centered variables. Model 1 examined the impact of visual, auditory, and haptic cues on online service volume. The findings indicated that only the coefficient of *HapticCue* was significantly positive, suggesting that the haptic cues played a primary role in influencing online service volume in physicians' knowledge sharing. Interestingly, the coefficient of *AuditoryCue* was significantly negative, implying that auditory cues may hinder comprehension rather than enhance it. One possible explanation for the negative effect of auditory cues was that textual descriptions of sounds may be too complex or abstract, requiring patients to exert additional cognitive effort to visualize them. This increased cognitive load could reduce attention to and understanding of the overall message. Additionally, in medical communication, auditory and visual cues may not be as effective as haptic cues in engaging patients. Haptic sensations, such as pain, temperature, and touch, were directly related to bodily experiences, making them more emotionally resonant. For example, descriptions like "reduced pressure" or "skin tingling" evoked embodied experiences, reinforcing a patient's perception of symptom severity and increasing their motivation to seek professional consultation. Visual cues, on the other hand, may have a limited impact on text-based medical knowledge sharing. Online medical content was often presented as text, supplemented by tables or images. Textual descriptions of visual elements (e.g., "red spots on skin") may not add significant value beyond what was already conveyed through accompanying images (e.g., "a picture of erythema"). As a result, text-based visual cues may struggle to evoke strong emotional responses in patients. The negative impact of auditory cues can also be understood through the lens of embodied cognition and sensory overload. Embodied cognition suggested that cognitive processes were grounded in bodily experiences. Since haptic sensations were directly tied to physical interactions, they were more intuitively processed by the brain. In contrast, auditory information must be reconstructed through linguistic symbols, requiring more cognitive effort. The abstract nature of auditory descriptions, combined with the complexity of medical terminology, may further hinder patient comprehension. For example, the term "click" in a medical context referred to an ejection click, a type of heart murmur, yet non-expert patients may struggle to interpret such descriptions. Rather than fostering emotional resonance, excessive use of abstract auditory cues could contribute to sensory overload, obscure key medical information, and ultimately discourage further engagement with online counseling.

Table 5. Main effects

DV: ServiceNum	Direct effects	Moderating effects - ProCapital			Moderating effects - Department		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
VisualCue	0.022	0.022	0.025	0.024	0.023	0.021	0.021
	(0.017)	(0.017)	(0.018)	(0.018)	(0.017)	(0.018)	(0.018)
AuditoryCue	-0.064***	0.000	-0.061***	0.004	0.033	-0.065***	0.031
	(0.011)	(0.027)	(0.012)	(0.029)	(0.020)	(0.011)	(0.020)
HapticCue	0.035**	0.034**	-0.028*	-0.030*	0.033**	-0.009	-0.008
	(0.015)	(0.015)	(0.016)	(0.015)	(0.015)	(0.010)	(0.010)
ProCapital_2	-1.288***	-1.275***	-1.289***	-1.276***	-1.282***	-1.310***	-1.305***
	(0.147)	(0.146)	(0.146)	(0.146)	(0.147)	(0.147)	(0.147)
ProCapital_3	-2.126***	-2.107***	-2.133***	-2.113***	-2.098***	-2.133***	-2.106***
	(0.160)	(0.159)	(0.159)	(0.158)	(0.160)	(0.160)	(0.160)
Department_2	-0.046	-0.067	-0.033	-0.054	-0.063	0.001	-0.016
	(0.149)	(0.149)	(0.149)	(0.149)	(0.150)	(0.149)	(0.150)
Department_3	-1.698***	-1.676***	-1.695***	-1.674***	-1.697***	-1.695***	-1.695***
	(0.166)	(0.166)	(0.166)	(0.167)	(0.166)	(0.166)	(0.166)
Department_4	-0.314*	-0.296	-0.283	-0.265	-0.339*	-0.318*	-0.343*
	(0.184)	(0.184)	(0.183)	(0.183)	(0.184)	(0.184)	(0.184)
Department_5	-2.590***	-2.567***	-2.539***	-2.517***	-2.448***	-2.082***	-1.936***
	(0.210)	(0.211)	(0.209)	(0.210)	(0.226)	(0.260)	(0.273)
Department_6	1.405**	1.422**	1.377**	1.393**	1.487***	1.422**	1.504***
	(0.606)	(0.609)	(0.606)	(0.609)	(0.544)	(0.611)	(0.545)
ArticleNum	-0.072**	-0.068**	-0.067**	-0.063**	-0.075**	-0.065**	-0.068**
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
GraphPrice	-0.408***	-0.410***	-0.407***	-0.410***	-0.403***	-0.412***	-0.407***
	(0.044)	(0.044)	(0.044)	(0.045)	(0.045)	(0.045)	(0.045)

