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How Online Patient-Provider Communication Impacts Quality of Life: Examining the Role of Patient-Centered Care and Health Competence


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Abstract

The question of how patient-provider communication affects health outcomes has been a longstanding concern for health communication scholarship and practice. As patient-provider communication becomes increasingly mediated by digital technologies, much research has sought to compare online patient-provider communication (OPPC) with that conducted in-person, weighing its relative merits against its costs and barriers. This line of inquiry has mostly focused on the comparative benefits of OPPC for service delivery with little attempt to link these benefits to the wider health implications of OPPC. Consequently, the mechanisms that explain the impacts of OPPC on patients' overall wellbeing have been underexamined. Through a survey of 681 participants in China, this study examined the direct and indirect pathways between OPPC and quality of life (i.e., sleep, exercise, social activities, and psychological wellbeing). Our results demonstrate statistically significant direct relationships between OPPC and the four quality-of-life constructs examined as well as the mediation effects of patient-centered care and health competence in these relationships. The findings call for greater attention to the longer-term contributions of OPPC in empowering patients, especially those who are underserved by the healthcare system.

Keywords: online patient-provider communication, quality of life, patient-centered care, health competence, mediation effect

How Online Patient-Provider Communication Impacts Quality of Life: Examining the Role of Patient-Centered Care and Health Competence

Online patient-provider communication (OPPC) has emerged as an increasingly viable complement to, if not substitution for, face-to-face patient-provider communication (FPPC) in a variety of healthcare services during the past decade (Tarver et al., 2018). With features such as asynchronous communication and clear documentation that enable quicker and more accurate health information exchange (Murero & Rice, 2013), OPPC enables patients and providers to overcome time-space and capacity constraints, which potentially results in more efficient delivery of health services and increased access to care (Umefjord et al., 2003). Notwithstanding the significant concerns over adoption rates and digital inequalities of OPPC (Jiang et al., 2019), a growing number of studies have documented the benefits of OPPC for the quantity (e.g., shorter waiting time; Tarver et al., 2018) and quality (e.g., patient satisfaction; Jiang, 2019) of service delivery. There has, however, been comparatively limited evidence regarding the link between OPPC and improved health outcomes (Goldzweig et al., 2013). In contrast to its immediate advantages over conventional FPPC, the broader contributions of OPPC toward patients' overall wellbeing remain inadequately understood and warrant greater attention considering the increasing uptake and resources allocated for such electronic health services.

According to Street et al. (2009), understanding how patient-provider communication leads to better or worse health outcomes requires researchers to identify the direct and indirect pathways involved, and examine the relevant intrinsic and extrinsic contextual modifiers of these relationships vis-à-vis the healthcare setting. Extending this pathways model, this study examined the direct and indirect relationships between OPPC and quality of life (QOL), and assessed the role of patient-centered care and health competence as possible mediators of these relationships (see Figure 1). As a concept of functioning and wellbeing

that encompasses physical, psychological, social, and other domains (Li et al., 2017; Silva et al., 2018; Street et al., 2009), the investigation of QOL as the outcome of OPPC help extend our understanding of OPPC in relation to the broader context of physiological, personal, and social determinants of health. Proponents of the pathways model (Street et al., 2009) contend that patient-provider communication is more likely to shape health and wellbeing through indirect pathways which comprise proximal outcomes of such communication that then affect health or that contribute to the intermediate outcomes that result in improved health. The two mediators investigated in this study—patient-centered care and health competence—were conceptualized as the proximal and intermediate outcomes of OPPC, respectively. Patient-centered care entails “respecting and responding to patients’ wants, needs, and preferences, so that they can make choices in their care that best fit their individual circumstances” (Levinson et al., 2010, p. 1311). Health competence refers to “the degree to which persons believe they have confidence in their ability to successfully perform the necessary health-related behaviors” (Waldrop et al., 2001, p. 233).

