



# Turning to digital: Examining the relationship between offline healthcare barriers and U.S. older adults' emotional well-being via online patient-provider communication and perceived quality of care (2017–2020)

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## ARTICLE INFO

### Keywords:

Offline healthcare barriers  
Online patient-provider communication  
Perceived care quality  
Emotional well-being

## ABSTRACT

**Purpose:** To examine the association between offline healthcare barriers and emotional well-being and assess the mediation roles of online patient-provider communication (OPPC) and perceived quality of care. This study also investigates the trends in offline healthcare barriers, OPPC, perceived quality of care, and emotional well-being over four years among the old population in the U.S.

**Methods:** Data from the Health Information National Trends Survey (HINTS) 5 Cycles 1, 2, and 4 were used. Mediation analysis and comparison analysis were employed.

**Results:** The results indicated an increment in OPPC and a decline in patient's perceived quality of care between 2017 and 2020. Across the three years, offline healthcare barriers were consistently negatively associated with emotional well-being, and perceived quality of care remained a mediator in such a relationship. Moreover, the serial mediating roles of OPPC and perceived quality of care between offline healthcare barriers and emotional well-being turned from statistically non-significant (2017) to significant (2018, 2020).

**Conclusion:** Our results witness the growing adoption of OPPC among older adults and the evolution of OPPC as a complementary communication modality. The findings can support interventions to augment OPPC utilization and enhance the perception of quality care of older adults, contributing to their increased emotional well-being.

## 1. Introduction

In 2022, the proportion of older adults in the U.S. reached 17.3 %, projected to be 22 % by 2050 (Statista, 2024). Such a demographic shift challenges the healthcare system, requiring effective, high-quality long-term care due to the high prevalence of multiple chronic conditions in this age group (Czaja, 2016). The prevalence of hypertension among U.S. older adults was 51.3 %, followed by arthritis (41.5 %) and diabetes (16.6 %) (Zheng et al, 2021). Additionally, 44.1 % of people aged 65 and above engaged in polypharmacy (Wang et al., 2023). Furthermore, complex health conditions of patients in late life are not only associated with an increased risk for healthcare needs but also correlate with negative self-perceptions, disease uncertainties, and psychological distress. Evidence from the Health and Retirement Study suggested that

older adults who faced psychological challenges had an increased risk for disease, disability, and mortality (Crowe et al., 2021). According to the Centers for Disease Control and Prevention (Centers for Disease Control and Prevention and National Association of Chronic Disease Directors, 2008), about 20 % of adults aged 50 or older experience some mental health concerns.

Offline healthcare barriers include the unavailability and inadequacy of health services and providers for disease prevention and treatment (World Health Organization, 2023). The lack of adequate healthcare can amplify older adults' worry about the negative impact of aging on their health, thereby reinforcing their psychological distress. Prior discussions have highlighted the negative impact of offline healthcare barriers on the emotional well-being of older adults (Eimontas et al., 2022; Root and Caskie, 2022; Zuverink and Xiang, 2020). For instance, Eimontas et al.

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(2022), using a multinational survey, have identified unmet medical healthcare needs as a risk factor for depression in older adults. Similarly, Zuverink and Xiang (2020) corroborated the link between offline barriers and poor health outcomes, including psychological health, among older adults. The inadequacy of healthcare resources often hinders older adults from effectively navigating the increasingly complex healthcare system and making well-informed decisions about their care, leading to concerns about long-term self-management (Liu et al., 2023a). Despite this body of scholarship, researchers argue that the relationship between offline barriers and general health outcomes extends beyond a bivariate relationship, necessitating further investigation into the mediating mechanisms and the significant role of innovative communication interventions (Street, 2003a).