HosRank	1.872***	1.890***	1.845***	1.862***	1.876***	1.841***	1.844***
	(0.176)	(0.177)	(0.176)	(0.176)	(0.177)	(0.176)	(0.177)
MedWord	0.001	0.002	0.005	0.006	0.001	0.005	0.004
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
SocialWord	-0.040***	-0.040***	-0.040***	-0.041***	-0.037***	-0.039***	-0.036***
	(0.006)	(0.006)	90.006)	(0.006)	(0.006)	(0.006)	(0.006)
PosWord	-0.002	-0.002	-0.004	-0.004	-0.004	-0.003	-0.005
	(0.010)	(0.009)	(0.010)	(0.010)	(0.009)	(0.010)	(0.009)
NegWord	0.005	0.004	0.004	0.002	0.004	0.004	0.003
	(0.006)	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)	(0.006)
AuditoryCue × ProCapital_2		-0.116***		-0.116***			
		(0.033)		(0.035)			
AuditoryCue × ProCapital_3		0.303***		0.315***			
		(0.059)		(0.061)			
HapticCue × ProCapital_2			0.128***	0.128***			
			(0.031)	(0.031)			
HapticCue × ProCapital_3			0.227***	0.238***			
			(0.083)	(0.085)			
AuditoryCue × Department_2					-0.358**		-0.347**
					(0.146)		(0.145)
AuditoryCue × Department_3					-0.105***		-0.103***
					(0.021)		(0.021)
AuditoryCue × Department_4					-0.055		-0.064**
					(0.038)		(0.029)
AuditoryCue × Department_5					0.669		0.714
					(0.480)		(0.493)
AuditoryCue × Department_6					1.058		1.102
					(1.205)		(1.314)
HapticCue × Department_2						0.114*	0.107***
						(0.031)	(0.031)
HapticCue × Department_3						0.018	0.016
						(0.023)	(0.022)
HapticCue × Department_4						0.127***	0.122***
						(0.030)	(0.029)
HapticCue × Department_5						-0.256***	-0.258***
						(0.087)	(0.087)
HapticCue × Department_6						0.094	0.132
						(0.287)	(0.306)
Constant	4.521***	4.506***	4.542***	4.527***	4.522***	4.535***	4.538***
	(0.197)	(0.197)	(0.196)	(0.197)	(0.198)	(0.197)	(0.198)
Observations	3,834	3,834	3,834	3,834	3,834	3,834	3,834
R-squared	0.357	0.362	0.361	0.366	0.361	0.363	0.367

Note: ***p<0.01, **p<0.05, *p<0.1. The robust standard error is given in parentheses.

