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What Drives Patient's Continuous Use of Online Team Consultation Services? A Teamwork Quality Model Using the Stimulus-Organism-Response Framework

Abstract. Online team consultations (OTCs) enhance existing online healthcare services by providing more comprehensive care compared to consultations with a single physician. However, poor teamwork quality, such as lack of coordination and uneven contributions, can result in patients discontinuing the use of online medical team (OMT) service. This not only disrupts the development of long-term patient relationships but also diminishes the overall benefits of collaborative care. Therefore, the aim of this study is to explore how the quality of teamwork within OMTs influences patients' willingness to continue using team-based consultation services. This study examines how teamwork quality, specifically coordination and balance of contributions, influences the continuous use of OMT services, with patient satisfaction as a mediator, while also investigating the moderating role of teamwork experience through the Stimulus-Organism-Response (S-O-R) framework. Our research model was validated using public data collected from a leading online health platform in China. We find that coordination and balance of contributions positively and significantly impact patient satisfaction, which subsequently leads to continuous use. Teamwork experience strengthens the effect of balance of contributions on satisfaction but has an insignificant influence on the link between coordination and satisfaction. By applying the S-O-R framework, this study deepens the understanding of how patients perceive OMT teamwork quality and their decision-making process about continued OTC service use. The findings also offer practical insights for supporting the sustained development of OTCs by improving OMTs' teamwork quality.

Keywords: Online team consultation; Continuous use; Satisfaction; Teamwork quality; S-O-R framework.

1 Introduction

In the past few years, a distinctive advancement within OHCs in China has been the emergence of online medical teams (OMTs). Comprising physicians from various specialties and institutions, these collaborative groups provide online team consultations (OTCs) to address intricate health issues by leveraging a comprehensive range of professional knowledge. While OHCs enable patients to receive input from several medical experts in one session, their short-term usage might not fully harness the potential benefits of this collective care. Maintaining ongoing relationships between patients and OMTs is vital for effective long-term health management. In the OTC context, continuous use refers to a patient's ongoing engagement with the same OMT.

In patients' decision-making process regarding whether to continue consultation with the same OMT, teamwork quality plays a vital role since it reflects the overall effectiveness and performance of team members in executing tasks (Hoegl and Gemuenden, 2001). However, poor teamwork quality can often hinder this continuity of OTCs. In OMTs, teamwork quality is particularly susceptible to degradation due to inconsistent engagement from participating physicians (Wang & Zhang, 2024b). Such insufficient commitment can foster free-riding behaviors and a diminished sense of collective responsibility, thereby undermining the quality of teamwork during OTCs. Consequently, OMTs are prone to issues of uneven contributions and poor coordination, which are considered adversarial to patient evaluation (Wang & Zhang, 2024a), this underscores the critical importance of ensuring both coordination and balanced contributions among members to uphold high-quality teamwork in the OTC context. Balance of contributions ensures that all members bring their expertise to the table (Hoegl and Gemuenden, 2001), while coordination reflects the efforts-structuring and collaboration process that members are dedicated to forming effective teamwork (Wang & Zhang, 2024a). Despite this, research on how the teamwork quality in OTCs influences patients' decisions to continue using these services remains scarce. To bridge this gap, we employ the Stimulus-Organism-Response (S-O-R) framework to understand the effect. This framework explains how external factors (stimuli) shape an individual's internal evaluation (organism), ultimately influencing their behavior (response). Within this framework, we position satisfaction as the key mediator between OTC teamwork quality and patient continuous use. Based on this, the first research question of this study is:

RQ1: *Does the OMTs' teamwork quality, including coordination and balance of contributions, promote continuous use of OTC service by improving patient satisfaction?*

This study also explores how contextual factors may influence the impact of OTC teamwork quality, with a particular focus on teamwork experience. OMTs' teamwork experience denotes the historical performance and effectiveness of a team stemming from its previous OTCs (Yang et al., 2021). This experience may greatly impact patients' perception of the teams' reliability and trust, ultimately influencing the patients' evaluation and their consultation decisions (Yang et al., 2021). Nonetheless, there is a lack of comprehensive understanding regarding whether the coordination and balance of contributions among medical team members affect patient satisfaction

differently. To address this gap, this study investigates the effect of OMTs' teamwork experience on the relationship between teamwork quality and patient satisfaction. Hence, our second research question is:

RQ2: *Is the effect of OMT teamwork quality on patient satisfaction contingent on OMT's teamwork experience?*

2 Literature Review

2.1 2.1 Online medical teams and teamwork quality

Online medical teams (OMTs) have materialized as a pioneering approach within the healthcare sector, underscoring the synergistic efforts of medical professionals in crafting holistic therapeutic guidance. This model has gained significant scholarly and practical attention in recent years. Despite these efforts, the quality of teamwork within OMT has received limited scholarly attention.