Thanks to evolving digital technologies, online patient-provider communication (OPPC) has emerged as a novel way for patients and providers to interact (Jiang, 2019a). OPPC is considered a more resource-saving, convenient, and efficient mode for delivering health support than traditional medical communication (Rosenberg, 2023). Compared to younger adults, older adults tend to rely more on and place greater trust in health information and decisions provided by healthcare professionals rather than other sources (Oh and Lim, 2021). Therefore, when offline healthcare is inadequate, patients may turn to OPPC to obtain information and build connections. Additionally, older adults often provide detailed health information or knowledge about specific conditions to assist healthcare providers in making diagnostic or treatment decisions (Xie, 2009). In this context, OPPC can alleviate concerns about insufficient offline care by enhancing access to health knowledge and communication. This increased engagement can boost their perceived control over health decisions, perceived patient-centeredness, satisfaction with health services, and emotional well-being (Kruse et al., 2020). Accordingly, the current study posits OPPC as a communication hub that is expected to be increasingly adopted when offline healthcare barriers are significant, contributing to improving older adults' emotional well-being (Liu et al., 2023a). While access to, utilization of, and understanding of OPPC may necessitate a high level of eHealth literacy, which could widen the digital divide (Spooner et al., 2017), this novel approach of technology-mediated communication nonetheless offers opportunities for the elderly, particularly with the ongoing digitalization of the U.S. healthcare system (Alder, 2024).

Moreover, Street (2003a) posited that patient-provider interactions are shaped by multifaceted contexts. The obstacles embedded in traditional healthcare or personal perception of healthcare quality are subject to change over time (McKeown et al., 2023; Ye et al., 2024). Thus, the interplay between offline healthcare barriers, OPPC, perceived quality of care, and emotional well-being is not likely an immutable pattern. It is imperative to explore the trend of key variables to assess the effect of offline healthcare barriers on emotional well-being over time. As such, by utilizing data from the 2017, 2018, and 2020 iterations of the Health Information National Trends Survey (HINTS), this study investigates the mechanism underlying offline healthcare barriers and emotional well-being and scrutinizes trends in key constructs.

## 2. Theoretical foundation and hypotheses development

### 2.1. Three-stage model

The three-stage model proposes that technology use seldom directly affects health outcomes but influences them through three mediating processes (Street, 2003b). Stage 1 focuses on the factors that influence the implementation of technology (e.g., individual needs and attitudes toward OPPC). This merges with Stage 2, which involves users' experiences of the interplay of users, media, and messages. Finally, at Stage 3, the desired intermediate outcomes of media use contribute to post-technology use outcomes. As such, we first hypothesized that offline healthcare barriers directly motivated patients' OPPC adoption in Stage 1. At Stage 2, older adults may benefit from OPPC to obtain timely and

personalized health support from professionals, possibly increasing their satisfaction with care quality. In the final stage, perceived high-quality care can improve emotional well-being by establishing trusting patient-provider relationships and patient commitment to treatment adherence. Fig. 1 shows the hypothesized model.

### 2.2. Offline healthcare barriers and emotional well-being

According to Street's three-stage model (2003b), access to and utilization of healthcare services are vital for improving health outcomes (e.g., emotional well-being) (Fulmer et al., 2021; van Gaans and Dent, 2018). Nevertheless, the scarcity of services and the shortage of healthcare providers with communication skills may pose significant challenges to acquiring high-quality care (Douthit et al., 2015). Prior literature indicated that even adults with public insurance faced difficulties finding providers accepting them as new patients and endured longer appointment wait times (Bhandari et al., 2014). These barriers can constrain healthcare utilization and negatively impact patients' emotional well-being. For example, diminished access to health care could increase the number of delayed or missed medical appointments, which may exacerbate symptom severity and prolong suffering (Root and Caskie, 2022). Older patients lacking access to necessary treatment would translate such experience to a sense of loss of control, decreased self-efficacy in health management, and fear and uncertainty about their illnesses (Liu et al., 2023b). Such circumstances can make patients feel that the healthcare system prioritizes efficiency and profit over patient needs and that their preferences and values are disregarded by providers (Cheng et al., 2020). Consequently, this may result in older adults' reluctance to ask questions and disclose symptoms and emotional stress during medical interactions, which hampers the therapeutic benefits of patient-provider communication essential for addressing health concerns (Street, 2003a). Thus, the following hypotheses were proposed:

H1. Offline healthcare barriers are negatively associated with older adults' emotional well-being.

### 2.3. Perceived quality of care and emotional well-being

In addition to the direct association between offline healthcare barriers and emotional well-being, cognitive determinants can help explain patients' offline healthcare experiences and health outcomes (Lai et al., 2024). Perceived quality of care is the subjective evaluation of the services they receive and the corresponding treatment outcomes (Gishu et al., 2019). Individual perceived effectiveness of healthcare, such as patient-provider interactions, is a crucial antecedent of health outcomes, as it fosters patient engagement and adherence to care, ultimately affecting a patient's health (Epstein and Street, 2007). Empirical evidence has well established the positive link between perceived quality of care and psychological outcomes. For example, Jiang (2017) has highlighted the critical role of perceived quality of care in empowering patients' sense of worth, confidence, and hope, which helps them cope with health uncertainties and negative emotions effectively.