Previous studies that examined related variables lend empirical support for the hypothesized pathways linking OPPC and QOL in this study. Besides the observation of a direct link between FPPC and QOL (Zhou et al., 2014), indirect links between FPPC and QOL that were modified by interpersonal communication barriers had also been documented (Li et al., 2017). Aspects of the indirect pathways proposed in this study that were supported by prior research include the associations between OPPC and patient-centered care (Wallwiener et al., 2009), patient-centered care and QOL (Purkale et al., 2016), patient-centered care and health competence (Finney Rutten et al., 2016; Lee & Lin, 2010), OPPC and health competence (Delbanco & Sands, 2004; Jahan et al., 2017; Roter et al., 2008), and health competence and QOL (Bachmann et al., 2016; Silva et al., 2018). Building on these

studies, the following direct and indirect relationships between OPPC and QOL were proposed:

- H1:** OPPC is positively associated with patients' QOL.
- H2:** Patient-centered care mediates the relationship between OPPC and QOL.
- H3:** Health competence mediates the relationship between OPPC and QOL.
- H4:** Patient-centered care and health competence sequentially mediate the relationship between OPPC and QOL.

Method

Sample

Research ethics approval for this study was obtained from the first author's institution. The online survey data for this study was collected through a private marketing research firm in October 2019. The 681 participants of this study had an average age of 30.8 ($SD = 8.15$, range: 18-65) and were mostly women (50.1%), obtained at least a college education (82.5%), married (65.5%), and earned between RMB4,000-10,000 per month (54.2%) (see Table 1).

Measures

OPPC was measured by asking participants to report the frequency in which they communicate with healthcare providers through each of the following online channels: email, social media, mobile apps, and health-related websites (Jiang, 2019). This measurement of OPPC is consistent with the call for researchers to capture the cumulative impact of patient-provider communication (Street et al., 2009). The four items were measured on five-point scales (1 = "never" to 5 = "always") and averaged to form a composite score ($M = 2.53$, $SD = .83$, Cronbach's $\alpha = .77$).

Patient-centered care was measured using three statements that assessed the extent to which participants were treated with respect and were involved in decisions about their health

by healthcare providers via the Internet in the past 12 months (Liu & Jiang, 2019). The three items were measured on five-point scales (1 = “strongly disagree” to 5 = “strongly agree”) and averaged to form a composite score ($M = 3.85$, $SD = .59$, Cronbach’s $\alpha = .62$).

Health competence was measured using five statements from the Perceived Health Competence Scale (Smith et al., 1995), which assessed the extent to which someone feels capable of effectively managing their health outcomes. The five items were measured on five-point scales (1 = “strongly disagree” to 5 = “strongly agree”) and, after reverse-scoring of negatively phrased statements, averaged to form a composite score ($M = 3.35$, $SD = .74$, Cronbach’s $\alpha = .76$).

QOL was measured using four subscales to encompass the physical, social, and psychological domains of an individual’s life (Wang, et al., 2012; Williams, et al., 2009; Zhou et al., 2014). The subscales comprised *sleep* ($M = 3.07$, $SD = .95$, Cronbach’s $\alpha = .62$) and *exercise* ($M = 3.24$, $SD = 1.13$, Cronbach’s $\alpha = .88$) for the physical domain, *social activities* ($M = 3.68$, $SD = .77$, Cronbach’s $\alpha = .67$) for the social domain, and *psychological wellbeing* ($M = 4.08$, $SD = .57$, Cronbach’s $\alpha = .70$) for the psychological domain. All items were measured on five-point scales (1 = “never” to 5 = “always” for sleep, exercise, and social activities; 1 = “strongly disagree” to 5 = “strongly agree” for psychological wellbeing) and averaged within each subscale to form a composite score for that construct.

Control variables were respondents’ socio-demographic characteristics: age, gender (0 = “female” and 1 = “male”), education (1 = “primary school or below” to 6 = “master’s degree or above”), personal monthly income (1 = “RMB1,500 or less” to 7 = “RMB15,000 or more”), and marital status (0 = “unmarried” and 1 = “married”).