Models 2-4 and models 5-7 examined the moderating effects of professional capital and specialty, respectively, as illustrated in Figure 4-7. First, using physicians with low professional capital (residents and attending physicians) as the base group, we found that the negative effect of auditory cues on online service volume became more pronounced for physicians with moderate professional capital (associate chief physicians). However, for those with high professional capital (chief physicians), the effect of auditory cues shifted from negative to positive. A possible explanation was that high professional capital served as a strong authority signal. Even if patients found auditory descriptions complex or difficult to interpret, they may still perceive them as indicators of expertise, increasing their willingness to seek consultation. In contrast, physicians at the mid-professional capital level did not project the same level of authority. In this case, complex auditory cues may not be seen as a marker of professionalism but rather as a sign of poor communication skills, reinforcing a negative impression. Additionally, the positive effect of haptic cues on online service volume strengthened for physicians with moderate professional capital and became even more pronounced for those with high professional capital. This suggested a joint effect between professional capital and

haptic cues, where the perceived credibility of more experienced physicians enhanced the effectiveness of haptic descriptions in patient service engagement.

Second, using internal medicine as the baseline group, we found that the negative effect of auditory cues on online service volume was significantly stronger in surgery, obstetrics and gynecology, and pediatrics. However, in dermatology and venereology, and otolaryngology, the effect was positive but not statistically significant. In surgery, auditory cues may evoke fearful associations with medical procedures (e.g., bone sawing, instrument friction), reinforcing perceived risk and leading to avoidance behaviors. Additionally, surgical treatment primarily focused on procedural outcomes rather than sound, making auditory descriptions seem redundant. Similarly, in obstetrics and gynecology, auditory cues (e.g., fetal heart sounds) required specialized knowledge to interpret, potentially increasing patient uncertainty. Given that women and children, the primary patients in obstetrics and gynecology, and pediatrics, tended to be more sensitive to illness-related information, complex auditory descriptions may heighten anxiety and fear, further discouraging service engagement. Conversely, haptic cues had a positive effect in surgery, particularly when used by surgeons to describe procedural sensations, enhancing patient comprehension and reducing fear. In pediatrics, detailed haptic descriptions provided step-by-step self-examination guidance for parents, helping them assess their child's condition and reduce uncertainty. Interestingly, in dermatology and venereology, the effect of haptic cues on online service volume was negative. This may be due to the visual nature of dermatological conditions, where form and color were the primary diagnostic features. As a result, haptic descriptions may be perceived as non-specific or even unnecessary. Additionally, since sexually transmitted diseases were highly sensitive topics, explicit haptic descriptions could cause discomfort and embarrassment, deterring patient service engagement.