Despite the potential role of perceived quality of care, many older adults reported dissatisfaction with their healthcare coordination,

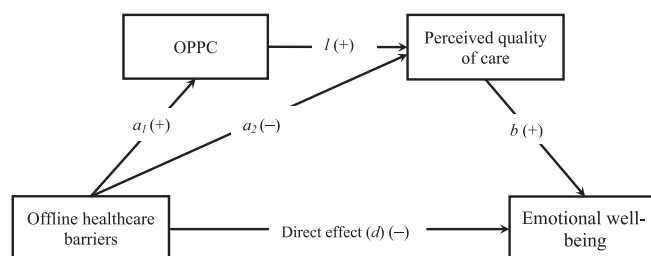


Fig. 1. Conceptual framework. Note: OPPC, online patient-provider communication.

consistency, and continuity (Eastman et al., 2022). Given that patients typically evaluate healthcare quality through tangible clinical cues (Hawthorne et al., 2014), protracted waiting time or limited healthcare choices would compromise their healthcare satisfaction. For instance, people who perceived themselves as marginalized in healthcare generally reported lower ratings of perceived healthcare quality (Sorkin et al., 2010). Conversely, a survey found that patients who experience greater continuity of care would hold higher satisfaction with the healthcare system and the provider's humanistic skills (Fan et al., 2005). Thus, we proposed:

**H2.** Perceived quality of care mediates the relationship between offline healthcare barriers and older adults' emotional well-being.

#### 2.4. Serial mediating roles of OPPC and perceived quality of care

Street (2003b) emphasized that besides traditional offline healthcare, OPPC was another important means to improve healthcare quality. Ample empirical literature suggested that OPPC could complement offline healthcare (Jiang, 2019b; Kim et al., 2021; Lu and Zhang, 2019). For example, people facing delays in getting physician appointments were more likely to participate in health chat groups and communicate with doctors through emails (Bhandari et al., 2014). Additionally, Oh and Lim (2021) found that lower satisfaction in patient-provider interactions was associated with increased pursuit of online health information for themselves.

This shift from offline to online healthcare is accorded with the uses and gratifications theory (UGT), maintaining that people tend to choose between alternative communication sources, and when they find one source less effective in satisfying their needs, they may switch to other sources (Katz et al., 1973). Drawing on the UGT, online health services can provide three gratifications (i.e., interpersonal utility, information-seeking, and accessibility gratifications) (Kim et al., 2021). First, by affording round-the-clock health support, OPPC enables patients to communicate with providers more frequently and efficiently, avoiding the physical inconvenience of visiting offline clinics (de Jong et al., 2014). Second, patients can seek more extensive health information during their clinical conversations on mobile health apps or via email, facilitating knowledge learning and fostering participation in self-health management. Third, accessing online health information and services can further improve patient satisfaction. In particular, the effect of offline healthcare barriers on OPPC adoption may be more pronounced among older adults because they face substantial long-term care needs due to functional impairments (Harerimana et al., 2019).

Furthermore, effective OPPC is integral to efficient patient care delivery and is intrinsically related to one's positive perception of healthcare quality. Kim et al. (2021) suggested that when users can appreciate the utility of patient portals in facilitating their access to health records, health information from their providers, and online tracking of clinical appointments, their care quality assessment would be increased. A systematic review showed that OPPC adoption can bolster patient satisfaction and yield beneficial psychological outcomes such as increased self-esteem, decreased stress, and depression (de Jong et al., 2014). Empirical evidence also indicated that perceptions of high-quality care can be a favorable outcome of reciprocal OPPC (Liu and Ye, 2021). Accordingly, we predicted:

**H3.** OPPC and perceived quality of care sequentially mediate the relationship between offline healthcare barriers and older adults' emotional well-being.