Results

The descriptive statistics of the focal variables and the zero-order correlations among them are reported in Table 2 and Table 3, respectively. The four mediation models,

corresponding to each QOL construct (i.e., sleep, exercise, social activities, and psychological wellbeing), were tested using PROCESS Model 6 (Hayes, 2013) and are reported in Table 4.

H1 predicted a positive direct relationship between OPPC and QOL. Our results indicate that OPPC had statistically significant positive relationships with sleep ($\beta = .15$, 95% CI [.054, .238], $p < .01$), exercise ($\beta = .32$, 95% CI [.227, .416], $p < .001$), social activities ($\beta = .12$, 95% CI [.042, .189], $p < .01$), and psychological wellbeing ($\beta = .11$, 95% CI [.042, .189], $p < .01$). Thus, H1 was supported.

H2 predicted patient-centered care as a mediator of the relationship between OPPC and QOL. Our results indicate that OPPC had statistically significant positive relationships with patient-centered care ($\beta = .16$, 95% CI [.105, .220], $p < .001$) in the four models. Patient-centered care also had statistically significant positive relationships with sleep ($\beta = .23$, 95% CI [.100, .354], $p < .001$), exercise ($\beta = .16$, 95% CI [.025, .285], $p < .05$), social activities ($\beta = .22$, 95% CI [.120, .322], $p < .001$), and psychological wellbeing ($\beta = .28$, 95% CI [.208, .354], $p < .001$). Moreover, the indirect relationships between OPPC and all four QOL constructs via patient-centered care were all statistically significant given that the bootstrapped confidence intervals did not include zero (sleep: $\beta = .04$, 95% CI [.017, .067]; exercise: $\beta = .03$, 95% CI [.004, .055]; social activities: $\beta = .04$, 95% CI [.017, .064]; psychological wellbeing: $\beta = .05$, 95% CI [.026, .070]). H2 was thus supported.

H3 predicted health competence as a mediator of the relationship between OPPC and QOL. Our results indicate that OPPC had statistically significant positive relationships with health competence ($\beta = .02$, 95% CI [.006, .033], $p < .01$) in the four models. Health competence was also found to have statistically significant positive relationships with sleep ($\beta = .27$, 95% CI [.169, .374], $p < .001$), exercise ($\beta = .60$, 95% CI [.494, .703], $p < .001$), social activities ($\beta = .30$, 95% CI [.221, .383], $p < .001$), and psychological wellbeing (β

= .16, 95% CI [.104, .222], $p < .001$). Moreover, the indirect relationships between OPPC and all four QOL constructs via health competence were significant (sleep: $\beta = .01$, 95% CI [.004, .053]; exercise: $\beta = .06$, 95% CI [.007, .106]; social activities: $\beta = .03$, 95% CI [.004, .056]; psychological wellbeing: $\beta = .02$, 95% CI [.003, .033]). H3 was therefore supported.

H4 predicted the sequential mediation of the relationship between OPPC and QOL by patient-centered care and health competence. In addition to the above-mentioned results, we observed a statistically significant positive relationship between patient-centered care and health competence ($\beta = .22$, 95% CI [.124, .320], $p < .001$). Moreover, the indirect relationships between OPPC and all four QOL constructs via patient-centered care → health competence were statistically significant (sleep: $\beta = .02$, 95% CI [.004, .018]; exercise: $\beta = .02$, 95% CI [.010, .037]; social activities: $\beta = .02$, 95% CI [.005, .019]; psychological wellbeing: $\beta = .01$, 95% CI [.003, .011]). Taken together, H4 was supported.