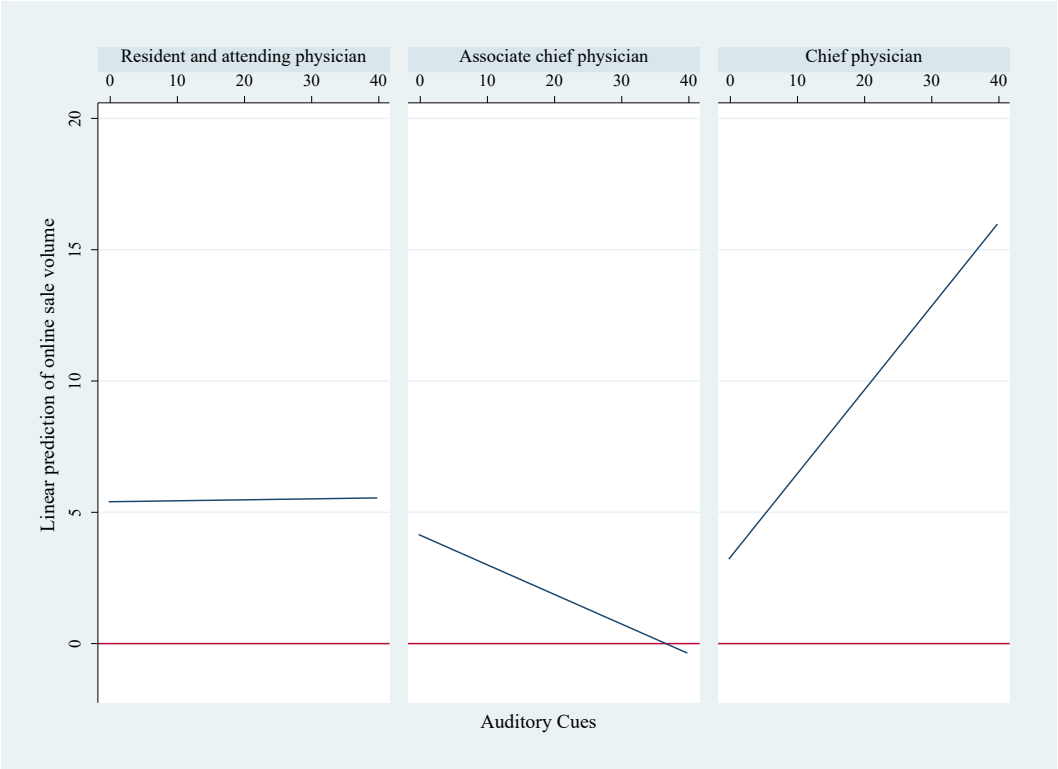

Figure 4: The moderating effects of professional capital on the relationship between auditory cues and online service volume

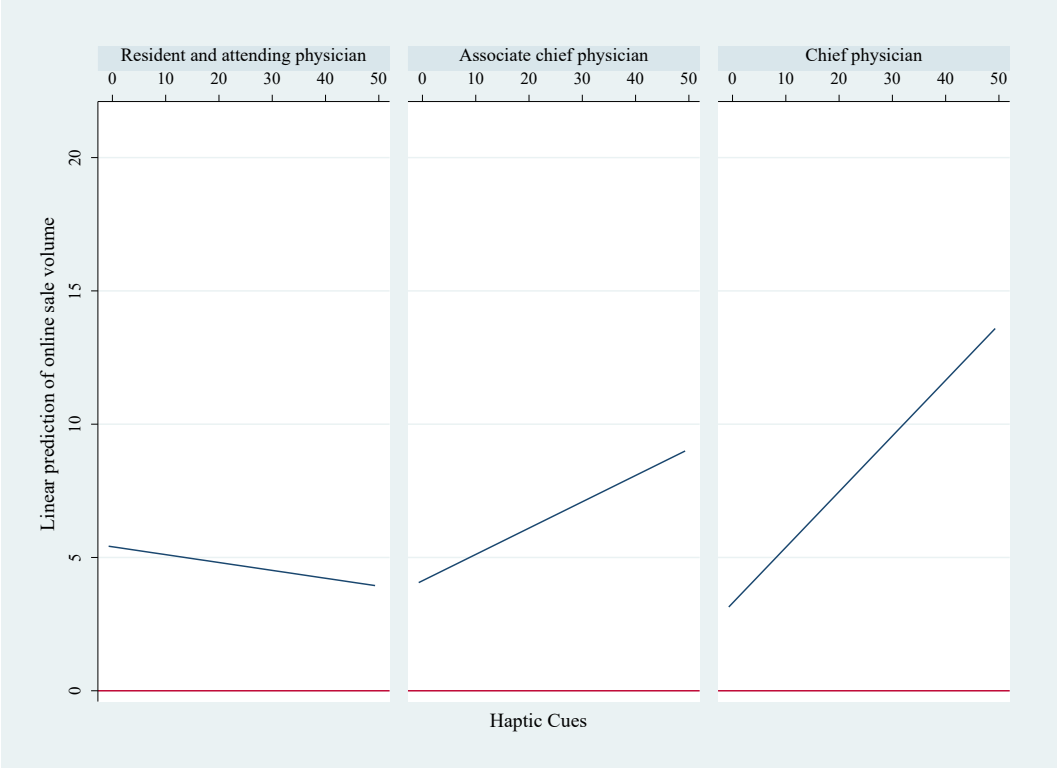

Figure 5: The moderating effects of professional capital on the relationship between haptic cues and online service volume

