Utilization and Patient Experiences of Telehealth Among Rural Californians

by
Meghan Elizabeth Ferrara

DISSERTATION
Submitted in partial satisfaction of the requirements for degree of
DOCTOR OF PHILOSOPHY

in

Nursing

in the

GRADUATE DIVISION
of the
UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

Approved:

DocuSigned by:
Susan Chapman — Susan Chapman
AD02AFFA1F714D0...
Chair

DocuSigned by:
Intinarelli, Gina — Intinarelli, Gina
D207B7...481...

DocuSigned by:
Mijung Park — Mijung Park
B5D5F15FDC59400...

Committee Members

To my parents, who, without knowing where it would lead, first set me on this path.

To my husband, who walked by my side every step of the way.

And to Perry. I am so excited to see where your path takes you.

Acknowledgements

First and foremost, I would like to acknowledge my dissertation chair and advisor of seven years, a dedicated educator and mentor extraordinaire, Dr. Susan A. Chapman. Susan was instrumental in my decision to pursue doctoral education, and has guided me through my doctoral studies with patience, wisdom, and care. Susan, thank you for your steadfast support throughout my studies and most of all on my dissertation journey. I am deeply grateful for your mentorship.

I would like to acknowledge my committee member Dr. Gina Intinarelli-Shuler, for her expertise in health systems and for her substantial support of my dissertation planning and research logistics. Thank you for sharing your valuable time and experience in support of my doctoral studies.

And my committee member Dr. Mijung Park, for her wisdom on matters of existentialism, *Dasein,* and the beingness of being. Thank you for helping to make interpretive phenomenology accessible to me, and for always being ready with a pep talk.

I would like to acknowledge Dr. Linda Branagan for her invaluable knowledge of all things telehealth, from national policy to minute procedures at the health system. Thank you for taking the time to meet with me throughout my dissertation research, and to respond to my many emails about telehealth EHR details.

To Kate, thanks for always being there for me despite living on the other side of the country. Our chats helped sustain me through the seemingly endless slog of research and writing. To Ann, Autumn, Zsuzsa, Kadence, and Rhezden, thanks for all the gatherings and celebratory dinners and reasons for a break from studying. And to all my extended family, especially the Rowes and the Madejs, thank you for all your love over the years and for always believing in me.

Mom and Dad, thank you for all the hours you spent reading to me and for the many other ways that you nurtured my love of learning. You laid the foundation that made this possible. I'm so proud of you both.

And last on my list but first in my heart, Yewie. You know what it took to reach this point. Your unwavering support is a gift and an honor. Thank you, thank you, thank you.

Utilization and Patient Experiences of Telehealth Among Rural Californians

Meghan Elizabeth Ferrara

Abstract

Background and Significance: Telehealth may help redress rural healthcare shortages in the United States and improve related rural health disparities. However, following the expansion of telehealth related to the COVID-19 pandemic, telehealth utilization has been lower overall among rural populations compared to urban populations. Certain populations are also more likely to use audio-only telehealth, with implications for care quality. To further understanding of these telehealth utilization disparities, the purpose of this dissertation was therefore to describe demographic and telehealth encounter characteristics of a population of rural adults and to explore telehealth experiences among this population.

Methods: Three studies were conducted for this dissertation. The first was a scoping review of the literature examining rural patients' experiences with video telehealth in the United States and related methods of patient experience assessment. The second study was a retrospective medical record review of adults who lived in rural California ZIP codes and utilized telehealth at an urban medical center from December 2021 to December 2022 (N = 9,359). This study analyzed demographic and telehealth encounter characteristics by three degrees of rural status. The third study used interpretive phenomenology qualitative methods to explore rural patients' lived experiences with telehealth (N = 16) and the value and meaning they assigned to telehealth.

Results: There were 24 articles included in the scoping review. Most studies (70%, n = 16) assessed rural telehealth patient experience using questionnaires, alone or in combination with interviews (n = 11). The majority of surveys were study-developed. Most studies employed convenience sampling (n = 18). Quantitative patient experience outcomes fell under categories of

patient satisfaction, telehealth care characteristics, patient-provider rapport, technology elements, and access. In scoping review studies, qualitative themes were most often presented as telehealth benefits and drawbacks. Findings from the demographic analysis showed that the most rural telehealth patients were older, and a higher proportion were White. Although patients who were American Indian, Asian, Black, and Latino together comprised 25% of the sample, this was lower than the average of rural counties in California. Video visit use and patient portal activation were significantly lower among patients who were older, Latino race or ethnicity, primary Spanish speakers, and publicly insured. Spanish-speaking patients had the lowest use of video telehealth visits. In the qualitative study, participants' valuations of telehealth were informed by their experiences of rural healthcare scarcity and remote rural living. Interview participants all experienced telehealth as a positive healthcare service, which was seen as a resource to support rural healthcare access and a rural way of life.

Conclusion: Findings of this dissertation study substantiate concerns of rural telehealth access disparities, particularly among patients who are older, of minoritized race or ethnicity, and Spanish-speaking. Ongoing research is needed to understand how underserved rural populations are utilizing telehealth, as well as to understand variation in utilization between regions and healthcare settings. Findings from all three studies highlight the underrepresentation of populations of color in rural telehealth research. Future research should use sampling methods to account for representation of rural population subgroups specific to study regions. To help remedy rural telehealth utilization disparities, policy should address patient-level telehealth barriers by supporting measures such as healthcare navigation resources, culturally tailored telehealth patient outreach, digital access assessment, and patient digital education. Policy should also support telehealth infrastructure and development in rural safety net providers.

Table of Contents

List of Figures

List of Tables

Chapter 1

Introduction to the Dissertation

Introduction

As of the 2020 Census, fourteen percent of the population of the United States—roughly 46 million individuals—was living in rural areas [1]. Defined by the US Census Bureau as any area with a population density less than 1,000 people per square mile [2], rural areas comprise 85% of land area in the United States [3]. Rural populations in this country face significant challenges accessing healthcare [3-7]. Healthcare availability is insufficient in many rural areas as a result of long-term trends in rural healthcare provider shortages, health system affiliation, and closure of rural healthcare facilities [3, 8-11]. Inadequate healthcare access contributes to a higher burden of morbidity and mortality for rural populations compared to urban populations [5, 12-14]. Furthermore, rural American Indians and people of color, who comprise roughly 20% of rural residents, experience a disproportionate share of rural healthcare disparities [3, 15-17].

Virtual or remote care has been proposed as one option to increase healthcare access for underserved rural populations, by connecting rural patients with healthcare services where they exist. Broadly known as telehealth, this mode of healthcare delivery uses information and communication technologies to remotely connect healthcare professionals to consumers for a healthcare encounter [18, 19]. In addition to increasing healthcare access, telehealth is also promoted to reduce cost and meet healthcare consumers' expectations for convenience [18, 20-22].

Given such potential, telehealth use has been gradually expanding since the turn of the century, with a majority of healthcare institutions estimated to use telehealth as of 2016 [23], and three-quarters of U.S. hospitals using telehealth by 2017 [24]. Gradual trends in telehealth adoption were accelerated at the outset of the coronavirus disease (COVID-19) pandemic due to the necessity of social distancing and conserving limited healthcare resources. The rapid

expansion of telehealth was supported by the Coronavirus Aid, Relief, and Economic Security Act (2020) and waivers from the Centers for Medicare and Medicaid services, which removed restrictions and expanded reimbursement for telehealth [25-27]. However, despite the promises of telehealth and the recent extensive mobilization of this modality, evidence is emerging that without specific attention to ensuring equitable access, telehealth may fail to meet its potential for rural populations, particularly disadvantaged groups [28-30].

Background

Rural populations in the United States experience multiple substantial health disparities. Health disparities or inequities are preventable differences in health outcomes that occur systematically across social groups with differential access to resources and power [31]. Rural health disparities are evident across a variety of indicators and are most plainly apparent in national mortality statistics [32]. Between the periods of 1969–1971 and 2005–2009 [32], a disparity in life expectancy between urban and rural populations grew from 0.4 years in the first period (70.9 vs 70.5 years, respectively) to 2.0 years in the latter period (78.8 vs 76.8 years, respectively). Compared to urban residents, rural residents in the United States have higher age-adjusted death rates due to the five leading causes of death [33]. The most rural counties also had the highest all-cause death rates for working-age adults 25 to 64 years old [5]. And compared to rural White populations, the rural mortality penalty has been shown to be more pronounced among American Indian communities and some communities of color [15, 16], who experience particular historical and structural barriers to realizing health [17].

Healthcare workforce shortages in rural areas limit access to healthcare and contribute to rural health disparities [5, 9, 33, 34]. Research indicates that these shortages are complex and have persisted over time. In 2019, slightly more family physicians practiced in non-metropolitan

counties than in metropolitan counties, with 47.4 versus 41.7 per 100,000 population, respectively [9]. However, a rural-urban gap was evident among primary care providers overall, with 89.4 percent practicing in metropolitan counties and only 10.6 percent in non-metropolitan counties [9]. Further, although the overall number of primary care providers increased in both rural and urban counties from 2009 to 2017, the rate of increase was greater in urban counties than in rural counties [35]. The urban-rural gap is even more pronounced among specialist physicians [5]. Compared to the most rural counties, the most urban counties had approximately four times as many obstetricians and gynecologists (16 versus 3 per 100,000 population) and six times as many general pediatricians and general internists (25 versus 4 per 100,000 and 50 versus 9 per 100,000, respectively). For specialists including neurologists, anesthesiologists, and psychiatrists, the most urban counties have almost nine times as many specialists as the most rural counties, with 263 versus 30 per 100,000 population, respectively [5]. And rural behavioral health practitioners are especially scarce: as of 2015, 65% of non-metropolitan counties lacked psychiatrists and 81% lacked psychiatric nurse practitioners, while 17% of the most rural counties (i.e., non-core counties) were completely without any behavioral health providers [11].

Telehealth has the potential to help redress rural healthcare shortages and related health disparities by connecting rural patients to distant healthcare services [34]. In support of this potential, telehealth has been found to have comparable or improved clinical outcomes to in-person care in various settings [36]. Evidence reviews have found telehealth to be acceptable to patients, with high satisfaction related to increased healthcare access, cost savings, usefulness, and savings in travel time and costs [37, 38]. Positive patient assessments were also reported in reviews of telehealth in rural settings both globally [39] and in the United States [40]. Telehealth has been in use in the form of store-and-forward technologies since the 1980s, but the advent of

the internet in the 1990s drastically increased its scope and utilization [29]. After decades of gradual growth, the COVID-19 pandemic pushed telehealth into daily, mainstream usage across clinical areas and healthcare populations. From 2019 to 2020, the number of Medicare reimbursed telehealth visits increased 63-fold, from 840,000 to 52.7 million annual visits [41], while telehealth utilization increased 20-fold among employer-based health plans [42].

However, research has demonstrated that pre-existing rural-urban disparities in telehealth utilization in the United States were not redressed by the COVID-19 expansion. In the period from 2014 to 2018, the proportion of private insurance claims for out-patient visits provided via telehealth increased more rapidly in urban versus rural zip codes [43]. This trend continued during the expansion related to COVID-19, with lower telehealth use for rural populations compared to urban populations in the year 2020 [41, 42]. Furthermore, greater telehealth uptake was found in households with higher incomes [43] and in counties with lower county poverty levels [42]. Lower telehealth uptake has also been associated with age over 55 years and higher comorbidity burden [43], whereas lower individual levels of education have been linked to less willingness to use telehealth [44]. These findings are significant given the lower overall income and education levels, and greater age and disease burden, among rural populations [5, 45, 46]. Finally, higher rates of telephone visits have been reported among patients who are older, of minoritized race or ethnicity, and rural dwelling [47-51], and it is unclear whether audio-only telehealth supports similar care quality as video modalities [52, 53]. These studies raise concerns that telehealth expansion may perpetuate or worsen existing rural disparities in health and healthcare access [28-30].

Problem Statement

Research has demonstrated the feasibility and clinical effectiveness of telehealth, as well as patient satisfaction with this modality, including among rural patients. Despite these encouraging findings, evidence shows that telehealth uptake among rural populations has not matched levels in non-rural settings and populations. Patient demographic characteristics such as age, income, socioeconomic status, and race or ethnicity have also been shown to have complex relationships with both telehealth use overall and video visit use specifically. Moreover, telehealth applications continue to expand and evolve. As a result of these shifts, patient experiences are changing and presenting new challenges for healthcare delivery.

For a healthcare modality to be effective, it must be deemed acceptable by its target population. To support acceptance and quality, healthcare services should reflect the values and perceived needs of healthcare consumers [54-56]. If telehealth is to increase healthcare access for underserved rural populations, it is necessary to understand the expectations that rural patients have for telehealth, as well as their direct experiences with telehealth. However, low-quality research limits knowledge of rural patients' use and experiences of telehealth [36]. Comprehensive research is needed to understand rural patients' experiences with telehealth, to support healthcare quality, patient-centered care, and effective rural telehealth policy.

Theoretical Frameworks

My approach to the design and development of this study was guided by two theoretical frameworks: technology-enhanced strong structuration theory [TESST; 57] and Miles' and Snow's organizational theory of strategic management [58]. TESST describes the discursive relationship between actors, structures, and technology and has been developed and applied by its authors specifically to study technological innovation in healthcare.