Discussion

In this study, we sought to explain the impacts of OPPC on patients' QOL through direct and indirect pathways. Our results indicated that higher frequency of OPPC was linked to greater QOL, specifically in terms of physical, mental, and social wellbeing, which extends extant empirical evidence regarding the link between FPPC and improved QOL (Kerr et al., 2003; Zhou et al., 2014) into the online context. Beyond the direct relationship between OPPC and QOL, this study demonstrates the contributions of OPPC to patient-centered care and health competence as a possible mechanism that explains its impact on QOL. Our results suggest that patients who had more frequent OPPC were more likely to report patient-centered care received from online healthcare providers which was associated with higher levels of perceived health competence and, in turn, healthier levels of sleep, exercise, social activities, and psychological wellbeing.

These findings point to patient-centered care as the salient intrinsic factor and health competence as the extrinsic factor vis-à-vis patient-provider communication that help predict whether OPPC affects patients' QOL. It is plausible that the increased accessibility to healthcare professionals facilitated by OPPC enhances patient involvement in their health care decision-making through, for instance, affording them adequate time to express their concerns and ask questions about their health (Roter et al., 2008). The patient-centered care ensuing from OPPC would help patients better understand their health, and motivate them to pursue a healthier lifestyle that contributes to physical and psychological wellbeing (Calfas et al., 2002; Lee & Lin, 2010; Rathert et al., 2013). Prior research suggests that patient-centered care helps to empower patients by nurturing their self-care skills and providing more pertinent information and support that facilitate their health management (Finney Rutten et al., 2016; Saha & Beach, 2011).

The sequential mediation effect of patient-centered care and health competence on the link between OPPC and QOL demonstrated in this study suggests that the relationship between OPPC and QOL and that between patient-centered care and QOL are predicated on enhancement in patients' health competence. With increased opportunities to receive professional health information almost any time and anywhere, patients' health competence would inevitably be improved. Greater health competence engenders higher quality of life when patients become well-equipped with the necessary knowledge and skills to maintain a standard of health, comfort, and enjoyment of life events (Bachmann et al., 2016; Silva et al., 2018). People who are competent in health management tend to adopt healthy sleep habits, regular exercises, active social participation, and steps to improve mental health (Arora et al., 2002; Nes et al., 2012; Rueda & Pérez-García, 2006). Our results indicated that health competence had moderate to strong relationships with the four constructs of QOL examined—sleep, exercise, social activities, and psychological wellbeing.

Our results are instructive for communication scholarship and practice regarding OPPC in several ways. In China, the context of this study, tensions between patients and providers have become prevalent, as evident by frequent verbal and physical violence against healthcare workers (Xu, 2014). In this regard, the significant relationship between frequency of OPPC and patient-centered care observed in this study lends support to the idea of OPPC as a potential intervention for improved patient-provider relationships (Jiang, 2019). Beyond the immediate benefits to patient-provider relationships, OPPC may potentially contribute to resolving tensions between patients and providers in the longer term through improvements in patients' health competence, as alluded to by the results in this study. Considering the significant resources required in developing and maintaining the electronic health services that support OPPC, it is valuable for researchers and practitioners to understand whether and how improvements to service delivery vis-à-vis OPPC are accompanied by gains in health outcomes. The findings in this study attest to the potential utility of OPPC in shaping broader, longer-term health outcomes through enhancements in patient-centered care and health competence. To be sure, OPPC is not without pitfalls, which may include perpetuating pre-existing health inequalities or creating new ones that stem from the digital divide (Jiang, et al., 2019). At the same time, however, OPPC represents an opportunity for better healthcare access among populations encountering stigma or discrimination within the healthcare system (e.g., troubled youth, sexual and gender minorities, migrant workers) but are nevertheless savvy in using digital technologies (Yeo, 2020; Liu & Yeo, 2021). The findings in this study call for greater attention to the longer-term contributions of OPPC in empowering such patients who tend to eschew conventional FPPC (Liu & Yeo, 2019).