As teamwork emerges as the cornerstone of modern work, interest in evaluating its quality has intensified. The quality of teamwork conveys a signal about the effectiveness and trustworthiness of the service provided (Chiu et al., 2009). In the context of OMTs, assessing teamwork quality is crucial for patient outcomes (Yang et al., 2021). It enables OHC managers to address underperforming teams and benchmark high-performing ones to improve operational efficiency. However, previous research on OMT has largely neglected the investigation of teamwork quality, particularly its impact on patient satisfaction and the continuous use of services.

2.2 Patient satisfaction and continuous use of online medical team services

Patient satisfaction, defined as the fulfillment of a patient's expectations in relation to their healthcare experience, stands as a fundamental metric for gauging the effectiveness of medical services. Existing studies have primarily investigated patient satisfaction with OTC service through the lens of team engagement, suggesting that higher member engagement can enhance patient satisfaction by increasing social support and improving the effectiveness of semantic communication during consultations (Wang & Zhang, 2024a, 2024b). As a result, the role of teamwork quality in OMTs—specifically, the balance of coordination and contributions—on patient satisfaction has yet to be thoroughly explored. Therefore, this study aims to investigate how the OMTs' teamwork quality affects patient satisfaction with the OTC service.

Given that OMT is an innovative online healthcare service, research on how patients continuously use this service mode remains insufficient. Maintaining long-term OTC service usage remains a significant challenge that may limit the utilization of the full benefits of collective medical efforts. User decisions to persist with a service are often driven by their recognition of its value, typically reflected in satisfaction (Cho, 2016). Therefore, this study applies the S-O-R model to scrutinize how OMT teamwork quality shapes patient satisfaction and, in turn, impacts the decision to continue using OTC services.

2.3 S-O-R framework

The Stimulus-Organism-Response (S-O-R) framework, is widely utilized to understand individual health behaviors from a psychological perspective (Deng et al; Liu et al., 2023). Numerous studies have applied the S-O-R framework to explore the mechanisms behind reuse or repurchase behavior, highlighting how external factors are perceived, processed, and transformed into mental states that guide subsequent actions. In the context of OTC, the quality of teamwork during consultations can serve as an external stimulus (S), influencing patients' cognitive evaluations (O), which, in turn, leads to behavioral responses (R), such as continued service use or disengagement. Anchored in the S-O-R framework, our focus lies on two key aspects of teamwork quality: coordination and balance of contributions, that may shape patients' cognitive and emotional responses (satisfaction), ultimately encouraging continued engagement with OTC services.

3 Development of Hypotheses

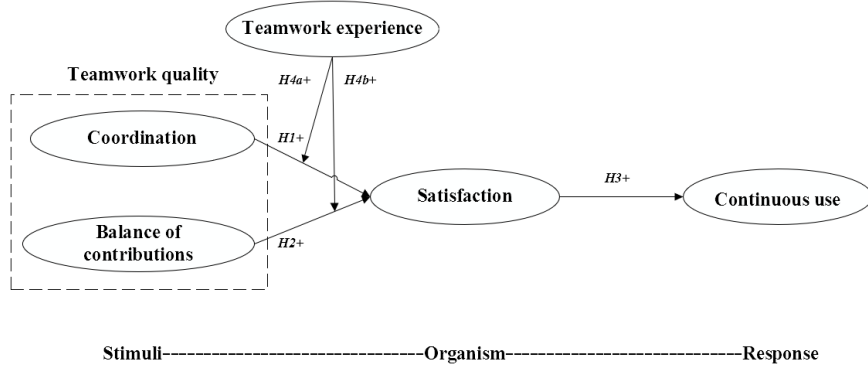


Fig. 1. Research Model

3.1 Teamwork quality and patient satisfaction

Within the S-O-R framework, the OMTs' teamwork quality (coordination and balance of contributions) acts as the "stimulus" that can be perceived by patients, while their satisfaction, reflects the "organism" response. In OTCs, when patients witness strong collaboration and seamless coordination among team members (S), they perceive the care as cohesive and well-coordinated. This fosters a sense of security and trust, especially when patients face uncertainty or anxiety about their condition. The transparency and consistency of team interactions help alleviate their tension, further enhancing satisfaction (O) (Ali et al., 2019). Given this, we propose that:

H1: Coordination is positively related to patient satisfaction

Patients generally prefer balanced contributions, which suggest a holistic, multi-disciplinary approach to their care. When multiple physicians actively participate,

patients gain confidence that their concerns are being evaluated from diverse perspectives, reducing reliance on a single viewpoint and minimizing potential biases, errors, or missed information in medical judgment (van de Water et al., 2007). This balanced engagement acts as a stimulus (S) that fosters patient satisfaction (O) by cultivating a perception of thoroughness and reliability in the care received. Based on this, we raise the following:

H2: Balance of contributions is positively related to patient satisfaction

3.2 Patient satisfaction and continuous use of OTC service

The impact of patient satisfaction on continued use exemplifies how an individual's internal state (organism) shapes subsequent behavior (response). Past research has demonstrated a positive relationship between patient satisfaction and continuous use intention in the online healthcare context (Cho, 2016). When patients are satisfied, it signifies that the service provider has effectively delivered benefits and reduced uncertainty, thereby increasing the likelihood of repeat engagements. Accordingly, we proposed that:

H3: Patient satisfaction is positively related to the continuous use of OTC service

3.3 Moderating role of teamwork experience

OMTs' teamwork experience plays a crucial role in enhancing patient satisfaction by serving as a tangible measure of the team's competence and reliability (Yang et al., 2021). This experience signifies the team's familiarity with collaborative consultation processes and their expected performance standards. When teamwork experience is high, patients are more likely to perceive quality attributes of team performance, such as coordination and balanced contributions, as indicators of well-honed work patterns developed through team consultation experience, reflecting the team's commitment and diligence. Consequently, we hypothesize that, in the context of high teamwork experience, the stimuli patients derive from the team's quality may become more salient, thereby potentially leading to heightened satisfaction (Marlow et al., 2018). Hence, we posit that:

H4a: Teamwork experience positively moderates the relationship between coordination and patient satisfaction

H4b: Teamwork experience positively moderates the relationship between the balance of contributions and patient satisfaction

4 Methodology

4.1 Research context and data collection

This study leverages public data procured from Haodf (haodf.com), a distinguished OHC within China. The dataset comprises comprehensive records of dialogues from these team consultations, as well as granular details at the team level. Our data compi-

lation includes 103,112 documented patient consultations with their respective OMTs. The chronological expanse of our inquiry spans a period from the year of the OMT service inception in 2017 through to 2023.

4.2 Measures

The dependent variable of this study is *Continuous use*. We gauge this variable using service time. OTC comes with a set time limit, typically 48 hours, which patients are informed of upon service purchase. If this time limit elapses, patients must renew their service to reconnect with the team. Hence, we determined continuous use behavior by analyzing the time intervals between patient-OMT communications. A continuous use was coded as 1 if the interval between the last and first communications exceeded 48 hours; otherwise, it was coded as 0. This study examines two independent variables: Coordination and Balance of contributions. Coordination denotes interactions and collaboration between physicians within the team. Thus, a value of 1 is assigned when a physician actively seeks input or cooperation from other team members during an OTC (Wang & Zhang, 2024b). Conversely, if all physicians respond to the patient independently, without engaging with their colleagues, the coordination score is set to 0. The balance of contributions measures the equitable effort distribution among team members during OTCs. Accordingly, it is marked as 1 if all the member physicians were involved in the consultation and coded as 0 if some physicians are not involved. The mediating variable is patient satisfaction (Satisfaction). To measure it, we employed a customized Chinese dictionary (Wang et al., 2023). This dictionary aims to measure patient satisfaction through the words that reflect patients' recognition of the physicians (e.g., professional, "reliable," "enthusiasm," and "carefulness.") in the online consultation context. Satisfaction was quantified by calculating the total number of these satisfaction-related words. The calculation is accomplished using Linguistic Inquiry and Word Count (LIWC), a reliable tool that has been widely used in online health contexts for analyzing word use. The moderating variable is teamwork experience (*Teamwork experience*), which represents an OMT's history of OTC engagements. It is quantified based on the number of prior OTCs an OMT has completed before the current patient. The model takes into account several control factors, including the sex (*Sex*) and age (*Age*) of patients, the extent of the OMT's personnel (*Team size*), and the monetary value of each OMT's services (*Price*) (in yuan). An overview of the variables' descriptive statistics is provided in Table 1.