Miles and Snow (1978/2003) developed a typology to categorize organizational actors' strategic behavior, describing how they perceive and respond to changes in the market or environment along dimensions of innovation, efficiency, and flexibility [59, 60]. Miles' and Snow's strategic adaptation theory can provide a focusing lens to narrow the identification and analysis of the structures that TESST brings attention to (Figure 1.1). This provides a structure that situates the study of telehealth services in the broader contexts of a healthcare organization and supports the application of study findings to healthcare organization strategic behavior and healthcare policy.

Purpose and Aims

The purpose of this mixed-methods study is to contribute understanding of the patient experiences, demographic characteristics, and telehealth utilization of rural telehealth patients. Therefore, the specific aims of this study are to:

1. Describe and assess the existing scientific literature evaluating rural patient experiences utilizing video telehealth services in the United States.
2. Describe demographic and telehealth utilization characteristics of rural-dwelling telehealth patients at a large urban health system and explore the relationship between these characteristics and degree of patient rurality.
3. Explore rural patients' lived experiences utilizing telehealth services, in particular how participants' rural life contexts shape these experiences and their perceived benefits, barriers, and facilitators to using telehealth.

Organization of the Dissertation

This dissertation consisted of three parts to meet the specific aims. Study results have been presented as manuscripts for publication, which make up the body of this dissertation.

Chapter Two details the conduct and results of a systematic scoping review. The purpose of the review was to explore how rural patient experiences with video telehealth in the United States have been evaluated in healthcare research. The relevant scientific literature is assessed, and rural telehealth patient experience outcomes are summarized. Review findings are considered in the broader context of current literature, practice, and policy. Research gaps and recommendations are also discussed.

Chapter Three presents the findings of a descriptive analysis of demographic and telehealth utilization data for patients of a large urban academic health system residing in rural zip codes with a telehealth visit in the one-year period from December 2021 to December 2022. The USDA Economic Research Service's 2010 Rural-Urban Commuting Area (RUCA) Codes were applied to patient zip codes to determine rurality, using the Washington, Wyoming, Alaska, Montana, Idaho (WWAMI) Rural Health Research Center's (RHRC) publicly available database of zip code RUCA approximations (see Appendix). RUCA Codes were also used to group patients by zip codes into three levels of rurality, to explore the relationship of degree of rurality to demographics and telehealth use.

Chapter Four presents the findings of a qualitative analysis using an interpretive phenomenological method to study rural patients' experiences with using telehealth. In-depth, semi-structured interviews with 16 telehealth users asked participants to reflect on how telehealth fits into their healthcare in the context of living rurally. Results of data analysis and interpretation are presented thematically. Chapter Five considers findings of the dissertation as a whole and discusses implications for healthcare practice, research, and policy.

Significance

The contribution this study makes is significant for several areas of practice, research, and policy concern. First, a review of available literature provides a picture of current approaches to studying rural patients' experiences with telehealth, as well as comprehensive understanding of these patient experiences and outcomes. Demographic analysis of a population of rural telehealth patients will provide information on who is accessing telehealth and how it is being used, offering a point of comparison to other patient populations, both rural and urban. This knowledge can inform interventions to increase access and point to areas of research priority. Qualitative patient experience findings can help guide telehealth practice and management decisions for rural providers and clinics, to support positive patient experiences with care and hence effective, accessible telehealth care.

Finally, considering quantitative and qualitative outcomes together can contextualize the results of both studies. Quantitative findings provide a broad picture of a population of rural telehealth characteristics, supporting a more detailed contextualization of qualitative patient experiences, which in turn provide nuance to quantitative demographic results. Areas of agreement and divergence between the two studies may provide different understandings of findings, reveal data and methodological limitations, and illuminate important topics for further inquiry.

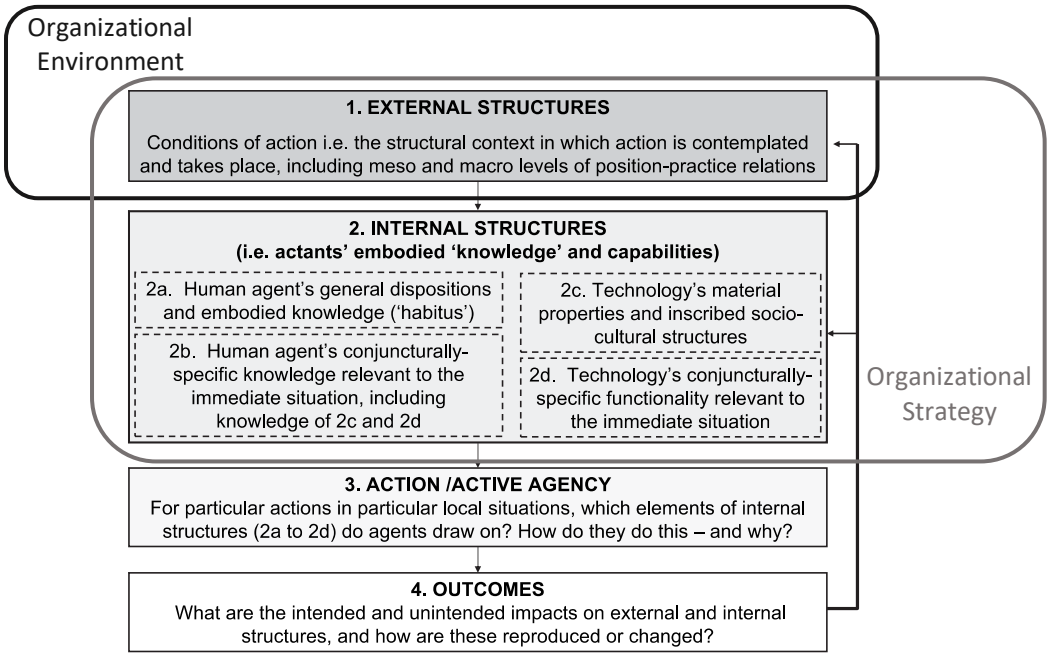

Figure 1.1: Theoretical Frameworks: Overlay of Organizational Theory on TESST
Miles' and Snow's organizational theory of strategic management applied to the quadripartite of Technology-Enhanced Strong Structuration Theory. Box 1 of the quadripartite, *external structures*, can be narrowed to consideration of the *organizational environment* as described by Miles and Snow. Box 1 and in particular Box 2, *internal structures*, can be understood as elements of organizational strategy.

References

1. Johnson KM, Lichter DT. Growing racial diversity in rural America: Results from the 2020 Census. Durham, NH. Carsey School of Public Policy, University of New Hampshire; 2022. National Issue Brief #163.

2. Ratcliffe M, Burd C, Holder K, Fields A. Defining rural at the US Census Bureau: American community survey and geography brief. United States Census Bureau 2016 (ACSGEO-1).

3. Barton B, Romsai TB, Hahn C. Chartbook on Rural Healthcare: National Healthcare Quality and Disparities Report. Agency for Healthcare Research and Quality; Rockville, MD; 2021 November. AHRQ Pub. No. 22-0010. PMID: 35263059.

4. Henning-Smith CE. Determinants of health in rural communities. In: Inungu JN, Minelli MJ, editors. Foundations of rural public health in America. Burlington, MA: Jones & Bartlett Learning; 2021. p. 17-29.

5. Meit M, Knudson A, Gilbert T, Tzy-Chyi Yu A, Tanenbaum E, Ormson E, et al. The 2014 update of the rural-urban chartbook. Rural Health Reform Policy Research Center; 2014 October.

6. National Quality Forum . A core set of rural-relevant measures and measuring and improving access to care: 2018 recommendations from the MAP Rural Health Workgroup. Washington, DC.: National Quality Forum; 2018 Aug. 31.

7. Douthit N, Kiv S, Dwolatzky T, Biswas S. Exposing some important barriers to health care access in the rural USA. Public Health. 2015;129(6):611-20. doi: 10.1016/j.puhe.2015.04.001.

8. O'Hanlon CE, Kranz AM, DeYoreo M, Mahmud A, Damberg CL, Timbie J. Access, quality, and financial performance of rural hospitals following health system affiliation. Health Affairs. 2019;38(12):2095-104. doi: 10.1377/hlthaff.2019.00918.

9. Larson E, Andrilla C, Garberson L. Supply and distribution of the primary care workforce in rural America: 2019. Seattle, WA.: WWAMI Rural Health Research Center, University of Washington; 2020 June. Policy brief #167.

10. Larson E, Andrilla H, Kearney J, Garberson L, Patterson D. The distribution of the general surgery workforce in rural and arban America in 2019. Seattle, WA. WWAMI Rural Health Research Center, University of Washington; 2021 March. Policy Brief.

11. Larson EH, Patterson DG, Garberson LA, Andrilla CHA. Supply and distribution of the behavioral health workforce in rural America. Seattle, WA. Data Brief #160: WWAMI Rural Health Research Center, University of Washington; 2016 September. Data Brief #160.

12. Curtin SC, Spencer MR. Trends in death rates in urban and rural areas: United States, 1999-2019. National Center for Health Statistics; Hyattsville, MD; 2021 September. NCHS Data Brief No. 417. p. 1-8. PMID: 34582331.

13. Garcia MC, Rossen LM, Bastian B, Faul M, Dowling NF, Thomas CC, et al. Potentially excess deaths from the five leading causes of death in metropolitan and nonmetropolitan counties - United States, 2010-2017. MMWR Surveill Summ. 2019 Nov 8;68(10):1-11. PMID: 31697657. doi: 10.15585/mmwr.ss6810a1.

14. Yaemsiri S, Alfier JM, Moy E, Rossen LM, Bastian B, Bolin J, et al. Healthy People 2020: Rural areas lag in achieving targets for major causes of death. Health Aff (Millwood). 2019 Dec;38(12):2027-31. PMID: 31794308. doi: 10.1377/hlthaff.2019.00915.

15. Henning-Smith CE, Hernandez AM, Hardeman RR, Ramirez MR, Kozhimannil KB. Rural counties with majority Black Or Indigenous Populations suffer the highest rates of premature death in the US. Health Aff (Millwood). 2019 Dec;38(12):2019-26. PMID: 31794313. doi: 10.1377/hlthaff.2019.00847.

16. James CV, Moonesinghe R, Wilson-Frederick SM, Hall JE, Penman-Aguilar A, Bouye K. Racial/ethnic health disparities among rural adults—United States, 2012–2015. MMWR Surveillance Summaries. 2017;66(23):1. PMID: 29145359. doi: 0.15585/mmwr.ss6623a1.

17. Kozhimannil KB, Henning-Smith C. Racism and health in rural America. Journal of Health Care for the Poor and Underserved. 2018;29(1):35-43. doi: 10.1353/hpu.2018.0004.

18. Dorsey ER, Topol EJ. State of telehealth. N Engl J Med. 2016;375(2):154-61. doi: 10.1056/NEJMra1601705.

19. World Health Organization . Telemedicine: opportunities and developments in member states. Report on the second global survey on eHealth. Geneva, CH: World Health Organization; 2010. ISBN: 9241564148.

20. Lin C-CC, Dievler A, Robbins C, Sripipatana A, Quinn M, Nair S. Telehealth in health centers: key adoption factors, barriers, and opportunities. Health Affairs. 2018;37(12):1967-74. doi: 10.1377/hlthaff.2018.05125.

21. Nelson R. Telemedicine and telehealth: The potential to improve rural access to care. AJN The American Journal of Nursing. 2017;117(6):17-8. doi: 10.1097/01.NAJ.0000520244.60138.1c.

22. Tuckson RV, Edmunds M, Hodgkins ML. Telehealth. New England Journal of Medicine. 2017;377(16):1585-92. doi: 10.1056/NEJMsr1503323.

23. U.S. Department of Health and Human Services Report to Congress: E-health and telemedicine. 2016.

24. American Hospital Association Fact Sheet: Telehealth. 2019.

25. Demeke HB, Merali S, Marks S, Pao LZ, Romero L, Sandhu P, et al. Trends in use of telehealth among health centers during the COVID-19 pandemic—United States, June 26-November 6, 2020. MMWR Morb Mortal Wkly Rep. 2021;70(7):240-4. doi: 10.15585/mmwr.mm7007a3.

26. Totten AM, McDonagh MS, Wagner JH. The evidence base for telehealth: Reassurance in the face of rapid expansion during the COVID-19 Pandemic. White Paper Commentary. Rockville, MD. Agency for Healthcare Research and Quality; 2020 May. AHRQ Publication No. 20-EHC015.

27. Centers for Medicare & Medicaid Services . Medicare Telemedicine Health Care Provider Fact Sheet. 2020 [April 21, 2023].

28. Hirko KA, Kerver JM, Ford S, Szafranski C, Beckett J, Kitchen C, et al. Telehealth in response to the COVID-19 pandemic: Implications for rural health disparities. Journal of the American Medical Informatics Association. 2020;27(11):1816-8. doi: 10.1093/jamia/ocaa156.

29. Kichloo A, Albosta M, Dettloff K, Wani F, El-Amir Z, Singh J, et al. Telemedicine, the current COVID-19 pandemic and the future: a narrative review and perspectives moving forward in the USA. Family Medicine and Community Health. 2020;8(3):e000530. doi: 10.1136/fmch-2020-000530.