### 3. Methods

#### 3.1. Sample

HINTS is a publicly available, cross-sectional, nationally representative survey of U.S. adults to assess their health information behaviors (Nelson et al., 2004). Data were derived from three waves of the HINTS 5

collected in 2017, 2018, and 2020. Data from HINTS 5 (2019) and HINTS 6 (2022) were excluded because of incomplete measures of focal variables. Eventually, 3285 participants in 2017, 3504 in 2018, and 3865 in 2020 completed the survey, of which 1465 in 2017, 1633 in 2018, and 1852 in 2020 were identified as older adults aged 60 and above. This study was based on HINTS data, so Institutional Review Board approval was not required.

#### 3.2. Measurement

A full description of the focal variables can be found in Table S1 in the Supplemental materials.

Offline healthcare barriers were measured by four indicators from previous research (Liu et al., 2023a). Respondents were asked if, in the past 12 months, when seeking care for a medical problem, they had to, for example, "bring an X-ray, MRI, or other type of test result with them to the appointment." Respondents' answers were dichotomous (0 = "no", 1 = "yes") and were summed.

OPPC was adapted from previous research (Cho et al., 2022) using three items that captured respondents' engagement in electronic communication with their providers (e.g., using electronic means to communicate with clinicians). Responses to these items were dichotomous (0 = "no", 1 = "yes") and added up.

Perceived quality of care was assessed by a single item (Swoboda et al., 2020). Respondents were asked: "Overall, how would you rate the quality of health care you received in the past 12 months?" A 5-point scale ranged from 1 = "excellent" to 5 = "poor". Responses were reversely scored.

Emotional well-being was measured through the Patient Health Questionnaire 4 (Wicke et al., 2022), which asked participants how often they experienced four symptoms of depression and anxiety in the past two weeks. All items were rated on a 4-point scale ranging from 1 = "nearly every day" to 4 = "not at all". The Cronbach's alphas were 0.877, 0.879, 0.876 (Samples 2017, 2018 and 2020).

Control variables include age, gender (1 = "male", 0 = "female"), education, race, household income, marital status (1 = "married", 0 = "others"), and health insurance (1 = "yes", 0 = "no"). Race was coded as non-Hispanic White, Black or African American, Hispanic, and others. Education was categorized as below high school, high school, vocational school, college, and above. Household income was categorized as less than \$20,000, \$20,000 to < \$35,000, \$35,000 to < \$50,000, \$50,000 to < \$75,000, and \$75,000 or more.

#### 3.3. Data analysis

First, descriptive analyses were performed to summarize the demographic characteristics. Second, a one-way analysis of variance (ANOVA) was used to identify whether a significant difference existed in focal variables from 2017 to 2020. Third, Model 6 of PROCESS was used to test the mediation model (Hayes, 2017). 95 % CI was used to conduct 10,000 resamples in bootstrapping procedures. We also tested whether the hypothesized relationships stand over time. The listwise deletion was used to handle missing values. Statistical analyses were performed utilizing SPSS 26.

### 4. Results

#### 4.1. Descriptive analyses

Table 1 shows that the average age of older participants was 70.27 in 2017 (ranging from 60 to 101), 71.23 in 2018 (ranging from 60 to 97), and 70.98 in 2020 (ranging from 60 to 104). Most were female, non-Hispanic white, unmarried, and reported college and above educational attainment, health insurance, and a household income below \$75,000. The results in Fig. 2 indicated an increment of 0.111 in OPPC from 2017 to 2020 ( $p < 0.001$ ) and a decrease of 0.109 in perceived