Limitations and Future Research

Owing to the cross-sectional design of this study, we are unable to account for possible bidirectional relationships among variables. For instance, the relationships between

OPPC and the two mediators (patient-centered care and health competence) are likely to be transactional in that higher frequency of OPPC predicts greater levels of each mediator and vice versa. Future research using longitudinal or experimental designs are needed to verify the hypothesized relationships in this study. As this study was designed to focused on the cumulative effects of OPPC, we neither differentiated between different use dimensions of OPPC nor compared the impacts to FPPC. Consistent with previous research (e.g., Jiang, 2019) and the notion of cumulative effect (Steel et al., 2009), OPPC was measured in this study by the frequency of using four digital channels to communicate with their healthcare providers. Future studies should further differentiate and explore the different dimensions of such usage, including the type of service and speciality. Researchers should also account for participants' level of FPPC and attendant outcomes in tandem with OPPC.

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Table 1*Sample Characteristics*

Age	$M = 30.80$ ($SD = 8.15$; range: 18-65)
	n (%)
Gender	
Male	340 (49.9%)
Female	341 (50.1%)
Education	
Below high school	3 (.4%)
High school	27 (4.0%)
Vocational school	89 (13.1%)
College	489 (71.8%)
Above college	73 (10.7%)
Income (RMB)	
< 1500	76 (11.1%)
1,500 to 4,000	95 (14.0%)
4,001 to 6,000	194 (28.5%)
6,001 to 10,000	175 (25.7%)
10,001 to 15,000	101 (14.8%)
> 15,000	40 (5.9%)
Marital status	
Married	446 (65.5%)
Unmarried	235 (34.5%)
N	681

Table 2*Descriptive Statistics of Focal Variables*

	Never	Rarely	Sometimes	Often	Always
OPPC					
1. Email	52.3%	28.8%	14.5%	3.4%	1.0%
2. Social media	16.2%	22.0%	31.7%	24.8%	5.3%
3. Mobile apps	12.2%	21.7%	31.0%	24.7%	10.4%
4. Health-related websites	16.9%	29.5%	32.7%	17.5%	3.4%
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Patient-centered care					
1. Explain things in a way you could understand	0.3%	2.8%	14.4%	67.4%	15.1%
2. Give the attention to your feelings and emotions	0.6%	7.0%	25.8%	42.9%	23.6%
3. Involve you in decisions about your health care as much as you wanted	0.9%	6.5%	24.8%	51.2%	16.6%
Health competence					
1. Typically, my plans for my health don't work out well	4.1%	45.8%	23.6%	22.2%	4.3%
2. No matter how hard I try, my health just doesn't turn out the way I would like	11.9%	24.2%	28.6%	28.5%	6.8%
3. It is difficult for me to find effective solutions to the health problems that come my way	13.7%	34.2%	22.6%	22.6%	6.9%
4. I'm generally able to accomplish my goals with respect to my health	1.5%	15.7%	24.5%	50.4%	7.9%
5. I succeed in the projects I undertake to improve my health	2.2%	10.7%	21.0%	49.3%	16.7%
	Never	Rarely	Sometimes	Often	Always
Sleep					
1. Spending about 8 hours sleeping every day	4.8%	35.1%	21.4%	31.9%	6.8%
2. Sticking to a regular bedtime schedule	9.1%	23.6%	25.7%	27.8%	13.8%
Exercise					
1. Exercising actively	7.0%	20.3%	23.1%	35.7%	14.0%

2. Exercising regularly	10.1%	22.5%	21.6%	31.6%	14.2%
Social activities					
1. Having enough time for enjoyable activities	5.7%	14.0%	30.2%	37.7%	12.3%
2. Having the best type of social activities to suit you	0.6%	4.3%	16.3%	54.2%	24.7%
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Psychological wellbeing					
1. I feel that I'm a person of worth, at least on an equal plane with others	0.3%	1.9%	10.6%	56.1%	31.1%
2. I feel that I have a number of good qualities	1.5%	3.5%	20.0%	50.7%	24.4%
3. I am able to do things as well as most other people	0.1%	3.2%	11.2%	51.7%	33.8%
4. I take a positive attitude toward myself	0.6%	4.7%	13.7%	49.3%	31.7%

Note. OPPC = online patient-provider communication.