30. Zhai Y. A call for addressing barriers to telemedicine: health disparities during the COVID-19 pandemic. Psychotherapy and Psychosomatics. 2020:1. doi: 10.1159/000509000.

31. Braveman P. Health disparities and health equity: concepts and measurement. Annual Review of Public Health. 2006;27:167-94. PMID: 16533114. doi: 10.1146/annurev.publhealth.27.021405.102103.

32. Singh GK, Siahpush M. Widening Rural–Urban Disparities in Life Expectancy, U.S., 1969–2009. American Journal of Preventive Medicine. 2014 2014/02/01/;46(2):e19-e29. doi: 10.1016/j.amepre.2013.10.017.

33. Moy E, Garcia MC, Bastian B, Rossen LM, Ingram DD, Faul M, et al. Leading causes of death in nonmetropolitan and metropolitan areas—United States, 1999-2014. MMWR CDC Surveill Summ. 2017 Jan 13;66(1):1-8. PMID: 28081058. doi: 10.15585/mmwr.ss6601a1.

34. Burrows E, Suh R, Hamman D. Policy Brief: Health Care Workforce Distribution and Shortage Issues in Rural America. . 2012.

35. Zhang D, Son H, Shen Y, Chen Z, Rajbhandari-Thapa J, Li Y, et al. Assessment of Changes in Rural and Urban Primary Care Workforce in the United States From 2009 to 2017. JAMA Network Open. 2020;3(10):e2022914-e. doi: 10.1001/jamanetworkopen.2020.22914.

36. Totten AM, Hansen RN, Wagner J, Stillman L, Ivlev I, Davis-O'Reilly C, et al. Telehealth for acute and chronic care consultations. Comparative Effectiveness Review. Rockville, MD: Agency for Healthcare Research and Quality, 2019 No. 216.

37. Kruse CS, Krowski N, Rodriguez B, Tran L, Vela J, Brooks M. Telehealth and patient satisfaction: A systematic review and narrative analysis. BMJ Open. 2017;7(8). doi: 10.1136/bmjopen-2017-016242.

38. Aashima, Nanda M, Sharma R. A review of patient satisfaction and experience with telemedicine: A virtual solution during and beyond COVID-19 pandemic. Telemed J E Health. 2021;27(12):1325-31. doi: 10.1089/tmj.2020.0570.

39. Orlando JF, Beard M, Kumar S. Systematic review of patient and caregivers' satisfaction with telehealth videoconferencing as a mode of service delivery in managing patients' health. PLoS One. 2019;14(8). doi: 10.1371/journal.pone.0221848.

40. Butzner M, Cuffee Y. Telehealth interventions and outcomes across rural communities in the United States: Narrative review. J Med Internet Res. 2021;23(8). doi: 10.2196/29575.

41. Samson LW, Tarazi W, Turrini G, Sheingold S. Medicare beneficiaries' use of telehealth in 2020 — Trends by beneficiary characteristics and location. Washington, DC. : Office of the Assistant Secretary for Plannnig and Evaluation, U.S. Department of Health and Human Services; 2021 December. Issue Brief No. HP-2021-27.

42. Cantor JH, McBain RK, Pera MF, Bravata DM, Whaley CM. Who is (and is rot) receiving telemedicine care during the COVID-19 pandemic. Am J Prev Med. 2021 2021/09/01/;61(3):434-8. doi: 10.1016/j.amepre.2021.01.030.

43. Poeran J, Cho LD, Wilson L, Zhong H, Mazumdar M, Liu J, et al. Pre-existing disparities and potential implications for the rapid expansion of telemedicine in response to the coronavirus disease 2019 pandemic. Med Care. 2021 Aug 1;59(8):694-8. PMID: 34054024. doi: 10.1097/mlr.0000000000001585.

44. Fischer SH, Ray KN, Mehrotra A, Bloom EL, Uscher-Pines L. Prevalence and characteristics of telehealth utilization in the United States. JAMA Network Open. 2020;3(10):e2022302-e. doi: 10.1001/jamanetworkopen.2020.22302.

45. Henning-Smith C, Hernandez A, Neprash H, Lahr M. Differences by rurality in satisfaction with care among Medicare beneficiaries. The Journal of Rural Health. 2021;37(1):114-23. doi: 10.1111/jrh.12423.

46. National Academies of Sciences Engineering and Medicine Achieving Rural Health Equity and Well-Being: Proceedings of a Workshop. 2018.

47. Benjenk I, Franzini L, Roby D, Chen J. Disparities in audio-only telemedicine use among Medicare beneficiaries during the Coronavirus Disease 2019 Pandemic. Med Care. 2021 Nov 1;59(11):1014-22. PMID: 34534186. doi: 10.1097/mlr.0000000000001631.

48. Chen J, Li KY, Andino J, Hill CE, Ng S, Steppe E, et al. Predictors of audio-only versus video telehealth visits during the COVID-19 pandemic. J Gen Intern Med. 2022 Apr;37(5):1138-44. PMID: 34791589. doi: 10.1007/s11606-021-07172-y.

49. Hsiao V, Chandereng T, Huebner JA, Kunstman DT, Flood GE, Tevaarwerk AJ, et al. Telemedicine use across medical specialties and diagnoses. Appl Clin Inform. 2023 Jan;14(1):172-84. PMID: 36858112. doi: 10.1055/s-0043-1762595.

50. Hsiao V, Chandereng T, Lankton RL, Huebner JA, Baltus JJ, Flood GE, et al. Disparities in telemedicine access: A cross-sectional study of a newly established infrastructure during the COVID-19 pandemic. Appl Clin Inform. 2021;12(03):445-58. doi: 10.1055/s-0041-1730026.

51. Lee EC, Grigorescu V, Enogieru I, Smith SR, Samson LW, Conmy AB, et al. Updated national survey trends in telehealth utilization and modality (2021-2022). Washington, DC.: Office of the Assistant Secretary for Planning and Evaluation, US Department of Health and Human Services; 2023 April. Issue Brief No. HP-2023-09.

52. Chang JE, Lai AY, Gupta A, Nguyen AM, Berry CA, Shelley DR. Rapid transition to telehealth and the digital divide: Implications for primary care access and equity in a post-COVID era. Milbank Q. 2021;99(2):340-68. doi: 10.1111/1468-0009.12509.

53. Juergens N, Huang J, Gopalan A, Muelly E, Reed M. The association between video or telephone telemedicine visit type and orders in primary care. BMC Med Inform Decis Mak. 2022 Nov 19;22(1):302. PMID: 36403030. doi: 10.1186/s12911-022-02040-z.

54. Anhang Price R, Elliott MN, Zaslavsky AM, Hays RD, Lehrman WG, Rybowski L, et al. Examining the role of patient experience surveys in measuring health care quality. Med Care Res Rev. 2014;71(5):522-54. doi: 10.1177/1077558714541480.

55. Frank L, Basch E, Selby JV. The PCORI perspective on patient-centered outcomes research. JAMA. 2014;312(15):1513-4. doi: 10.1001/jama.2014.11100.

56. Santana MJ, Manalili K, Zelinsky S, Brien S, Gibbons E, King J, et al. Improving the quality of person-centred healthcare from the patient perspective: development of person-centred quality indicators. BMJ Open. 2020 Oct 29;10(10):e037323. PMID: 33122312. doi: 10.1136/bmjopen-2020-037323.

57. Greenhalgh T, Stones R. Theorising big IT programmes in healthcare: Strong structuration theory meets actor-network theory. Social Science & Medicine. 2010;70(9):1285-94. doi: 10.1016/j.socscimed.2009.12.034.

58. Miles RE, Snow CC. Organizational Strategy, Structure, and Process. Stanford, CA: Stanford University Press; 1978/2003.

59. Parnell JA, Wright P. Generic Strategy and Performance: an Empirical Test of the Miles and Snow Typology. British Journal of Management. 1993;4(1):29-36. doi: 10.1111/j.1467-8551.1993.tb00159.x.

60. Scott WR, Davis GF. Organizations and organizing: Rational, natural, and open system perspectives: Pearson Prentice Hall; 2007.

Chapter 2

Rural Patients' Experiences with Synchronous Video Telehealth in the United States: A Scoping Review

Abstract

Background: Telehealth can help increase rural healthcare access. To ensure this modality is accessible for rural patients, it is necessary to understand rural patients' experiences with telehealth. Objectives of this scoping review were to explore how rural patients' telehealth experiences have been measured, assess relevant research, and describe rural telehealth patient experiences.

Methods: We searched five databases for articles published from 2016 through 2022. Primary research reports assessing rural adult patient experiences with synchronous video telehealth in the United States in any clinical area were included. Data collected pertained to study characteristics and patient experience assessment characteristics and outcomes. Quality of included studies was assessed using the Quality Assessment with Diverse Studies tool. Review findings were presented in a narrative synthesis.

Results: There were 740 articles identified for screening, and 24 met review inclusion criteria. Most studies (70%, $n = 16$) assessed rural telehealth patient experience using questionnaires; studies employed interviews ($n = 11$) alone or in combination with surveys. The majority of surveys were study-developed and not validated. Quantitative patient experience outcomes fell under categories of patient satisfaction, telehealth care characteristics, patient-provider rapport, technology elements, and access. Qualitative themes were most often presented as telehealth benefits or facilitators and drawbacks or barriers.

Conclusions: Available research indicates positive patient experiences with rural telehealth services. However, study weaknesses limit generalizability of findings. Future research should apply established definitions for participant rurality and clearly group samples by rurality. Efforts should be made to use validated telehealth patient experience measures.

Introduction

In the rural United States, inadequate healthcare access is a persistent issue that contributes to poor health outcomes for rural populations [1-5]. Telehealth can increase healthcare access for underserved rural populations by connecting patients to healthcare services where they exist [6, 7]. The previously gradual expansion of telehealth in the United States was rapidly accelerated by the advent of the coronavirus disease (COVID-19) pandemic, when the need to reduce virus transmission and triage healthcare required a rapid transition to virtual care [8]. This transition was supported at the outset of the pandemic by Centers for Medicare & Medicaid Services (CMS) waivers, which removed restrictions and expanded reimbursement for many telehealth services [9]. Following these regulatory changes, the number of Medicare reimbursed telehealth visits increased 63-fold from 2019 to 2020, from 840,000 to 52.7 million annual visits [10]. Private payers quickly followed CMS to expand telehealth reimbursement, further enabling the telehealth expansion [11]: In the first three months of the pandemic, telehealth encounters accounted for 23.6% of ambulatory care visits among privately insured adults, up from 0.3% of visits in the same period a year previous, March to June, 2019 [12].

While telehealth usage has declined since peak pandemic levels, a greater share of care continues to be provided virtually than before 2020 [13, 14]. However, evidence shows there has been lower telehealth uptake within the United States among some underserved groups, including rural populations [10, 13, 15-17]. Furthermore, video telehealth utilization has been lower among patients who are older [17-20], lower income [17, 21], less educated [17, 22, 23], rural dwelling [18, 20, 24, 25], and Black [17-20, 26] or Hispanic or Latino [17, 20, 22, 26]. Although multiple barriers influence telehealth use disparities, rural patient experiences are a central component that must be understood to support optimal telehealth utilization [27-29].

Previous research has described telehealth patient experiences, including several systematic reviews. Findings from a 2017 review by Kruse et al. [30] indicate overall positive telehealth patient experiences across clinical areas and applications, with ease of use, cost savings, improved access, and decreased travel identified among factors supporting patient satisfaction. Orlando et al. [31] found similarly high patient and caregiver telehealth satisfaction among global rural and remote populations. Butzner and Cuffee [32] conducted a narrative review of studies in rural settings published up to 2019, and identified positive patient, caregiver, and provider experiences with eHealth modalities including video, provider consult, and wearable devices. And more recently, a number of evidence syntheses report positive telehealth patient experiences across health conditions [33] and for specific applications, such as with older adults [34], rural telerehabilitation patients [35], orthopedics [36], and palliative care [37].

However, to our knowledge no review has focused on patient experiences with video-only telehealth for rural utilizers in the United States. This is significant given structural factors that shape rural healthcare in this country, including its mixes of private and public payers and state and federal regulation, which impact healthcare organization and reimbursement. Specific features of rurality in the United States, such as extensive land area, large total rural population, and heterogeneous rural regions, also shape U.S. rural culture and healthcare access. And as research indicates rurality influences how individuals conceptualize health and utilize healthcare [38-41], it is important to understand rural-specific telehealth patient experiences.

Video encounters provide distinct experiences from audio-only encounters, make up a majority of telehealth visits [17], and most closely approximate in-person care, while uncertainty remains around future reimbursement for audio-only services [42]. These factors merit reviewing video telehealth experiences independently. Additionally, methods for measuring telehealth

patient experiences differ widely and are reported on with varying completeness [34, 43]. Finally, many reviews precede the COVID-19 pandemic and accompanying surge in telehealth research, warranting an up-to-date review.

Objectives

Given these gaps in the literature, we developed two questions to guide this scoping review:

1) How have rural patient experiences with synchronous patient-to-provider video telehealth in the United States been measured?
2) How do rural patients in the United States experience synchronous video telehealth?