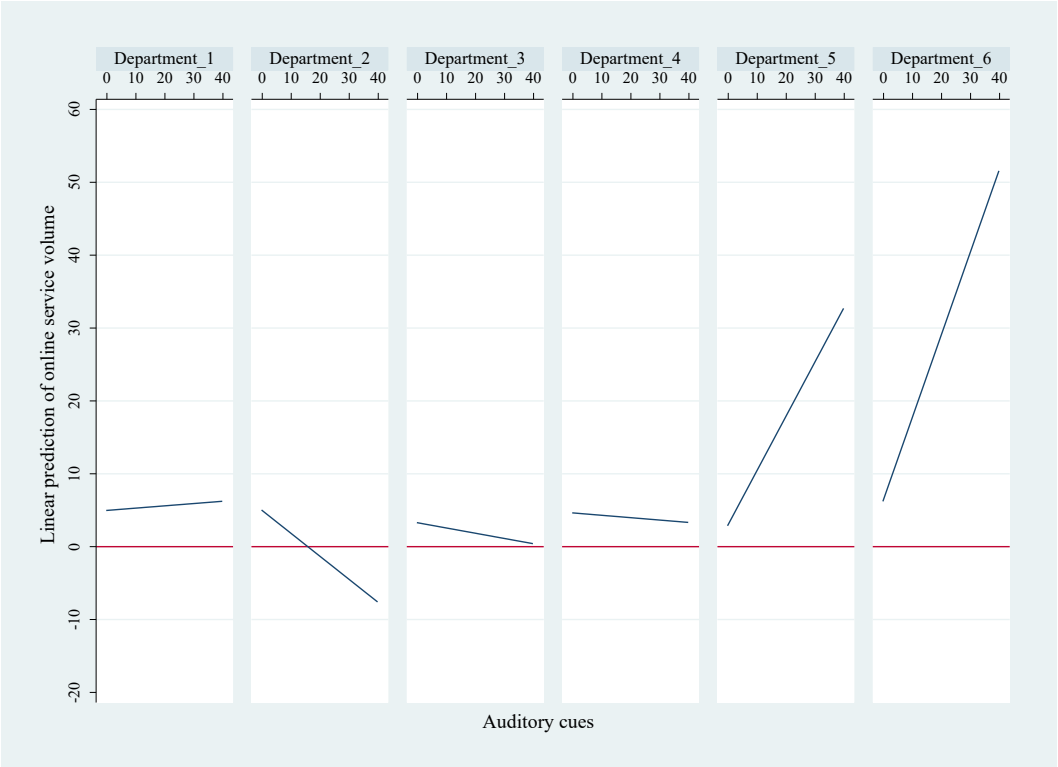

Figure 6: The moderating effects of department on the relationship between auditory cues and online service volume