Table 3*Zero Order Correlations Among Focal Variables*

	2	3	4	5	6	7
1 OPPC	.22***	.16***	.20***	.36***	.21***	.14**
2 Patient-centered care		.22***	.19***	.21***	.25***	.34***
3 Health competence			.28***	.48***	.37***	.32***
4 Sleep				.40***	.34***	.26***
5 Exercise					.47***	.28***
6 Social activities						.36***
7 Psychological wellbeing						

Note. OPPC = online patient-provider communication. * $p < .05$; ** $p < .01$; *** $p < .001$

Table 4
Mediation Models

	β	SE	95% CI	<i>p</i>
Model 1: Sleep				
OPPC→ PCC	.16	.03	[.105, .220]	<.001
OPPC→ Health competence	.02	.01	[.006, .033]	.005
PCC→ Health competence	.22	.05	[.124, .320]	<.001
Health competence→ Sleep	.27	.05	[.169, .374]	<.001
PCC→ Sleep	.23	.07	[.100, .354]	<.001
OPPC→ Sleep	.15	.05	[.054, .238]	.002
OPPC→ PCC→ Sleep	.04	.01	[.017, .067]	/
OPPC→ PCC→ Health competence→ Sleep	.02	.01	[.004, .018]	/
OPPC→ Health competence→ Sleep	.01	.01	[.004, .053]	/
Model 2: Exercise				
OPPC→PCC	.16	.03	[.105, .220]	<.001
OPPC→ Health competence	.02	.01	[.006, .033]	.005
PCC→ Health competence	.22	.05	[.124, .320]	<.001
Health competence→ Exercise	.60	.05	[.494, .703]	<.001
PCC→ Exercise	.16	.07	[.025, .285]	.020
OPPC→ Exercise	.32	.05	[.227, .416]	<.001
OPPC→ PCC→ Exercise	.03	.01	[.004, .055]	/
OPPC→ PCC→ Health competence→ Exercise	.02	.01	[.010, .037]	/
OPPC→ Health competence→ Exercise	.06	.02	[.007, .106]	/
Model 3: Social activities				
OPPC→ PCC	.16	.03	[.105, .220]	<.001
OPPC→ Health competence	.02	.01	[.006, .033]	.005
PCC→ Health competence	.22	.05	[.124, .320]	<.001
Health competence→ Social activities	.30	.04	[.221, .383]	<.001
PCC→ Social activities	.22	.05	[.120, .322]	<.001
OPPC→ Social activities	.12	.03	[.043, .189]	.002
OPPC→ PCC→ Social activities	.04	.01	[.017, .064]	/
OPPC→ PCC→ Health competence→ Social activities	.02	.01	[.005, .019]	/
OPPC→ Health competence→ Social activities	.03	.01	[.004, .056]	/
Model 4: Psychological wellbeing				
OPPC→ PCC	.16	.03	[.105, .220]	<.001
OPPC→ Health competence	.02	.01	[.006, .033]	.005
PCC→ Health competence	.22	.05	[.124, .320]	<.001
Health competence→ Psychological wellbeing	.16	.03	[.104, .222]	<.001
PCC→ Psychological wellbeing	.28	.04	[.208, .354]	<.001
OPPC→ Psychological wellbeing	.11	.03	[.042, .189]	.003
OPPC→ PCC→ Psychological wellbeing	.05	.01	[.026, .070]	/
OPPC→ PCC→ Health competence→ Psychological wellbeing	.01	.01	[.003, .011]	/
OPPC→ Health competence→ Psychological wellbeing	.02	.01	[.003, .033]	/

Note. *P*-values are not computed for bootstrapped indirect effects. CI: confidence interval; OPPC = online patient-provider communication; PCC: Patient-centered care; Covariates: demographic variables: gender, age, education, income, and marital status.

Figure 1

Pathways Between Online Patient-Provider Communication and Quality of Life