Our objectives were to review relevant scientific literature, focusing on methods of assessing patient experience; critically appraise available studies; and describe rural patients' experiences with video telehealth services in the United States. Finally, we aimed to identify evidence gaps and future directions for research.

Methods

This scoping review was conducted according to guidance from the Joanna Briggs Institute [44] and reported according to the statement on Preferred Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews, PRISMA-ScR [45].

Eligibility Criteria

Population, concept, and context guided development of inclusion and exclusion criteria [44, 46]. To meet review objectives, studies had to examine adult utilizers of video telehealth. Studies with rural or mixed rural-urban samples were eligible, with any study-provided definition of rural area or population accepted. Studies of synchronous, patient-to-provider video telehealth were included; mixed telehealth modalities were included if patient video experience

outcomes were reported separately. Any patient experience measure or assessment pertaining to video telehealth was accepted. All telehealth applications, clinical areas, and providers were included. All study designs were included, and sources were not screened based on quality [45, 47]. However, only primary research reports were included.

Studies were excluded if the sample was entirely non-rural, included pediatric patients, or included caregivers without reporting patient findings separately. Also excluded were studies in which telehealth modality was limited to asynchronous, text, or audio-only communication; provider-to-provider consult; store-and-forward; mHealth, such as mobile applications or wearable devices; or other virtual health technologies. Studies that only addressed non-users' hypothetical attitudes or beliefs about telehealth were excluded. We excluded studies from countries outside the United States. Database searches were limited to full-text, English articles, published from January 1, 2016, to December 31, 2022, to balance the expansion of telehealth research following the COVID-19 pandemic.

Information Sources and Search Strategy

Five databases were searched: PubMed, Embase, CINAHL, Web of Science, and the Cochrane Library. Initial PubMed searches identified relevant keywords, Medical Subject Heading (MeSH) terms, and existing systematic reviews. Informed by these results, the following basic search strategy was constructed:

((patient experience OR qualitative research) AND telehealth AND rural populations)

The full PubMed search strategy (Table 2.1) used multiple synonyms for each term in a combination of keywords and MeSH terms. Other database search strategies were based on the PubMed search. Reference lists of included articles were also searched.

Study Selection

Identified citations were uploaded to Covidence (Melbourne, Australia), a web-based systematic review management program, and duplicate sources were removed. A study selection table of inclusion and exclusion criteria (Microsoft Word) was piloted during title and abstract screening with 20 studies. Using the study selection form and Covidence, the lead author screened titles and abstracts to identify studies for full-text review, then used the study selection tool to select full-text articles for inclusion. The senior author reviewed all inclusion and exclusion decisions, and discrepancies were resolved through discussion.

Data Items, Charting, and Presentation

Consistent with review objectives, data extraction focused on telehealth patient experience assessment; other outcomes (e.g., symptom assessments, feasibility) are not reported here. Study characteristics extracted were design, purpose, setting, and period; outcomes assessed; and data sources and collection. Population data collected were sample characteristics and definition of rurality. Telehealth intervention, measure or assessment of patient experience, patient experience data analysis, and patient experience findings comprised concept data items. Study context data regarding clinical focus area, provider type, and originating (patient) and distant (provider) site were collected. Period of data collection relative to the start of COVID-19 stay-at-home orders in March of 2020 was also noted. Data items were charted in evidence tables by study characteristics, patient experience assessments, and patient experience outcomes.

Synthesis of Results

Quantitative patient experience measure items were analyzed by the lead author using qualitative content analysis [48, 49]. Informed by concepts from the patient-reported experience literature [50, 51] and telehealth evaluation literature [43, 52], quantitative outcomes were

categorized thematically to facilitate reporting of findings. Overall findings as they relate to review questions were summarized in a narrative synthesis.

Critical Appraisal of Included Studies

The decision to critically appraise included studies was supported by our objective [45, 47, 53] to assess research on rural telehealth experiences. Methodology and reporting of included studies were evaluated using the Quality Assessment with Diverse Studies (QuADS) tool [54], a 13-item measure with demonstrated reliability and validity [54, 55]. With QuADS appraisal, a score from zero to three is assigned for each criterion, for a maximum score of 39 points. Authors independently scored 14 articles, then discussed differences in ratings until consensus on scores was reached. The lead author completed scoring for the remaining 10 articles. QuADS scores are presented as a percentage out of 39.

Results

Study Selection

Results of study selection are displayed in Figure 1, the 2009 PRISMA Flow Diagram [56]. Database searches yielded 1,413 records. After 622 duplicate citations were removed, 791 records remained for title and abstract screening. One hundred-three records were identified for full-text review. Full-text screening excluded 83 articles (see Figure 1 for reasons), and four sources were identified from reference lists of included studies, yielding 24 articles included for review [57-80]. As the articles by Batsis et al. [2019; 57] and Batsis et al. [2020; 58] report on one study, this review includes 23 studies.

Characteristics of Included Studies

Study Design

Table 2.2 depicts characteristics of studies included in the review. Eleven studies used mixed methods designs [57-60, 63, 65-67, 70, 71, 74, 76], eight studies used quantitative designs [61, 62, 69, 72, 75, 78-80], and four used qualitative methods [64, 68, 73, 77]. Included sources described pilot studies [57, 58, 63, 67, 70, 71, 79, 80], evaluation projects [59, 74], a clinical demonstration project [61], a quality assurance project [62], and development of a clinical decision algorithm [68]. A range of clinical focus areas were represented, with mental health being the most common (n = 6) [59, 63, 67, 74, 79, 80]. Telehealth interventions included clinical assessment or consultation (*n* = 11) [60-62, 64-66, 68, 71-73, 76, 79], evidence-based psychotherapy (*n* = 6) [59, 63, 67, 74, 77, 80], and education (*n* = 3) [57, 58, 75, 78]. Telehealth models were direct-to-consumer (43%, *n* = 10) [57-59, 63, 64, 67, 68, 71, 74, 75, 80] or hub-and-spoke (39%, *n* = 9) [60-62, 65, 66, 73, 78, 79]. Five studies did not include an intervention but assessed participants' prior experiences with telehealth [65, 68-70, 73].

Seven studies included a comparison group: Ferucci et al. [65], Goldstein et al. [68], and Holtz et al. [70] compared telehealth users to non-users; Finley et al. [66] compared in-person to telehealth and rural to urban and suburban patients; Solomons et al. [78] compared in-person to telehealth patients; Greteman et al. [69] compared rural and urban telehealth users; and Whealin et al. [80] compared telehealth users' pre- and post-engagement telehealth attitudes. No studies compared participant experience by race or ethnicity, and no studies randomized group assignment. Twelve studies (52%) were conducted at U.S. Veterans Affairs (VA) healthcare systems across the United States [59, 61-63, 66-68, 72, 74, 75, 77, 80]. Three studies [68-70] conducted recruitment following March 2020 COVID-19 stay-at-home orders.

Sample Characteristics

Eighteen studies employed convenience sampling (78%). Study samples were overall small, with 11 studies (48%) reporting samples smaller than 50; samples ranged from $N = 7$ to $N = 10{,}009$ (Table 2.2). Study characteristics are shown in Table 2.3. Participants' mean age, reported in 14 studies, ranged from 45.5 years in mental health patients [59] to 83 years among ophthalmology patients [72]. In six studies, average age was less than 60 years [57-59, 67, 76, 78, 80]. The proportion of participants 75 years or older was higher in telecardiology patients than in-person cardiology patients in Finley et al. (43% vs. 31%, respectively) [66], and the average age of telehealth non-users in Goldstein et al. [68] was higher than telehealth users ($\mu = 69.1, \pm 8.7$ vs. $\mu = 64.5, \pm 9.0$, respectively). A larger proportion of telehealth non-users than telehealth users were over 50 years in Ferucci et al. (63% vs. 49%, respectively), [65] although this study found no statistically significant demographic differences between groups. In contrast, Solomons et al. [78] found telehealth patients were significantly more likely to be older ($p = .02$), have less education ($p = .006$), and live in a rural county ($p < .0001$) than in-person patients.

Greteman et al. [69] found that survey respondents from rural counties were significantly more likely to be older ($p = .002$), white ($p < .001$), and married ($p = .006$), with lower socioeconomic status ($p < .001$) than urban residents. Eight studies did not report sample race or ethnicity; of the 15 that did, eight consisted of 90% or more White participants. VA study samples displayed notably more racial and ethnic diversity. Nine studies reported participants' education levels. Participants with high school education or less averaged approximately 35% of samples in reporting studies and ranged from 61% of dialysis patients [60] to 7% of in-person genetics counseling patients [78]. More than half of studies that reported participants' sex (57%, 12 of 21) had samples that were less than 50% female; of these, nine were VA studies.

Participant Rurality

Eight studies [35%; 59, 63, 66, 68, 69, 74, 75, 78] reported the number of rural participants, which ranged from 55% to 100% of samples (Table 2.2). Only nine studies [39%; 57, 58-60, 66, 68-70, 75, 78] described how participant rurality was defined. Rurality was assigned by county [57, 58, 69, 70, 78], zip code [75], participant self-report [66], and by distance of telehealth remote site from telehealth provider site [60]. Fourteen studies (61%) did not define participant rurality; instead, participant rurality is presumed based on study setting.

Critical Appraisal of Included Studies

QuADS scores ranged from 35.9% [62] to 87.2% [70], with an average score of 66.6% (Table 2.2). Common areas of low QuADS scoring included not employing theoretical frameworks (QuADS criterion 1, average score = 0.4 on a scale of zero to three), not fully justifying analytic methods (criterion 10, $\mu = 1.6$), and not considering research stakeholders in study design or conduct (criterion 12, $\mu = 1.4$). Common strengths of included studies were research aims statements (criterion 2, $\mu = 2.6$), setting and target population descriptions (criterion 3, $\mu = 2.7$), appropriateness of study design to research aims (criterion 4, $\mu = 2.5$), and appropriateness of analytic method to research aims (criterion 11, $\mu = 2.6$). Scores varied considerably on rationale for chosen data collection tools (criterion 6, $\mu = 1.9$, mode = 2), but appropriateness of tools to meet study aims was overall well-rated (criterion 7, $\mu = 2.3$, mode 3; scores for all data collection measures, not just patient experience).

Assessment of Rural Telehealth Patient Experience

Details of patient experience assessments and patient experience data analysis are presented here and in Table 2.4. The majority of studies (70%, $n = 16$;) used questionnaires to collect patient experience data, including all quantitative studies. Mixed methods studies either

combined surveys with interviews [57-59, 70, 71], employed surveys with open-ended items [60, 66, 76], used interviews only [63, 67, 74] (quantitative strands addressed other outcomes), or conducted patient focus groups [65]. The four qualitative studies conducted semi-structured patient experience interviews [64, 68, 73, 77].

Patient experience surveys used Likert-scaled, yes/no or agree/disagree, and open-ended items, alone or in combination. Nine patient experience questionnaires [57-59, 61, 62, 65, 66, 70, 71, 79] were study-developed; comprehensiveness of patient experience measure descriptions and rationale ranged widely. Cheung et al. [60] used survey items adapted from two similar studies [81, 82], Greteman et al. [69] used study-developed and previously-validated items, and Holtz et al. [70] modified a survey from a similar study [83]. In addition to a study-developed patient survey, Batsis et al. [57, 58] employed the Yip Telemedicine Scale, a 15-item, Likert-scaled survey previously validated in a similar patient population [84]. Schlittenhardt et al. [76] used the Utah Telehealth Satisfaction survey, a validated measure with seven, five-point Likert-scaled items and one open-ended item. Solomons et al. [78] used two surveys with items adapted from the Yip Telemedicine and Utah Telehealth scales. Whealin et al. [80] used three VA-developed, standardized measures of telehealth patient experiences and perceptions.

Quantitative patient experience data analysis was frequently only descriptive in both quantitative and mixed methods studies, with five mixed methods studies [57, 58, 60, 65, 71, 76] using this method in quantitative strands (Table 2.4). The mixed methods study by Finley et al. [66] also used Chi squared analysis to assess differences in qualitative code frequencies between telehealth and in-person groups. Holtz et al. [70] employed ANOVA for group differences between telehealth users and non-users on outcomes of telehealth and in-person care perceptions. In three mixed methods studies, quantitative strands did not address patient experiences [63, 67,

74], and one did not report quantitative analysis [59]. Six quantitative studies [61, 62, 72, 75, 78, 79] employed only descriptive analysis, while in addition Whealin et al. [80] conducted paired *t*-tests of pre- to post-treatment patient telehealth perceptions, and Greteman et al. [69] used Chi squared analysis to test differences between rural and urban survey respondents.

Thematic analysis was most commonly used to analyze qualitative data, with five mixed methods studies [57, 58, 60, 66, 70, 76] and three qualitative studies [64, 73, 77] doing so. However, completeness in describing thematic analysis methodology varied. Other qualitative analyses were diverse, including rapid qualitative analysis [59, 67], matrix analysis [68], constant comparative analysis [71], and directed content analysis [74]. The mixed methods study by Ferucci et al. [65] used Grounded Theory methodology to analyze focus group data.