**Table 1**  
Descriptive statistics of the controlling variables among U.S. older adults, 2017–2020.

	2017 N=1,465	2018 N=1,633	2020 N=1,852
Age (years, mean ± SD)	70.27 ± 8.00	71.23 ± 8.17	70.98 ± 8.10
Gender, n (%)			
Male	598 (41.6)	713 (44.3)	816 (44.3)
Female	839 (58.4)	895 (55.7)	1028 (55.7)
Education, n (%)			
Below high school	126 (8.7)	163 (10.0)	160 (9.0)
High school	357 (24.6)	345 (21.3)	400 (22.4)
Vocation school	115 (7.9)	109 (6.7)	139 (7.8)
College and above	854 (58.8)	1,005 (62.0)	1,085 (60.8)
Race, n (%)			
Non-Hispanic White	909 (70.3)	1,005 (70.6)	1,091 (67.6)
Black or African American	163 (12.6)	183 (12.9)	222 (13.8)
Hispanic	131 (10.1)	159 (11.2)	204 (12.6)
Others	90 (7.0)	76 (5.4)	96 (6.0)
Household income, n (%)			
Less than \$20,000	276 (21.6)	319 (23.0)	363 (22.5)
\$20,000 to < \$35,000	229 (17.9)	250 (18.0)	254 (15.7)
\$35,000 to < \$50,000	182 (14.2)	184 (13.3)	252 (15.6)
\$50,000 to < \$75,000	240 (18.8)	271 (19.6)	291 (18.0)
\$75,000 or more	353 (27.6)	362 (26.1)	455 (28.2)
Marital status, n (%)			
Married	724 (50.0)	754 (46.6)	821 (45.9)
Others	724 (50.0)	863 (53.4)	967 (54.1)
Health insurance, n (%)			
Yes	1411 (97.5)	1,575 (98.1)	1,782 (98.0)
No	36 (2.5)	31 (1.9)	37 (2.0)

Note: SD, standard deviation; OPPC, online patient–provider communication; N, number of observations.

quality of care from 2017 to 2020 ( $p = 0.002$ ). No additional significant changes were observed in the key variables (see more details in [Table S2](#) in [Supplementary materials](#)).

4.2. Mediation analysis

As depicted in [Table 2](#), the effect of offline healthcare barriers on emotional well-being was consistently significant ( $\beta = -0.10/-0.09/-0.13$ ; 95 % CI  $[-0.14, -0.04]/[-0.14, -0.03]/[-0.16, -0.07]$ ; Samples 2017, 2018 and 2020), supporting H1. The indirect effect of

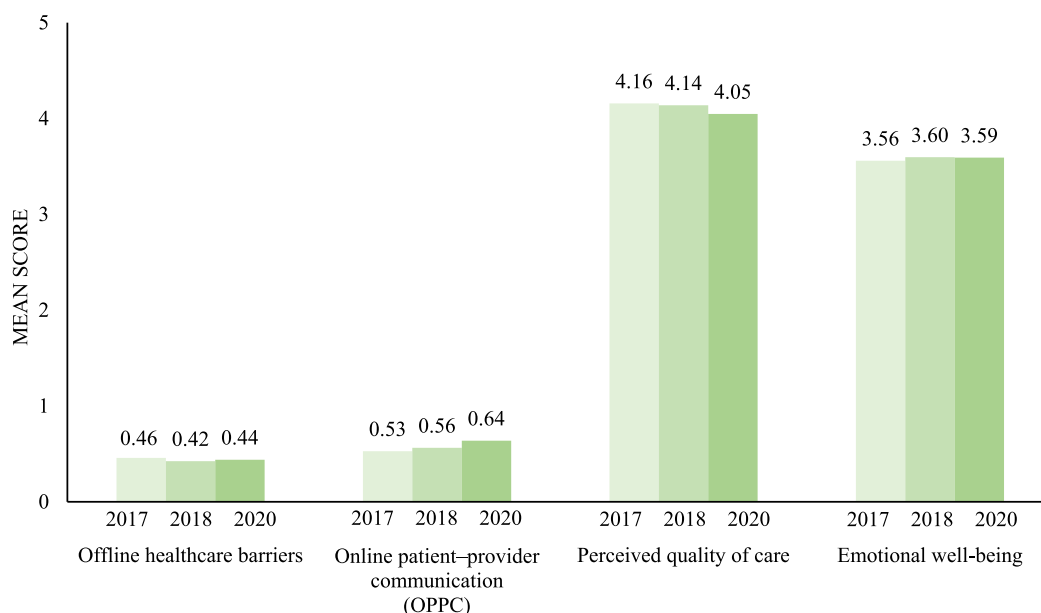
offline healthcare barriers on emotional well-being through perceived quality of care was significant ( $\beta = -0.05/-0.05/-0.05$ ; 95 % CI  $[-0.08, -0.03]/[-0.08, -0.03]/[-0.07, -0.02]$ ; Samples 2017, 2018 and 2020). Thus, H2 was supported. The sequential mediating role of OPPC and perceived quality of care in the association between offline healthcare barriers and emotional well-being was only significant in 2018 and 2020 ( $\beta = 0.003/.002$ ; 95 % CI  $[0.001, 0.01]/[0.0004, 0.003]$ ; Samples 2018 and 2020), but not in 2017 ( $\beta = 0.001$ ; 95 % CI  $[-0.0003, 0.002]$ ; Samples 2017). As such, H3 was partially supported.