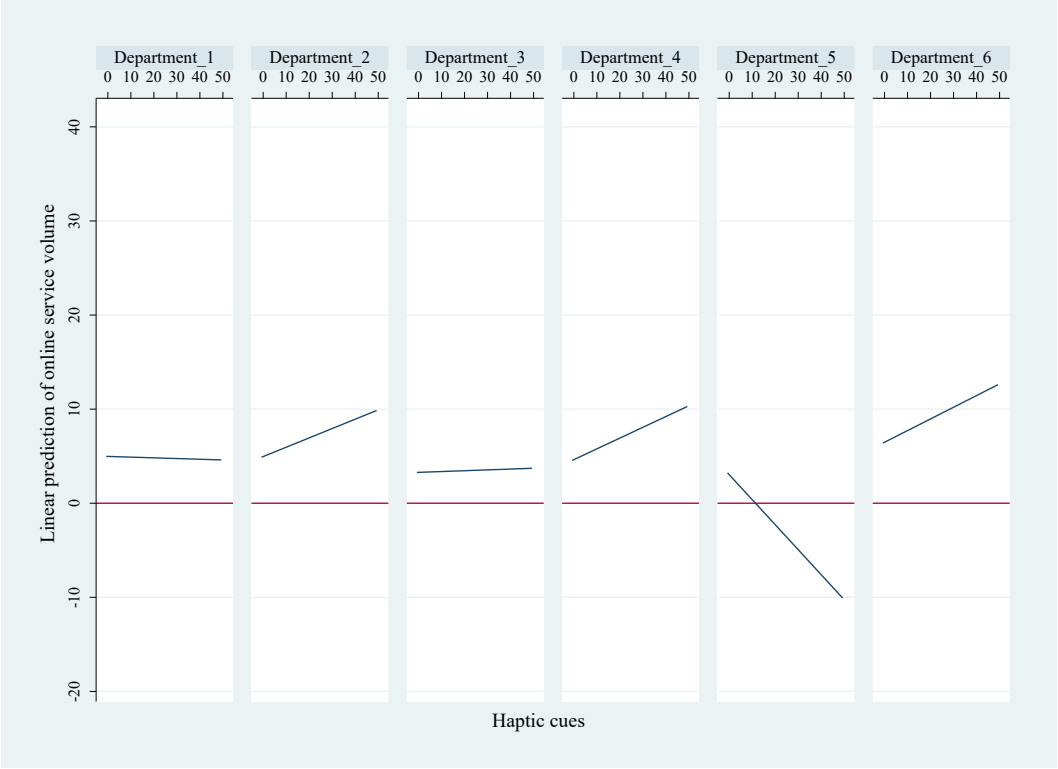

Figure 7: The moderating effects of department on the relationship between haptic cues and online service volume

4.3. Robustness checks

We conducted various tests to ensure the robustness of our results. First, we tested the robustness of the empirical models by adding the control variables. We considered physician-level (prices for telephone and video consultations) and text-level variables (first-person pronouns and second-person pronouns) separately. The first-person pronouns can show a strong tendency toward self-expression and convey credibility (Barasch & Berger, 2014). The second person was more authoritative and dictatorial and was shown as advising in a commanding manner (Kacewicz et al., 2014). Robustness tests for the results of adding control variables were presented in Appendix B and C, including Table B.1 and Table C.1 for the regression results and Figure B.2-B.5 and C.2-C.5 showing the moderating effects. Moreover, we did not take logarithms of the dependent variable and used the count data model to re-examine. First, for the dependent variable with nonnegative values, normal distribution models were not suitable, and accordingly, the Poisson model or negative binomial model was more appropriate (Guan & Liu, 2016). Second, the variance of the dependent variable was 26,255,070 with a mean of 1217.208, showing overdispersed, and it was better suited for negative binomial regression (Yayavaram & Ahuja, 2008). We also examined the distribution of the dependent variable and found that the percentage of 0 values was not greater than 10% (Jiang et al., 2024a, 2024b), so we used only negative binomial regression. This method was widely used in the context of knowledge sharing in online communities (Chen et al., 2019; Jin et al., 2015). The results of the negative binomial regression were shown in Table D.1 in Appendix D. We further divided the dataset into different groups and conducted regressions separately. The results of grouped regression were in Tables E.1 and E.2 in Appendix E. Finally, we replaced the measurement of professional capital and re-estimated the models by combining associate and chief physicians into a high professional capital group and resident and attending physicians into a low professional capital group. The results of the regressions replacing the professional capital measurement were shown in Table F.1 in Appendix F. The moderating effects were shown in F.2-F.5. The results were roughly consistent.