Patient Experience Outcomes Assessed

Seventeen included articles (74% of 24) dealt with telehealth patient experiences as a primary outcome (Table 2.5); the studies by Finley et al. [66] and Whealin et al. [80] dealt exclusively with telehealth patient experiences. Seven articles treated patient experience as a secondary outcome [58, 69, 72, 74, 76, 78, 79].Other primary outcomes included telehealth program feasibility (*n* = 10), [57, 59-62, 64, 67, 71, 74, 76] intervention or clinical outcomes (*n* = 8), [59, 67, 71, 75-79] and provider perspectives on telehealth (*n* = 6). [58, 63, 65, 68, 71, 73]

Quantitative patient experience measures were analyzed using qualitative content analysis, and five categories of patient experience outcomes were identified (Table 2.6). The first category, *patient satisfaction with telehealth*, addressed outcomes related to participants' expectations of and preferences for telehealth [85]. Outcomes under *characteristics of telehealth care* assessed telehealth's general practical elements. *Patient-provider rapport* was measured as outcomes of communication, relationship, and provider characteristics. *Technology elements*

measured outcomes related to functionality and usability of telehealth technologies. Finally, *access* outcomes included perceived healthcare access and patient travel-related savings.

Qualitative thematic findings were frequently presented as telehealth benefits or facilitators and drawbacks or barriers. Seven studies qualitatively explored benefits and facilitators [58, 63-65, 67, 71, 73]. Themes related to telehealth drawbacks or barriers were reported in six studies [58, 64, 65, 70, 71, 73].

Synthesis of Results: Rural Telehealth Patient Experiences

Patient experience findings in included studies depict an overall positive experience with video telehealth services for rural patients. Participants' overall satisfaction was high, ranging from 88% of participants agreeing or strongly agreeing they were satisfied in Dang et al. [61], to 100% agreeing they were "overall happy with the service" in Solomons et al. [78]. The proportions of participants reporting they would use video telehealth again were also high, with 77% [61], 87% [62, 79], and 98% [78] participant agreement. Preference for telehealth over in-person care ranged from 65% of tele-dementia patients [61] to 73% of home tele-mental health participants [80] and 96% of inhaler training participants [75]. In more moderated results, mean score for preference for telehealth versus in-person was roughly neutral in tele-continence patients ($\mu = 2.43$, five-point Likert scale) [76].

Patient perceptions of telehealth quality were positive, with 100% of telehealth users in Whealin et al. [80] agreeing they received good care, 87% agreeing telehealth took care of their needs in Solomons et al. [78], and 61% reporting telehealth worked well or very well for them in Ferucci et al. [65]. Participants agreed their privacy was protected while using telehealth [61, 72, 75, 76, 78, 79], and participants in Whealin et al. appreciated the anonymity of home-based tele-mental health (HTMH; two items on six-point Likert scale, 1=strongly agree, 6=strongly

disagree; mean, standard deviation: 5.31, ±1.54; 5.66, ±1.47). Telehealth's convenience [61, 62, 75, 80] and comfort [75, 79, 80] were also highly rated by participants. In two studies addressing physical exams, dementia patients largely agreed the lack of a physical exam was acceptable (78% agreed or strongly agreed) [61], while 22% of telehealth users in Ferucci et al. chose "limited physical exam" as telehealth's primary drawback.

Patient-provider communication was generally rated as good, but results were mixed. Ninety-one percent reported good communication with the provider in Davis et al. [62] and 30% of telehealth utilizers in Ferucci et al. [65] chose improved communication as telehealth's primary benefit. Two items on the Yip Telemedicine Scale used by Batsis et al. [57] addressed communication, with high participant agreement (five-point Likert scale: 1=strongly disagree, 5=strongly agree): "I feel comfortable communicating with my healthcare provider" ($\mu = 4.63$, ±0.49) and "I can easily talk to my health-care provider" ($\mu = 4.59$, ±0.64). Whealin et al. [80] found that from pre- to post-treatment, HTMH utilizers reported significantly increased agreement that "it is easy to communicate with the therapist using HTMH" ($T = -2.02$, $p = 0.05$). However, in Hutchinson et al. [71], only 38% of respondents felt completely heard and understood by the palliative care clinician (five-point Likert scale item), and in Holtz et al. [70] telehealth users only moderately disagreed that telehealth would provide worse communication ($\mu = 3.32$, ±1.46, 5 point Likert scale: 1=strongly agree, 5=strongly disagree).

In provider relationship findings, 85% of patients in Dang et al. [61] reported being comfortable with their provider through telehealth, and 98% in Locke et al. [75] felt they built a good relationship with the provider. However, findings were mixed in Whealin et al. [80], with 100% of participants agreeing they were comfortable interacting with the provider via telehealth, but only 51% agreeing that telehealth provided the same provider rapport as in-person.

Participants also reported that the telehealth provider was approachable (μ = 1.1, ±0.4, five-point Likert scale: 1=most agree, 5=most disagree) [60], the telehealth provider was caring (μ = 4.09, ±1.15, 5 point Likert scale: 1=strongly agree, 5=strongly disagree) [70], and they were confident in the telehealth provider (100% agreement, yes/no) [72].

Regarding technological elements, participants reported good audio and visual quality. On the Yip Telemedicine Scale, participants in Batsis et al. [57] strongly agreed they could clearly hear their healthcare provider (μ = 4.67, ±0.55) and could see their provider as if in-person (μ = 4.67, ±0.55). Findings regarding audio and visual quality from study-developed surveys were similarly positive [60, 61, 76, 78, 79]. However, participants commonly reported issues with telehealth technology, with 93% reporting issues in Bauer et al. [59] In Locke et al. [75], 18.5% and 25% reported issues occurred "sometimes" or "most or all of the time," respectively, and 35% of telehealth users in Ferucci et al. [65] chose technology problems as telehealth's primary drawback. Despite issues, participants overall indicated they were comfortable using telehealth technology, with little assistance [57, 58, 75, 78, 80].

Perceived healthcare access was a common patient experience outcome, assessed in seven studies, with patients endorsing that telehealth increased their access to care [61, 75, 76, 78] and saved them travel time and expenses [57, 62, 65, 75, 80]. In notable findings, 75.8% of participants in Locke et al. [75] reported that without telehealth they would not have received inhaler training at all, and participants in Whealin et al. [80] strongly agreed that HTMH made it easier to get therapy (μ = 5.69, ±1.54, six-point Likert scale). In August 2020, Greteman et al. [69] surveyed a population-based sample in Iowa and found that a significantly lower proportion of rural county residents reported having engaged in any telehealth video visit compared to urban county residents (16.0% vs. 24.4%, respectively; $P<.001$). However, the proportions of rural and

urban telehealth users who felt comfortable with telehealth provider communication were not statistically different (89.3% vs. 93.9%, respectively; *P*=.07).

Qualitative themes related to telehealth benefits largely agreed with quantitative findings. Qualitative participants described convenience [58, 63, 64, 66, 67, 76, 77], savings in travel time or costs [58, 65-67, 73, 76, 77], efficiency [58, 64, 71], improved communication [58, 65, 73], and increased access to healthcare or healthcare providers related to their experiences with telehealth [60, 63, 66, 73]. Qualitative drawbacks or barriers were also similar to quantitative findings, including technical difficulties [64, 65, 71, 73], lack of internet or poor connectivity [64, 65, 70], and missed nonverbal communication [58].

Qualitative findings also contributed depth and nuance to rural patients' telehealth experiences, allowing patients to weigh telehealth benefits against drawbacks. For example, while interview participants in Lindsay et al. [74] noted the convenience, comfort, and patient-provider rapport provided by video-to-home psychotherapies, they also described how the video interface was not suitable to certain interventions, such as meditation. Participants in other studies voiced similar sentiments, describing the overall value of video telehealth while elaborating drawbacks, including less natural communication, missed body language, lack of eye contact, and uneasiness around video communication with a stranger [57, 58, 64, 68]. And although participants in Goldstein et al. [68] preferred in-person care overall, they also found telehealth primary care consultations to be more relaxed and less rushed. Qualitative findings additionally revealed telehealth's particular value when accessing in-person healthcare is especially burdensome, as with palliative care and treatment for post-traumatic stress disorder or obsessive-compulsive disorder [59, 63, 67, 71].

Qualitative comparison group findings provided distinct insights into rural patients' perspectives not portrayed by quantitative findings. Finley et al. [66] found that in-person, telehealth naïve cardiology patients who had not used telehealth often held negative and incorrect views about telehealth, which were not shared by telecardiology patients; the authors note the importance of patient education to overcome such barriers. By contrast, in Ferucci et al. [65], telehealth users and non-users identified similar telehealth benefits (e.g., improved access and communication, saved money and travel) and barriers (technology and privacy/security concerns). Non-users also emphasized patient preference and limits of video as barriers, but a majority (68%) were open to using telehealth, potentially indicating a low threshold to initiating telehealth. Comparing rural, suburban, and urban patients, Finley et al. found that urban residents most often stated incorrect information about telehealth, but suburban residents most often made negative statements about telehealth, particularly related to care quality, being face-to-face, and provider communication. In this study, rural residents were most positive about telehealth and spoke the most about time demands of accessing healthcare. Finally, qualitative findings offered important detail relating to the experience of rurality, as when participants described complications of accessing healthcare from rural places, which included taking ferries [70], multiple flights in one day [65], traveling overnight [73], and weather impacts [71].

Discussion

In this scoping review, we examined research on rural telehealth patient experiences, with a focus on methods of patient experience assessment. Demonstrating overall positive experiences with video telehealth for rural patients across a range of clinical areas and applications, our findings align with the broader literature. In a review of studies published December 2019 to August 2020, Aashami et al. [33] found telehealth patient satisfaction was high across clinical

areas and did not vary significantly by age. Alsabeeha et al. [34] conducted a review of older adults' telehealth satisfaction in studies published in 2020 and 2021, and also found telehealth satisfaction was not influenced by age. Specifically, older adults' telehealth satisfaction was high during COVID-19, despite experiencing more technical and hearing difficulties. However, these reviews did not focus on rural participants, covered earlier timeframes, and included patients from multiple countries and multiple telehealth modalities.

Potential sensory or cognitive impairments and inexperience with technology in older adults raise concerns that these patients face challenges accessing telehealth [86-88], important given rural populations' older average age [89]. Several studies we reviewed included predominantly older adults and reported positive patient experiences, substantiating earlier reviews. However, technology support was often included with interventions, and no included studies assessed technological comfortability across ages. Only Finley et al. [66] compared telehealth experience by age, finding that age was positively associated with positive attitude toward telecardiology. Given mixed evidence of telehealth utilization in older adults, patient experiences in this rural demographic should be explored further.

In this review, rural patients identified many advantages to telehealth, similar to other reviews [32-36, 90]. With positive patient satisfaction and experiences, findings reported here appear to contradict evidence of lagging rural telehealth utilization. However, barriers identified in this review parallel rural telehealth impeding factors reported elsewhere, chiefly inadequate internet connectivity and technology comfortability. Rural populations are impacted by limited broadband internet access, which contributes to disparities in access to and use of digital technologies, an issue known as the digital divide [91]. Rural broadband access may actually be more pronounced than commonly reported, given evidence that the Federal Communications

Commission (FCC) broadband access metric, based on data from broadband providers, overestimates access [92, 93]. Furthermore, gaps between the FCC measure and actual or realized broadband access widen as measures of county-level disadvantage increase [94], evidenced in qualitative findings reported here [70]. Telehealth equity may require subsidizing broadband access for vulnerable or underserved users, and accurate measures of broadband access are needed to appropriately allocate funding.

The digital divide also encompasses comfortability using technology for healthcare, or eHealth literacy, with evidence that computer, email, and healthcare-related internet use are all significantly impacted by age, race, education, income, and health insurance status [95]. Patient portal activation, as a proxy for eHealth literacy, has been shown to be significantly lower among rural patients, while being positively associated with both telehealth and video visit use [20]. Moreover, eHealth literacy may be positively associated with perceived telehealth usefulness, ease of use, and patient satisfaction, among rural and urban users [96]. In contrast, lower education may be associated with higher telehealth patient satisfaction [97]. This could partly account for high patient satisfaction in some included studies; however, patient experiences were not assessed by educational attainment. Importantly, reviewed studies found that initial technical inexperience was easily overcome with patient digital education, and any successful telehealth use was a facilitator of future use. Reimbursement or incentivization for patient digital education could support telehealth equity, especially for under-resourced providers serving vulnerable populations [98].

In an emerging digital divide, research has demonstrated inequitable video and audio-only telehealth utilization, with patients who are older, lower income, less educated, rural dwelling, and of minoritized race or ethnicity less likely to use video telehealth [17-26]. At stake

is the tension between increased access overall, supported by audio-only visits, and care quality, possibly supported by video-visits, with implications for health equity [18, 98]. Minoritized racial groups comprise roughly 20% of rural U.S. populations and experience higher burdens of rural health disparities than their White counterparts [99-102]. Furthermore, given the importance of patient-centeredness and cultural tailoring for telehealth to address disparities [29], it is particularly important to understand telehealth experiences of diverse rural patients. However, rural racial and ethnic diversity was underrepresented, or not reported, in many reviewed studies. Several VA studies provided notable exceptions [67, 68, 74, 80]. We found similarly positive patient experiences between samples with varying diversity, indicating that factors in addition to patient experience influence differences in video utilization by race. However, as included studies did not compare telehealth experiences by patient race or ethnicity, our ability to analyze this topic was limited.