5. Discussion

Utilizing HINTS data from 2017 to 2020, the current study detected an increase in OPPC but decreased perceived quality of care among older adults. Offline healthcare barriers were associated with individual emotional well-being directly and indirectly. The mediating roles of OPPC and perceived quality of care between offline healthcare barriers and emotional well-being shifted from non-significant in 2017 to significant in 2018 and 2020.

5.1. Trends of focal variables

First, our results indicated an upward trend of OPPC between 2017 and 2020. Two factors may contribute to this phenomenon. Foremost is the proliferation of electronic technologies. Internet usage among U.S. residents aged 65 years and above has risen from 66 % in 2018 to 75 % in 2021 ([Pew Research Center, 2024](#)), while smartphone ownership has increased by 15 % ([Pew Research Center, 2022](#)). These trends reflect an emerging dynamic in healthcare whereby more accessible online communication channels increasingly support older adults’ OPPC experiences. Government and health organizations have also tailored innovative assistive technologies for older adults. In 2019, the [World Health Organization \(2019\)](#) introduced an interactive digital application to address older adults’ priority issues, such as depressive symptoms, mobility, vision, and hearing loss. By providing personalized care, guidance, and training from health and social workers, such technologies help improve older adults’ self-management skills and computer performance while alleviating their anxiety towards technology use. When older adults become proficient and comfortable with online healthcare services, they are more likely to employ health services and



**Fig. 2.** The comparison of offline healthcare barriers, online patient–provider communication (OPPC), perceived quality of care, and emotional well-being among U.S. older adults, 2017–2020.



**Table 2**

Mediating effects of OPPC and perceived quality of care on the relationship between offline healthcare barriers and emotional well-being among U.S. older adults, 2017–2020.

Mediation pathways	2017		2018		2020	
	$\beta$	95 % CI	$\beta$	95 % CI	$\beta$	95 % CI
offline healthcare barriers $\rightarrow$ OPPC ( $a_1$ )	0.08**	[0.02, 0.14]	0.14***	[0.09, 0.21]	0.10***	[0.05, 0.16]
offline healthcare barriers $\rightarrow$ perceived quality of care ( $a_2$ )	-0.25***	[-0.35, -0.22]	-0.26***	[-0.38, -0.24]	-0.27***	[-0.39, -0.26]
perceived quality of care $\rightarrow$ emotional well-being ( $b$ )	0.16***	[0.08, 0.17]	0.14***	[0.06, 0.15]	0.12***	[0.05, 0.13]
OPPC $\rightarrow$ perceived quality of care ( $l$ )	0.04	[-0.02, 0.11]	0.12***	[0.07, 0.20]	0.09**	[0.04, 0.16]
offline healthcare barriers $\rightarrow$ perceived quality of care $\rightarrow$ emotional well-being ( $a_2 \times b$ )	-0.05	[-0.08, -0.03]	-0.05	[-0.08, -0.03]	-0.05	[-0.07, -0.02]
offline healthcare barriers $\rightarrow$ OPPC $\rightarrow$ perceived quality of care $\rightarrow$ emotional well-being ( $a_1 \times l \times b$ )	0.0007	[<.001, 0.002]	0.003	[0.001, 0.01]	0.002	[0.0004, 0.003]
offline healthcare barriers $\rightarrow$ emotional well-being (direct effect, $d$ )	-0.10***	[-0.14, -0.04]	-0.09**	[-0.14, -0.03]	-0.13***	[-0.16, -0.07]

Note: Standardized beta is shown in each cell; All models controlling for age, gender, education, race, household income, marital status, and health insurance; OPPC, online patient–provider communication; CI, confidence interval.

\*\*  $p < 0.01$ .

\*\*\*  $p < 0.001$ .

support from online providers. Another possible explanation is that during COVID-19, social distancing practices may have limited availability of offline clinic services, increasing OPPC adoption by older adults (Koonin et al., 2020). To illustrate, telehealth visits among older adults have risen from 4 % to 30 % between May 2019 and June 2020 (Buis et al., 2020). This unexpected pandemic may also account for a somewhat surprising result in our study: a downward trend in older adults’ perceived quality of care. This also echoed the research that showed a decreasing trend in patients’ perception of patient–provider communication before and during the early COVID-19 pandemic (Kim et al., 2023).