5. Discussions and Conclusions

5.1. Main findings

This study revealed three key findings. First, haptic cues in physicians' knowledge sharing positively influenced online service volume. It highlighted how free knowledge sharing can translate into financial benefits for physicians. By incorporating descriptions of manipulation, gestures, movements, and sensations, physicians can improve patient understanding of complex medical information. However, visual cues did not significantly impact online service

volume, likely because images or videos were more effective than text alone in conveying visual narratives (Eldesouky, 2020). Additionally, auditory cues had a negative effect, possibly due to sensory overload. Patients may struggle to process and recall sound-related information, particularly when unfamiliar with medical terminology. Second, physicians with high professional capital were better positioned to leverage sensory marketing. For those physicians, both haptic and auditory cues positively impacted online service volume, enhancing their financial benefits. However, for physicians with low to medium professional capital, auditory cues remained detrimental, likely because complex auditory descriptions may be perceived as unclear or overwhelming rather than as indicators of expertise. Third, the negative impact of auditory cues on online service volume was particularly pronounced in surgery, obstetrics and gynecology, and pediatrics, where such cues may evoke anxiety or require specialized knowledge to interpret. In contrast, the positive effect of haptic cues was more evident in surgery and pediatrics, where haptic descriptions helped reduce uncertainty and improve patient comprehension. However, in dermatology and venereology, excessive haptic cues may have a negative impact due to privacy concerns and the dominance of visual information in diagnosing skin conditions.

5.2. Theoretical implications

This study made several theoretical contributions to the literature on physician knowledge sharing in OHPs. Prior research had established that free knowledge sharing enhanced a physician's reputation, indirectly leading to financial returns through increased patient service engagement in paid consultation (Guo et al., 2017; Zhang et al., 2018). Building on this foundation, our study extended the focus to examine how the linguistic features of knowledge sharing directly influenced financial outcomes. While existing research has explored linguistic features such as text length (Chen et al., 2020; Ho et al., 2016; Jiang et al., 2022; Jing et al., 2024), text readability (Chen et al., 2020; Jiang et al., 2022; Luo et al., 2023; Zhang et al., 2020b), linguistic style matching (Chen et al., 2020; Jiang et al., 2022), and emotional polarity (Chen et al., 2020; Ho et al., 2016; Jiang et al., 2022; Luo et al., 2023; Majumdar & Bose, 2018; Throckmorton et al., 2015; Yang et al., 2019; Zhang et al., 2020b), this study shifted attention to content-specific keywords as a key semantic feature. We argued that in the medical domain, beyond technical medical terminology, sensory-based vocabulary played a crucial role in capturing patient attention and driving service purchases by eliciting vivid sensory imagery. Furthermore, this study clarified the economic value of linguistic features in physician knowledge sharing, differentiating itself from prior research that primarily focused on online interaction (Huang & Yeo, 2018; Kumar et al., 2022; Xu et al., 2023; Yang et al., 2019). By demonstrating how sensory cues in medical text influenced patient service engagement and conversion, we provided new insights into the direct financial impact of linguistic strategies in OHPs.

Second, this study extended the application of feeling-as-information theory to the online healthcare context. Traditionally used in marketing and e-commerce, this theory suggested that product descriptions and advertisements influenced consumers' emotions, which then served as informational cues shaping their decision-making (Avnet et al., 2012; Kramer & Yoon, 2007). While prior consumer behavior research based on this theory has focused on semantic features from an affective perspective, little attention has been given to sensation-specific keywords as part of these features. Additionally, studies examining sensory experiences through the feeling-as-information theory have primarily explored whether virtual sensory experiences enabled by new technologies can be perceived by consumers (Chen et al., 2025; Xiong et al., 2025). This focus differed from the present study, which investigated how sensory language in physician knowledge sharing influenced patient service engagement in online healthcare. We argued that a similar mechanism applied in online healthcare, where patients, faced with complex medical information, relied on sensory cues as cognitive shortcuts. Specifically, physicians' use of auditory and haptic-based sensory language can evoke sensory imagery, enhancing patient attention, flow experiences, and associative memory (Fu et al., 2024).