Although audio-only telehealth may increase access for vulnerable patients, the future of reimbursement for this modality is uncertain. The Consolidated Appropriations Act of 2023 continued Medicare reimbursement for audio-only telehealth permanently for behavioral and mental health telehealth services, but only through December 31, 2024 for other telehealth services [42]. To inform future policy decisions and ensure equitable video telehealth access, more research is needed to understand telehealth utilization and barriers among diverse rural patients, ascertain audio-only care quality, and determine appropriate application of and patient preference for audio-only versus video telehealth.

Finally, elements of rural culture and identity have been found to impact rural healthcare utilization, relevant to review findings. In a review of studies published 2011 to 2021, Pullyblank [41] assessed the impact of rural healthcare beliefs on telehealth attitudes, and identified privacy

and confidentiality as concerns possibly impeding rural telehealth utilization. Our findings show rural users were satisfied with telehealth privacy, with few reservations [73, 80]. Pullyblank identified rural resourcefulness and frugality as supporting telehealth utilization, aligning with the high value participants in reviewed studies placed on telehealth convenience and patient savings. In their influential 2019 review of rural mental health help-seeking, Cheesmond et al. [40] identified rural stoicism, stigma, and distrust as help-seeking barriers. Participant experiences from several studies reviewed here indicate tele-mental health offers greater anonymity and similar rapport-building to in-person, helping overcome such attitudinal barriers, as well as the dire shortage of rural mental health providers [103].

Examining studies of provider-to-provider telehealth in rural healthcare published from 2010 to 2021, Totten et al. [104] identified rural-specific barriers likely also relevant to patient-provider telehealth, specifically inadequate internet coverage and incomplete understanding of rural contexts by urban-based telehealth counterparts. Other reviews have documented cultural disconnect between rural patients and non-rural providers, as well as the importance to rural patients of familiar provider relationships [38-41, 105]. While we found high ratings of patient-provider relationship, studies included in this review did not aim to explore rural culture or identity in telehealth patient experiences or expectations. Given the evidence, rural cultural factors in telehealth utilization bear further exploration. Future research should also explore how rural health-related attitudes and telehealth beliefs changed following COVID-19 [69].

Regarding our first research question, we identified an array of rural telehealth patient experience assessments. This diversity of measures, which has been noted in other reviews of telehealth [31, 34, 43, 104], limits generalizability and creates challenges for future study design that builds on existing research. Furthermore, treatment of rural telehealth patient experiences

was subject to methodological weaknesses, and findings are characterized by certain limitations. Survey detail varied widely, and most studies assessed patient experience using study-developed, non-validated measures. This is reflected in concerns regarding survey quality, such as ambiguous wording or scoring and conflation of clinical intervention components, technological elements, and impact of the modality on healthcare experiences. It was therefore sometimes difficult to parse how patient experience related to different encounter dimensions. This is significant given the complexity of the patient experience concept [28] and evidence that virtual environment impacts patient experience [106], with implications for optimizing telehealth interventions. Notably, rigorous measure development requires time investments that present challenges amid rapid real-world changes in telehealth, and that were beyond the scope of most included studies.

Definitions of rurality in these studies were generally weak. Nearly two-thirds of studies did not describe how participant rurality was assigned, limiting ability to compare methods across studies or generalize findings. Many included studies also did not report sample rurality and used mixed rural and nonrural samples, without separately reporting findings according to rurality. Because of these issues, it is difficult to ascertain the extent to which findings are attributable to rural patients.

The preponderance of VA studies may also introduce bias to review results. Veteran populations differ substantively from other rural populations, as demonstrated by high proportions of male VA participants, given that women overall utilize telehealth more than men [107, 108]. VA organization and delivery of care, with its national network of health systems and federal funding and governance, should also be considered. Importantly, VA telehealth is federally governed under “Anywhere to Anywhere” legislation [63], allowing telehealth

provision across state lines regardless of provider licensing, an advantage not currently permitted in all states. The number of VA studies reflects VA attention to rural healthcare due to the high proportion of U.S. veterans living rurally [59, 109] and underscores more limited attention to rural telehealth experiences elsewhere.

Only three studies recruited participants following the March 2020 COVID-19 lockdown. Telehealth experiences pre- to post-pandemic were not directly assessed, supporting only limited comparison; however, patient experiences were consistent across study periods. Patient experience research following COVID-19 telehealth expansion, which includes rural patients who were previously resistant to telehealth, can help address knowledge gaps related to rural telehealth preferences and utilization. However, studies must also endeavor to access rural patients who remain telehealth naïve post-COVID-19, to fully explicate these questions.

Limitations

This review included a high proportion of pilot, implementation, and evaluation studies, and although not necessarily flawed, these designs may bias review findings. Specifically, early-adopter or self-selection bias and social desirability bias may be present, in which participants may be more open to telehealth and more likely to give favorable feedback. Nonresponse bias may also be present; very few studies collected or reported data on non-completers or patients who declined participation. Most studies used convenience sampling; this was a stated limitation in several studies, which noted that samples were non-representative of rural diversity. Studies did not assess differences in patient experiences by race or ethnicity, and several did not report race/ethnicity data, limiting analysis of telehealth experiences of diverse patient populations.

As we included only video visits, we could not compare audio-only versus video telehealth experiences. However, in study screening, we excluded many studies that did not

differentiate between audio-only and video or synchronous and asynchronous telehealth experiences. These distinctions are necessary to clarify the impact of different telehealth modalities, especially amid uncertainty for future audio-only reimbursement.

As others have noted [104], studies do not always include "rural" in the title or abstract, posing challenges to study identification. We attempted to account for this in our search strategy, but may have missed relevant citations nonetheless. Allowing any rural definition included broad, imprecise parameters for participant rurality; not all results may be applicable under rigorous categorization or across rural populations. As eligibility criteria allowed any measure of patient experience, some included studies had little relevance to the review; however, this helps illustrate existing literature and may not be a limitation.

Conclusions

Optimizing and ensuring equity in rural telehealth requires understanding rural patients' experiences of this modality. This scoping review described evaluation of rural telehealth patient experiences across diverse telehealth applications. Methods of assessing rural patient experiences were varied, particularly regarding detail and content of patient experience measures. Findings indicate that rural patients overall experienced telehealth positively, but further research is needed to explicate on-going gaps in rural telehealth utilization.

Future studies should apply established parameters for rural status, clearly describe these methods, and report sample rurality. Efforts should be made to use validated telehealth patient experience measures. Understanding of rural patient experiences can benefit from comparisons between groups and timepoints, and studies with controls and randomization are needed. Finally, topics that require ongoing attention include telehealth experiences of rural populations of color,

the value rural patients place on cultural concordance with urban-based telehealth providers, and rural patients' expectations for telehealth's long-term role in rural healthcare.

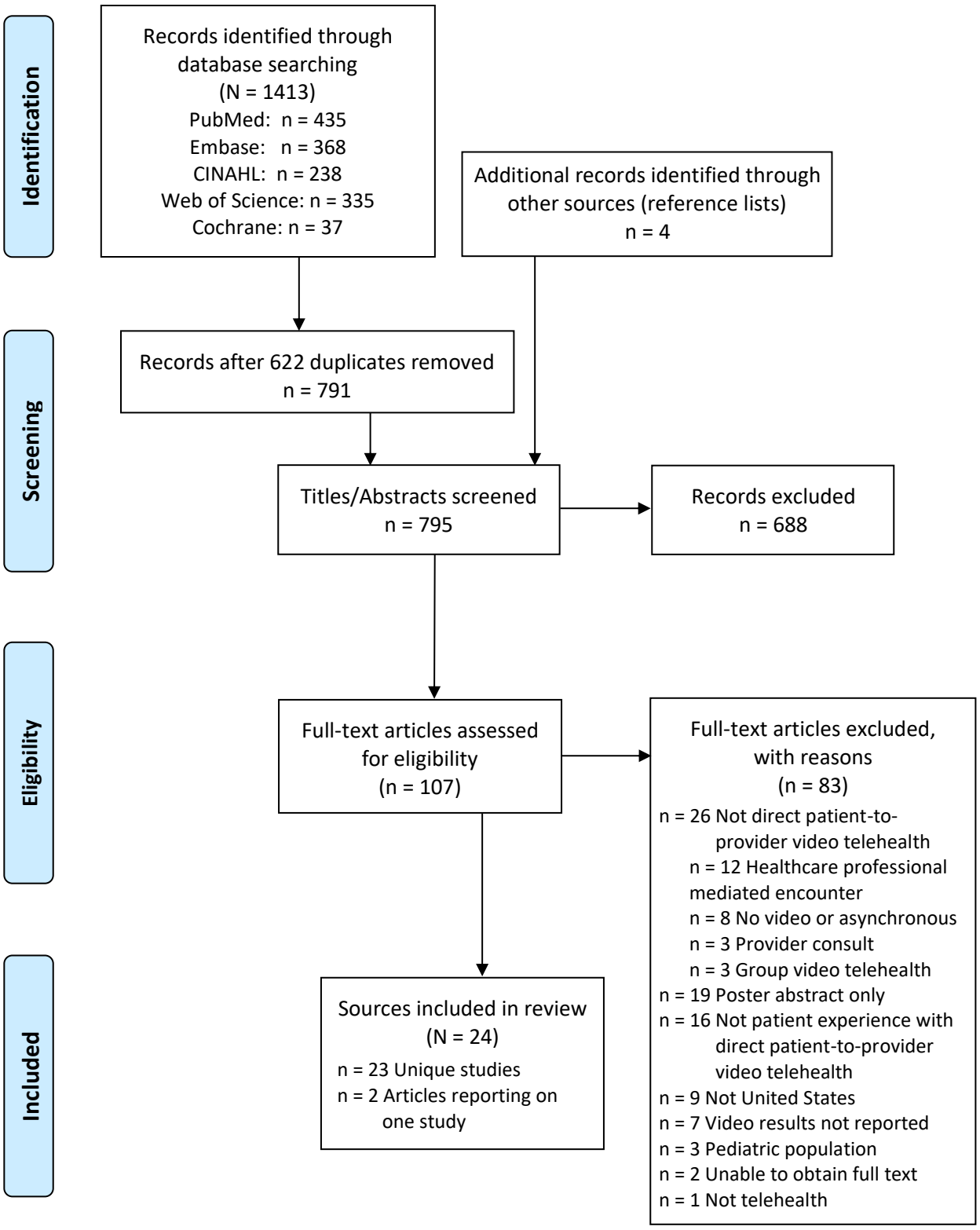

Figure 2.1. 2009 PRISMA Flow Diagram (Moher et al., 2009): outcomes of study screening and selection processes.

Table 2.1. PubMed search strategy.

#	Strategies
1	("Patient Outcome Assessment"[MeSH Terms] OR "Patient Outcome Assessment"[Title/Abstract] OR "Patient Preference"[MeSH Terms] OR "Patient Preference"[Title/Abstract] OR "Patient Preferences"[Title/Abstract] OR "Patient Reported Outcome Measures"[MeSH Terms] OR "Patient Reported Outcome Measures"[Title/Abstract] OR "Patient Reported Outcome Measure"[Title/Abstract] OR "patient reported outcome"[Title/Abstract] OR "patient reported outcomes"[Title/Abstract] OR "Patient Satisfaction"[MeSH Terms] OR "Patient Satisfaction"[Title/Abstract])
2	(“Qualitative Research”[Mesh]) OR qualitative[Title/Abstract] OR “mixed method” [Title/Abstract] OR “mixed methods”[Title/Abstract] OR “focus group”[Title/Abstract] OR “focus groups”[Title/Abstract] OR interview[Title/Abstract] OR interviews[Title/Abstract] OR interviewing[Title/Abstract] OR interviewed[Title/Abstract] OR ethnography[Title/Abstract] OR ethnographic[Title/Abstract] OR phenomenology[Title/Abstract] OR phenomenological[Title/Abstract] OR “grounded theory”[Title/Abstract] OR “case study”[Title/Abstract] OR “constant comparative”[Title/Abstract] OR “constant comparison”[Title/Abstract] OR “content analysis”[Title/Abstract] OR “discourse analysis”[Title/Abstract] OR “narrative”[Title/Abstract] OR “participant observation”[Title/Abstract] OR “field study”[Title/Abstract] OR “field studies”[Title/Abstract] OR “patient experience”[Title/Abstract] OR “patient experiences”[Title/Abstract] OR “patient perception”[Title/Abstract] OR “patient perceptions”[Title/Abstract] OR “patient perspective”[Title/Abstract] OR “patient perspectives”[Title/Abstract] OR experience[Title] OR experiences[Title]
3	("eConsult"[Title/Abstract] OR "electronic consult*"[Title/Abstract] OR “eHealth”[Title/Abstract] OR "Remote Consultation"[MeSH Terms] OR “remote consult*”[Title/Abstract] OR "Telemedicine"[MeSH Terms] OR “Telemedicine”[Title/Abstract] OR "telehealth”[Title/Abstract] OR "video consult*"[Title/Abstract] OR “video visit”[Title/Abstract] OR "virtual visit"[Title/Abstract])
4	("hospitals, rural"[MeSH Terms] OR "hospitals, rural"[Title/Abstract] OR "rural hospitals"[Title/Abstract] OR "Rural Health"[MeSH Terms] OR "rural health"[Title/Abstract] OR "Rural Health Services"[MeSH Terms] OR "rural health services"[Title/Abstract] OR "Rural Nursing"[MeSH Terms] OR "rural nursing"[Title/Abstract] OR "Rural Population"[MeSH Terms] OR "rural population"[Title/Abstract] OR “rural”[Title])
5	#1 OR #2
6	#3 AND #4
7	#5 AND #6

Table 2.2. Overview of studies eligible for inclusion in the scoping review (*n* = 23), reported on in 24 articles.