Table 1. Descriptive Statistics

Variable	N	Mean	Std. Dev.	Min	Max	%
<i>Continuous use</i>	103,112	0.072	0.259	0	1	7.230
<i>Satisfaction</i>	103,112	0.897	1.885	0	82.01	-
<i>Coordination</i>	103,112	0.025	0.157	0	1	2.530
<i>Balance of contributions</i>	103,112	0.343	0.199	0.043	1	3.590
<i>Teamwork experience</i>	103,112	344.3	574.2	0	3630	-
<i>Sex</i>	103,112	0.451	0.498	0	1	45.06
<i>Age</i>	103,112	35.68	20.89	0.5	100	-
<i>Team size</i>	103,112	4.700	2.525	2	23	-
<i>Price</i>	103,112	70.79	88.09	0	490	-

4.3 Analysis and results

Given that satisfaction is a continuous variable and continuous use is in a binary form, the analytical procedure was divided into two phases. First, we utilized multiple linear regression analysis to scrutinize the impact of coordination and balance of contributions on patient satisfaction, alongside evaluating the role of teamwork experience as a moderating factor. Subsequently, in the second stage, we embraced a logistic regression model to assess the effect of satisfaction on the propensity for patient continued use behavior. The statistical software STATA 17 was adopted to execute these regression analyses.

The results of stage 1 are delineated in Table 2. Model 1 serves as a foundational model, encompassing solely control variables. Successively, model 2 integrates both independent variables and the aforementioned moderating factor for a more comprehensive analysis. Our analysis discerns that the *Coordination* significantly bolsters *Satisfaction* ($\beta = 0.706, p < 0.01$), thereby affirming H1. Concurrently, the *Balance of contributions* is observed to positively influence *Satisfaction* ($\beta = 0.475, p < 0.01$), substantiating H2. In model 3 we scrutinize the potential moderating influence of *Teamwork experience* by incorporating interaction terms. The results reveal that *Teamwork experience* positively moderates the relationship between *Balance of contributions* and *Satisfaction* ($\beta = 0.001, p < 0.01$), lending support to H4b. However, the coefficient of *Teamwork experience* * *Coordination* is insignificant ($\beta = 0.000, p > 0.1$), leading to the rejection of H4a. Table 3 presents the results of stage 2. In model 2, *Satisfaction* is identified as a positive predictor of *Continuous use* ($\beta = 0.093, p < 0.01$), thus, H3 is confirmed.

Table 2. Results of the First Stage

Dependent variable	<i>Satisfaction</i>		
	Model 1	Model 2	Model 3
<i>Coordination</i>		0.706*** (0.050)	0.663*** (0.057)
<i>Balance of contributions</i>		0.475*** (0.038)	0.417*** (0.041)
<i>Teamwork experience</i>		0.000 (0.000)	0.000 (0.000)
<i>Teamwork experience</i> *			0.000
<i>Coordination</i>			(0.000)
<i>Teamwork experience</i> *			0.001***
<i>Balance of contributions</i>			(0.000)
Controls	YES	YES	YES
Observations	103,112	103,112	103,112
R-squared	0.010	0.016	0.016

Notes. Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3. Results of the Second Stage

Dependent variable	<i>Continuous use</i>	
	Model 1	Model 2
<i>Satisfaction</i>		0.093*** (0.005)
Controls	YES	YES
Pseudo R ²	0.017	0.023
Observations	103,112	103,112

Notes. Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

We proceeded to investigate the intermediary function of Satisfaction through a bootstrapping approach using 5,000 samples. The findings unveil that across all mediated pathways, the 95% bias-corrected confidence intervals (CI) did not encompass zero, as illustrated in Table 4. This exclusion substantiates the significance of the mediation effects. The finding confirms our presupposition that the eminence of teamwork quality propels patient continuous use through the enhancement of satisfaction in the context of OTCs.

Table 4. Mediation Test

Paths	Indirect effect	95%CI	
		Lower	Upper
<i>Coordination—Satisfaction—Continuous use</i>	0.007	0.006	0.009
<i>Balance of contributions—Satisfaction—Continuous use</i>	0.005	0.004	0.006

5 Conclusion and Discussions

We find that coordination and balance of contributions during OTC significantly increase patient satisfaction, which subsequently leads to continuous use of OTC service provided by the same OMT. Moreover, our findings show that the effect of balanced contributions on patient satisfaction becomes more salient as teamwork experience increases. This study enriches the S-O-R literature by investigating how the quality of teamwork of OMTs acts as a stimulus affecting patient satisfaction (the organism), ultimately guiding the decision to continue using the service (the response). Furthermore, our study shed light on the moderating role of teamwork experience on the relationship between OTC teamwork quality and patient satisfaction. This study also yields insights that are applicable in practice. First, for members of OMTs, it is essential to recognize that balanced contributions are key to delivering a satisfying OTC experience. Therefore, each member should actively share their expertise and insights, as this collaborative approach fosters a proactive and cohesive team image. Additionally, every team member's unique experience can offer valuable perspectives in addressing patients' health concerns. Further, physicians should prioritize coordination among team members to ensure that their combined, multi-faceted efforts result in high-quality, integrated care.

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