Third, this study integrated sensory marketing with feeling-as-information theory to address a gap in research on linguistic features and financial outcomes in online healthcare, explaining how specific sensory keywords in online knowledge sharing affected online services volume provided by physicians, associating linguistic features with financial gains. Sensory marketing suggested that engaging consumers' senses can influence perceptions, judgments, and behaviors by creating subconscious triggers that help them process abstract concepts such as product complexity or quality (Krishna, 2012). We argued that a similar process occurred in online medical knowledge sharing, where sensory language enhanced patients' understanding of complex medical concepts, improved knowledge transfer efficiency, and ultimately shaped their perceptions and decision-making. Our findings showed that visual cues in text did not significantly increase online service volume. Auditory cues may reinforce the abstract nature of medical knowledge, leading to cognitive overload and a negative impact. In contrast, haptic cues played a crucial role in enhancing the effectiveness of knowledge sharing, making them a key driver of patient interaction and service uptake.

5.3. Practical implications

This study provided several practical implications for both platform developers and physicians.

First, platform developers can implement targeted incentives, such as financial rewards or visibility boosts, to

encourage physicians to share medical knowledge online. These initiatives not only helped attract more patients but also enhanced physicians' reputations, leading to increased service engagement and sustained platform growth. For example, platforms can leverage analytics to show how sensory-rich content improved key engagement metrics such as click-through rates and consultation bookings. Beyond incentives, platforms can demonstrate the effectiveness of sensory marketing in improving communication outcomes. They can support physicians by developing real-time writing tools or content prompts that suggested sensory-enriched vocabulary tailored to different medical specialties. For example, encouraging the use of haptic descriptors can improve patients' understanding of treatment procedures. At the same time, platforms should help physicians simplify complex auditory descriptions by flagging overly technical terms and offering layperson-friendly alternatives. To further support sensory-based communication, platforms can provide multimodal formats, such as text, images, and video, to enhance patient comprehension and interaction. Accordingly, specialty-specific templates that accounted for physicians' departmental focus and levels of professional capital can further optimize the utility of shared content.

Second, the findings guided physicians in using sensory cues more effectively when sharing knowledge online. Physicians can tailor their language to reflect the expectations and emotional needs of their patients, depending on their medical specialty and their professional standing. For instance, haptic cues can be particularly effective in high-touch specialties like surgery and pediatrics, where references to physical sensations mirror clinical procedures and enhance trust. However, in fields such as dermatology and venereology, the use of subjective haptic language should be applied with care, as it may cause confusion or raise privacy concerns. Auditory cues, while powerful in some contexts, should be used selectively. In specialties requiring precision, such as surgery, obstetrics and gynecology, and pediatrics, complex auditory descriptions may be misinterpreted by patients without medical training. Physicians can mitigate this by replacing technical terms with accessible metaphors. Moreover, the strategic use of sensory cues should reflect the physician's level of professional capital. Those with lower professional capital may benefit from emphasizing clear, actionable haptic language to build credibility, while those with higher capital can combine haptic and auditory descriptions more confidently to enrich the patient experience.

5.4. Limitations and future research

We recognized that the study had some limitations. First, we only considered three important sensory cues in sensory marketing: visual, auditory, and haptic cues. This inevitably left out other important factors, and future research could dig deeper into the role of other sensory cues. Second, sensory cues were only content-specific keywords in linguistic features, so we have explained how physicians derived financial returns from knowledge sharing only from the perspective of feeling-as-information theory. Future research could tap into the influence mechanisms of other language styles. Third, this study only considered the effect of textual information in knowledge sharing on the online services. Future research could consider the different impacts of multimedia forms of knowledge dissemination, such as pictures and videos.

6. Conclusion

This study combined sensory marketing with feeling-as-information theory perspectives to uncover the relationship between sensory cues in physicians' online knowledge sharing and the online service volume through text mining and econometric modeling. The results showed that haptic cues in physicians' knowledge sharing had a positive effect on physicians' online service volume, and auditory cues had a negative effect. Furthermore, auditory and haptic cues worked differently for physicians with different specialties and different professional capitals. This study shed light on the underlying mechanisms of how online knowledge sharing by physicians brought them financial returns, contributing to the literature related to knowledge sharing in OHPs.

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