First Author (Year)	Method	Design	Setting	Telehealth Intervention	Sample Size	Sample Rurality[a] & Rurality Parameters[b]	QuADS Score[c]
Batsis (2019) (2020)[d]	MM[e]	Pragmatic single-arm pilot trial. Convergent: before-and-after comparison; thematic analysis	Weight and wellness center in one rural New Hampshire county	16-week evidence-based obesity management program delivered via 1:1 video-conference	*N* = 37	Study county classified as rural according to the 2010 Census	76.9% 84.6%
Bauer (2021)	MM	Evaluation project. Convergent: before-and-after comparison; rapid qual. analysis	9 VHA[f] facilities in multiple states	10 web-based PTSD[g] treatment modules with real-time 1:1 coaching	*N* = 80	*n* = 60 (75%) rural or highly rural Study facilities had to serve veterans residing in U.S. Census rural "areas," not further defined: participants grouped by residence in rural/highly rural or urban areas	74.4%
Cheung (2021)	MM	Pilot single-arm clinical trial. Convergent: descriptive cross sectional and thematic analysis	University of Vermont Medical Center; 5 rural dialysis centers	VC[h] consult between specialty palliative care clinicians and patients at rural dialysis centers	*N* = 39	Rurality of study clinics was measured in round trip miles and driving minutes from University of Vermont Medical Center	66.7%
Dang (2018)	QUAN[i]	Clinical demonstration project: descriptive cross sectional	Miami VA[j] Healthcare System; 7 satellite facilities	Clinical video telehealth (CVT) dementia consultation clinic	*N* = 94		51.3%
Davis (2019)	QUAN	Quality assurance project: descriptive cross sectional	Albuquerque, NM VHA; 16 CBOCs[k] in New Mexico, Colorado, and Texas	CVT teleneurology clinic providing follow-up care	*N* = 1,100		35.9%
Day (2021)[l]	MM	Pilot implementation case study. Convergent: before-and-after comparison; qualitative description	VHA Healthcare System in a Western mountain state	VTH[m] for Mental Health treatment; various specialty areas and treatment modalities	*N* = Not reported	84% rural Participants designated as rural or urban without further definition	48.7%
Demirci (2019)	QUAL[n]	Thematic content analysis with participants in the intervention arm of a randomized controlled trial	A rural Critical Access Hospital in Pennsylvania	Lactation support using two-way video on personal devices via a mobile phone application	*N* = 17		51.3%

First Author (Year)	Method	Design	Setting	Telehealth Intervention	Sample Size	Sample Rurality[a] & Rurality Parameters[b]	QuADS Score[c]
Ferucci[o] (2022)	MM	Convergent: analytical cross sectional; Grounded Theory	Alaska Tribal Health System: 3 larger regional hub hospitals	Specialty care, not otherwise specified	*N* = 153		71.8%
Finley (2021)	MM	Convergent: thematic analysis; between-group code comparison	Southern Arizona VA Health Care System; 3 rural CBOCs	Outpatient cardiology services in a hub-and-spoke format	*N* = 292	IP[p]: 32 (17%) rural TH[q]: 55 (55%) rural Rurality self-selected by participants (options: urban, suburban, or rural)	69.2%
Fletcher (2022)	MM	Pilot single-arm open trial. Convergent: before-and-after; rapid qualitative analysis	Rural and suburban areas around a large metropolitan area	VTH obsessive compulsive disorder treatment, 12-16 weekly therapy sessions	*N* = 12		79.5%
Goldstein (2022)	QUAL	Rapid qualitative and matrix analyses	VA outpatient primary care clinics in the Piedmont area of North Carolina	Primary care video telehealth	*N* = 24	100% rural Rurality was defined using Rural-Urban Commuting Area (RUCA) codes, consistent with the VA Office of Rural Health; level of designation (e.g., county, census tract) not reported	82.1%
Greteman (2022)	QUAN	Population-based survey: descriptive & analytical cross sectional	State of Iowa, with 7 sampling strata: 6 highly rural counties and the rest of Iowa	n/a[r]	*N* = 10,009	*n* = 2,347 (65%) rural Rural-Urban Commuting Codes (RUCCs) categorized respondents' county of residence as rural (codes 4-9) or urban (codes 1-3); stratified sampling over-sampled 6 highly rural counties (RUCCs 7–9)	82.1%
Holtz (2022)	MM	Pilot study. Sequential explanatory: analytical cross sectional; qualitative description	Three rural counties in Northern Lower Michigan	n/a	*N* = 59	RUCCs, assigned at the county level: recruitment took place in 2 counties with a RUCC of 9 and 1 county with a RUCC of 7	87.2%

First Author (Year)	Method	Design	Setting	Telehealth Intervention	Sample Size	Sample Rurality[a] & Rurality Parameters[b]	QuADS Score[c]
Hutchinson (2022)	MM	Pilot study. Convergent: cross sectional descriptive; constant comparative qualitative analysis	Maine Medical Center (Portland, ME); University of Vermont Medical Center (Burlington, VT)	Palliative care consultations via video conference on a study-provided tablet	*N* = 11	Not reported: study authors define rural at the state level (Maine and Vermont)	66.7%
Ihrig (2019)	QUAN	Economic and geographic analysis	Buffalo, NY VA and associated CBOCs	Low-vision tele-optometry evaluation and low-vision telerehabilitation assessment	*N* = 419	Not reported: assumed from recruitment at CBOCs	38.5%
Jordan (2021)	QUAL	Thematic analysis	Alaska Native Medical Center in Anchorage, AL and regional or rural ATHS clinics statewide	Specialty care delivered via video teleconference in a hub-and-spoke format	*N* = 7	Not reported: assumed from recruitment at regional/rural ATHS clinics	64.1%
Lindsay (2017)	MM	Program evaluation. Convergent: descriptive and analytical time series; directed content analysis	"Sonny" Montgomery Veterans Affairs Medical Center (Jackson, MS) and six CBOCs	Weekly VTH delivery of evidence-based practice therapies for mental health care	*N* = 93	83% rural Participants grouped by rural or urban without further definition	76.9%
Locke (2019)	QUAN	Noncontrolled before and after comparison	Veterans Affairs Puget Sound Health Care System	Inhaled medication administration technique training via home video telehealth	*N* = 74	100% rural U.S. Census Bureau urban-rural classification of zip codes was used to identify rural patients for recruitment	51.3%
Schlittenhardt (2016)	MM	Convergent: before-and-after quantitative description; qualitative description	An urban medical facility and one rural satellite clinic	Pelvic health and continence follow-up care via clinical video telehealth	*N* = 7		69.2%
Silvestrini (2021)	QUAL	Thematic analysis	VA Puget Sound Health Care System, Seattle, WA; CBOCs in Alaska, Oregon, and WA	TelePain, a video-delivered program for non-pharmacological chronic pain management	*N* = 16		66.7%
Solomons (2018)	QUAN	Nonrandomized, controlled before-and-after	Maine Medical Center Cancer Risk and Prevention Clinic; 2 remote clinics in Maine	Hereditary cancer and genetics counseling and education provided via live interactive videoconference	*N* = 174	90% rural Participant county of residence and Office of Management and Budget list of rural counties	74.4%

First Author (Year)	Method	Design	Setting	Telehealth Intervention	Sample Size	Sample Rurality[a] & Rurality Parameters[b]	QuADS Score[c]
Talarico (2020)	QUAN	Pilot implementation project. Before-and-after description	A northeast Florida specialty mental health treatment facility	Video mental health follow-up and medication assessment	*N* = 40		56.4%
Whealin (2017)	QUAN	Pragmatic noncontrolled pilot project. Descriptive and comparative analyses	Central urban location and homes of rural Pacific Island-dwelling veterans	VTH 12-session Cognitive Processing Therapy intervention for PTSD treatment	*N* = 47		71.8%

[a] Sample rurality, *n* (%) rural, if reported
[b] Rurality parameters, definitions used, and assignment of participant rurality, if reported.
[c] QuADS, Quality Assessment with Diverse Studies (Harrison et al., 2021)
[d] Batsis et al. (2019) and Batsis et al. (2020) report on one study
[e] MM, mixed methods research
[f] VHA, Veterans Health Administration
[g] PTSD, post-traumatic stress disorder
[h] VC, Video conference
[i] QUAN, quantitative research
[j] VA, Veterans Affairs
[k] CBOC, community-based outpatient clinic, in the VA healthcare system
[l] Day et al. (2021) presents evaluation of two implementation projects, PIVOT (Lindsay et al., 2019) and PIVOT-R; the latter is rural-specific and is reported in this review and table.
[m] VTH, video telehealth to home
[n] QUAL, qualitative research
[o] Ferucci et al. (2022) is a follow-up study to Jordan et al. (2021), based in the same healthcare system
[p] IP, in-person
[q] TH, telehealth
[r] n/a, not applicable: study assessed prior patient experience with telehealth, not a specific telehealth intervention

Table 2.3. Sample characteristics for in included studies. Some categories condensed or abridged for conciseness.

First Author (Year)		Age mean years, SD[a] (range)	Sex % female	Economic Measures	Insurance Status	Education	Race/Ethnicity
Batsis (2019) Batsis (2020)		μ = 46.9, ±11.6 (27–64)	86.5	---	Medicare: 10.8% Medicaid: 16.2% Private: 75.7%	---	White: 100%
Bauer (2021)		μ = 45.04, ±12.4 (23–72)	66.50	Full-time: 26.25% Unemployed: 37.50% Retired: 25.00%	VA[b]	High School: 12.50% Some College: 56.25% 4-year Degree: 20.00% Postgraduate: 11.25%	AI/AN[c]: 1.27% Black/AA[d]: 15.19% Hispanic/Latino: 6.33% White: 62.03%
Cheung (2021)		μ = 70.8, ±10.9	39	---	---	College: 39%	White = 90%
Dang (2018)		μ = 74.7 (36–95)	---	---	VA	---	---
Davis (2019)		Median = 63 (23–94)	---	---	VA	---	---
Day (2021)		30–39 years: 31% 40–59 years: 37% 60–89 years: 28%	37	---	VA	---	---
Demirci (2019)		---	100	---	Medicare: 29% Medicaid: 41% Private: 53%	Less than High School: 24% High School/GED: 35% Some College/Vocational: 18% Bachelor's or Higher: 24%	Black/AA: 6% White: 94%
Ferucci (2022)	TH[e] Use	≥50 years: 49%	80	Employed: 48%	Insurance other than Tribal Health System: 73%	High School or Higher: 92%	---
	No TH	≥50 years: 63%	68	Employed: 88%	Insurance other than Tribal Health System: 58%	High School or Higher: 88%	---
Finley (2021)	TH	55–64 years: 15% 65–74 years: 39% 75–84 years: 31% 85+ years: 12%	4.0	---	VA	High School/GED: 49.0% Associate degree: 23.0% Bachelor's Degree: 15.0% Postgraduate: 8.0%	AI/AN: 1.0% Black: 1.0% Hispanic/Latino: 9.0% White: 88.0%

First Author (Year)		Age mean years, SD[a] (range)	Sex % female	Economic Measures	Insurance Status	Education	Race/Ethnicity
Finley *(cont'd)*	IP[f]	55–64 years: 14% 65–64 years: 50% 75–84 years: 21% 85+ years: 10%	2.6[g]	---		High School/GED: 46.9% Associate degree: 25.0%% Bachelor's Degree: 13.0% Postgraduate: 8.4%	AI/AN: 2.1% Black: 5.7% Hispanic/Latino: 13.0% White: 74.5%
Fletcher (2022)		μ = 47.2, ±15.2	22	---	VA	---	AA: 44% White: 55%
Goldstein (2022)	TH Use	μ = 64.5, ±9.0	21	---	VA	---	Black: 100%
	No TH	μ = 69.1, ±8.7	0	---		---	Black: 100%
Greteman (2022)	Overall μ = 58.3						
	Rural:	<50 years: 22.7% 50–64 years: 28.2% 65–74 years: 26.1% 75+ years: 23.0%	44.9	Employed: 51.5% Out of Work: 1.5% Retired: 42.8%	Health Insured: 94.6%	High School or less: 34.2% Some College/Tech. School: 32.0% College Degree or More: 33.6%	Hispanic: 1.2% White: 99.1%
	Urban:	<50 years: 28.6% 50–64 years: 28.2% 65–74 years: 24.8% 75+ years: 18.4%	42.0	Employed: 50.8% Out of Work: 3.2% Retired: 41.3%	Health Insured: 94.9%	High School or less: 23.8% Some College/Tech. School: 29.2% College Degree or More: 47.0%	Hispanic: 1.9% White: 96.6%
Holtz (2022)	TH Use	---	72	Household Income <20,000: 48% Employed: 20% Out of Work: 12% Retired: 20%	---	High School/GED: 36% Some College: 28% Bachelor's Degree: 8% Postgraduate: 16.0%	AI/AN/NH[h]: 8% Black/AA: 0% White: 76% No Response: 16%
	No TH	---	69	Household Income <20,000: 38% Employed: 18% Out of Work: 6% Retired: 56%	---	High School/GED: 31% Some College: 37% Bachelor's Degree: 12% Postgraduate: 19%	AI/AN/NH[i]: 0% Black/AA: 1% White: 62% No Response: 31%
Hutchinson (2022)		μ = 70.8, ±13.3	55	Perceived Income Inadequacy: 45%	---	High School or above: 70%	---
Ihrig (2019)		μ = 83 (50–101)	3	---	VA	---	---