5.2. Mediation pathways

First, the role of OPPC was acknowledged in enhancing emotional well-being, reinforcing the three-stage model (Street, 2003b), which contends that effective OPPC can be an integral part of patient-centered care. Nevertheless, such an effect has only been recognized since 2018. Understandably, when OPPC is in its infancy, older adults may not have sufficient health literacy to comprehend eHealth for self-care. In particular, older adults in the U.S. have poor eHealth literacy and face challenges in Internet access, online communication, and information navigation (Chesser et al., 2016). Thus, they are presumably unable to fully exploit the potential of OPPC, although they are keen to access online healthcare services. Nonetheless, as supported by our results, with progressively increasing use of OPPC by older adults, it is promising that OPPC can help promote older adults’ confidence and skills in applying online healthcare resources, leading to better health outcomes. Another explanation may be the insufficient compassionate communication and psychosocial care online. The social information processing theory of computer-mediated communication posits that computer-mediated communication may reduce communicators’ sense of involvement, trust, and intimacy owing to the lack of nonverbal cues and social presence (Walther, 1992). Thus, developing and maintaining relationships online may take longer time than offline.

5.3. Theoretical implications and practical implications

The current study not only extends the application of the three-stage model of health (Street, 2003b) to the phenomenon of OPPC use and its attendant health impacts but also adds a direct path (i.e., from OPPC to psychological health) to the original model, thereby creating a more comprehensive one with stronger explanatory power. Our study’s most notable theoretical contribution may be the serial mediating effect of OPPC and perceived quality of care. Specifically, while offline healthcare barriers (Stage 1) may directly cause patient dissatisfaction, these

barriers can also prompt older adults to adopt OPPC (Stage 2) as a complementary communication modality, which contributes to their perceived quality of care and psychological health (Stage 3).

In addition, our findings have practical implications. First, healthcare and social programs should make endeavors to alleviate the cost burden, simplify medication routines, and facilitate access to mental healthcare for older adults. Second, the findings confirmed the value of OPPC as an alternative to face-to-face communication in assisting patients to receive high-quality care. It suggests the importance of training online professionals to deliver PCC, an essential component of efficient care. This is particularly pertinent in computer-mediated communication, where patients’ perception of emotional support may be compromised by inadequate nonverbal cues and asynchronous communication (Lai et al., 2024). In addition, to maximize the effectiveness of OPPC, it is important to improve older people’s eHealth literacy, such as the skills in participation in communication with their virtual providers, to ascertain that quality online healthcare services are employed when made accessible (Lee et al., 2020).

5.4. Limitations

This study has several limitations. First, the use of cross-sectional data precludes the establishment of causal relationships. To confirm causality, longitudinal surveys or experimental methods should be employed. Second, the perceived quality of care was measured by a single item, which may cause measurement errors. Future research should use multiple items to ensure internal reliability. Third, data from HINTS 5 (2019) and HINTS 6 (2022) were excluded because of incomplete measures of focal variables. Future studies may consider using a more comprehensive dataset to replicate and validate the study model.

5.5. Conclusion

Our findings show that offline healthcare barriers consistently undermined individuals’ emotional well-being from 2017 to 2020, with the serial mediating role of OPPC and perceived quality of care only identified in 2018 and 2020. Also, an upward trend of OPPC adoption was observed. Therefore, we advocate for interventions to promote OPPC tailored to older groups and to minimize offline healthcare barriers among underserved populations. This study has implications for healthcare institutions, policymakers, and health professionals who aim to design evidence-based interventions to augment the emotional well-being of the elderly.

## Funding details

Financial support was provided by the University of Oklahoma Libraries' Open Access Fund.

## 7. Ethical approval

This study used secondary data. The HINTS data meet established ethical standards and have obtained ethics approval.

## CRedit authorship contribution statement

**Jizhou Francis Ye:** Writing – original draft, Formal analysis, Conceptualization, Funding acquisition. **Yuyuan Kylie Lai:** Writing – original draft, Formal analysis, Conceptualization. **Xinshu Zhao:** Writing – review & editing.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

The data supporting this study's findings are available on the National Cancer Institute (NCI) website (<https://hints.cancer.gov>).

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.pmedr.2024.102885>.

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