First Author (Year)		Age mean years, SD[a] (range)	Sex % female	Economic Measures	Insurance Status	Education	Race/Ethnicity
Jordan (2021)		<40 years: 57% 40–59 years: 14% 60+ years: 29%	43	---	---	---	---
Lindsay (2017)		20–39 years: 37.6% 40–59 years: 51.6% 60–79 years: 10.8%	27.9	---	VA	---	Black: 49.5% White: 46.2%
Locke (2019)		μ = 69.2, ±8.5	0	---	VA	---	White: 93.2%
Schlittenhardt (2016)		μ = 54	100	---	---	---	---
Silvestrini (2021)		μ = 60 (41–73)	25	---	VA	---	White: 93.75%
Solomons (2018)	TH	μ = 55, ±15.5	83	---	Adequately Insured: 85% Under or uninsured: 7%	High School: 25%% Some College/2-year Degree: 36% 4-year College or More: 33%	Black/AA: 2% Native American: 2% White: 90% Other:7%
	IP	μ = 49, ±13.5	84	---	Adequately Insured: 85% Under or uninsured: 4%	High School: 7% Some College/2-year Degree: 34% 4-year College or More: 54%	Black/AA: 0% Native American: 0% White: 91% Other: 9%
Talarico (2020)		---	58	Self-Identified as Homeless: 15%	---	---	AA: 1% Asian: 1% Hispanic: 1% White: 97%
Whealin (2017)		μ = 49.3	17	---	VA	---	Asian American: 21.3% Black/AA: 6.4% Mixed: 19.1% NH/PI[i]: 27.6% White: 25.6%

[a] SD, standard deviation
[b] VA, Veterans Affairs
[c] AI/AN, American Indian/Alaska Native
[d] AA, African American
[e] TH, telehealth
[f] IP, in-person
[g] In the study by Finley et al., 43.2% of the in-person group was missing data on sex.
[h] NH, Native Hawaiian
[i] NH, Native Hawaiian
[j] PI, Pacific Islander

Table 2.4. Patient experience assessment characteristics and selected outcomes.

First Author (Year)	Data Collection Method	Tool(s)/Measures	Response Rate[a]	Data Analysis	Key Patient Experience Findings
Batsis (2019) (2020)[b]	Questionnaire Interview	Yip Telemedicine Scale, 15 items Study-developed 5-point Likert scale items Semi-structured interview guide	73% (27/37)	Quantitative descriptive Thematic analysis	*QUAN:* Participants strongly agreed video conference is particularly helpful for patients in rural areas (μ = 4.85) *QUAL:* themes of time-savings, ease of use of the TH[c] technology, lack of face-to-face as a deficit
Bauer (2021)	Interview Questionnaire	Study-developed interview survey with 4-point and 3-point Likert scale items and open-ended questions	36% (29/80)	Likert-scale analysis not reported Rapid qualitative analysis	*QUAN:* 76% rated seeing the intervention coach via video as "very important" *QUAL:* Qualitative descriptive findings: Video TH enhanced provider connection; participants emphasized convenience and comfort of PTSD[d] treatment at home
Cheung (2021)	Questionnaire	Self-report acceptability survey adapted from two studies with one open-ended and eight 5-point Likert scale items	94% (34/36)	Quantitative descriptive Thematic analysis	*QUAN:* High overall acceptability of TH intervention (μ = 1.75, 5-point Likert, where 1 or 2 indicated agreeability) *QUAL:* Themes of TH convenience (reducing travel), TH technical aspects (audio/visual quality)
Dang (2018)	Questionnaire	Study-developed interview survey with 17, 5-point Likert scale items	29% (27/94)	Quantitative descriptive	Overall satisfaction with TH intervention was 88%; 78% agreed lack of physical contact was acceptable; 62% felt TH made it easier to get care
Davis (2019)	Questionnaire	Study-developed mailed survey with five agree/disagree items	64% (701/1,100)	Quantitative descriptive	Percent agreement: 89% overall satisfaction; 91% had good communication; 87% desired to continue TH in future; 89% agreed TH more convenient than in-person
Day (2021)	Interview	Not reported	Unable to determine[e]	Quantitative n/a[f] Qualitative not reported	TH helped participants engage in mental health care and allowed for more frequent visits; unanimously willing to continue using TH for mental health care
Demirci (2019)	Interview	Semi-structured interview guide	81% (17/21)	Thematic content analysis	Themes: telelactation fills void for lactation support; video benefits (efficiency and convenience; trust) and video barriers (discomfort talking to stranger via video)
Ferucci (2022)	Questionnaire Focus Groups	Study-developed electronic survey Semi-structured focus group guides, for TH users and never users	Survey, n/a[g]; 31% Focus Groups (47/153)	Quantitative descriptive and Chi square or Fisher's Exact Grounded Theory	*QUAN:* Compared to TH users, nonusers were more likely to be comfortable or very comfortable using new technology (p = .024)

First Author (Year)	Data Collection Method	Tool(s)/Measures	Response Rate[a]	Data Analysis	Key Patient Experience Findings
Ferucci *(cont'd)*					*QUAL:* TH benefits among users: care access; saves time; improved communication; less travel; saves money
Finley (2021)	Questionnaire	Study-developed paper survey with demographic items and two free-text patient experience questions	In-person: 57% (109/192) TH: 70% (70/100)	Thematic analysis Descriptive and between-group code frequency comparison using Chi square	Compared to TH, in-person more frequently referred to technology concerns and care not being face-to-face Rural patients made more positive statements about TH (71% vs 32% of suburban and 39% of urban) and most often referenced time demands (24% vs 7% and 7%)
Fletcher (2022)	Interview	Semi-structured interview guide	75% (9/12)	Quantitative n/a Rapid qualitative analysis technique	Patients reported benefits of video for OCD[h] treatment, including convenience, flexibility, and less travel burden; some noted particular value of TH for mental health treatment; one patient stated a preference for in-person
Goldstein (2022)	Interview	Semi-structured interview guide based on theoretical framework	n/a	Matrix analysis with a priori theoretical dimensions	Patients perceived access barriers to TH related to technical skills, equipment, or broadband access Among users, a successful video visit increased future video visit confidence; video visits were perceived as lower quality and more impersonal than in-person visits
Greteman (2022)	Questionnaire	Survey with study-specific and previously developed items, various scales; mailed with option to complete online	40% (4,048/10,009)	Quantitative descriptive and Chi square	Compared to urban residents, fewer rural residents had used video TH with any provider (24.4% vs. 16.0%, p<.001); there was no significant difference in the proportion of urban and rural TH users who were comfortable using video TH (93.9% vs. 89.3%, p =.07)
Holtz (2022)	Questionnaire Interview	Study-developed paper survey with 5-point Likert scale items Semi-structured interview guide based in part on survey responses	Survey, n/a; 14% Interviews (8/59)	ANOVA and multivariate linear regression Thematic analysis	ANOVA: Compared to TH users, nonusers were more likely to believe they would receive better care in person (users: μ = 3.30; nonusers: μ = 1.91; P=.003) and believe that providers would not be as caring via TH (users: μ = 4.09; nonusers: μ = 2.91; p=.007). *QUAL:* ease of TH use, especially compared to travel; positive TH perception; internet access as TH barrier

First Author (Year)	Data Collection Method	Tool(s)/Measures	Response Rate[a]	Data Analysis	Key Patient Experience Findings
Hutchinson (2022)	Questionnaire Interview Videorecording	Study-developed survey with 5-point Likert scale items Semi-structured interview guide	Unable to determine	Quantitative descriptive Inductive, constant comparative approach	*QUAN:* 6 of 8 responding patients rated the tele-consult overall as equal to, or better than, in-person visit (75%) *QUAL:* Advantages: improved access and efficiency, reduced preparation; Disadvantages: technical issues, distraction of video self-view. Patients also reported that eye contact and body language did not translate well.
Ihrig (2019)	Questionnaire Chart Review	Clinic-specific general satisfaction verbal survey with six yes/no items, one 5-point Likert scale item and one open-ended item	Unable to determine	Quantitative descriptive	100% of the surveys analyzed replied 'yes' to the six general satisfaction questions and rated overall satisfaction with TH intervention as 'excellent'
Jordan (2021)	Interview	Semi-structured interview guide	n/a	Thematic free coding	TH Benefits: avoiding travel, saving time and money, more frequent visits, and improving communication. Barriers: technical difficulties, concerns about sharing over video, privacy concerns, and lack of an exam
Lindsay (2017)	Interview	Not reported	5% (5/93)	Quantitative n/a Directed content analysis	Patients reported TH addressed barriers to care such as distance, transportation, parking, work schedules, and health conditions that made travel difficult. Also reported certain topics may be better suited to discuss in-person.
Locke (2019)	Questionnaire Chart Review	Program evaluation survey, Likert scale not specified	91% (67/74)	Quantitative descriptive	*Percent agreement, n* (%): Prefer TH program to in-person, 64 (95.5); Program is convenient, 56 (83.6); saves time, 48 (71.6); saves travel expenses, 58(86.6). 37 (57%) patients reported technical issues occurred never or rarely; 16 (24.6%) reported most or every time.
Schlittenhardt (2016)	Questionnaire	Utah Telehealth Satisfaction survey, seven 5-point Likert scale items, and "several" open-ended items	100% (7/7)	Quantitative descriptive Thematic analysis	*QUAN:* mean (range): TH made it easier to get care today 4.71 (4-5); Next time prefer to see provider in-person, 2.43 (1-4; lower score = higher TH preference) *QUAL:* Theme of convenience: reduced time and need of transportation; Fewer costs in gas, mileage, and food

First Author (Year)	Data Collection Method	Tool(s)/Measures	Response Rate[a]	Data Analysis	Key Patient Experience Findings
Silvestrini (2021)	Interview	Semi-structured interview guide	48% (16/33)	Thematic analysis	TH patient experience themes: TH pain care is convenient and alleviates travel burden; Able to use the TH technology without significant issues
Solomons (2018)	Questionnaire	Two Surveys with 4-point Likert scale items adapted from Yip TM and Utah TH Satisfaction scales: six items post-appointment, five items 1-month post	Post: 85%[i] (90/106) 1-month: 46% (41/90)	Quantitative descriptive analysis with scores dichotomized to agree/disagree	*Percent Agreed:* Did not need help using TH, 97%; TH met my needs, 87%; Better access to care with TH, 95%; Prefer in-person, 32%; Would use TH again, 98%. *Disagreed:* TH met my needs, 13%
Talarico (2020)	Questionnaire	Study-developed survey with seven 4-point Likert scale and 5 yes/no items	Unable to determine	Quantitative descriptive	87% of survey respondents indicated they would use TH again and would recommend it to others; 90% were satisfied with audio/visual quality and personal comfort
Whealin (2017)	Questionnaire	Mobile TH Technology Impact Questionnaire, with 10 scaled and 1 open-ended items; 12-item, 6-point Likert scaled VHA[j] Perceptions of Home-Based Tele-mental Health Questionnaire; 8-item, 5-point Likert scaled VHA mobile TH Patient Satisfaction Questionnaire	100% (29/29 TH users)	Quantitative descriptive analysis of Satisfaction survey; paired *t*-tests of pre- to post-treatment Perceptions of HTMH scores	Paired *t*-tests, pre- to post-treatment (*T, p*): Enough therapist contact in HTMH (-2.18,[k] *p*=0.04); Easy to communicate with therapist using HTMH (-2.02, *p*=0.05). *Percent agree or strongly agree:* Comfortable interacting with provider, 100%; Same level of provider rapport, 51%; Tech disruptions impacted overall satisfaction, 11%; Would rather use HTMH than travel, 72%

[a] Assessment response rate as percent of enrolled participants, if applicable
[b] Batsis et al. (2019) and Batsis et al. (2020) report on one study; Patient experience assessment methods reported in Batsis et al. (2019)
[c] TH, telehealth
[d] PTSD, post-traumatic stress disorder
[e] Unable to determine: response rate not able to be determined due to incomplete or unclear reporting of eligibility, enrollment, and/or completion data
[f] Quantitative n/a: quantitative analysis not applicable because the quantitative strand did not address patient experiences
[g] n/a, not applicable: response rate as percent of enrolled participants not applicable because survey/interview response constituted enrollment
[h] OCD, obsessive-compulsive disorder
[i] Only remote (TH using) group completed TH satisfaction and acceptability surveys
[j] VHA, Veterans Health Administration
[k] negative *T* value indicates increased agreement

Table 2.5. Primary and secondary study outcomes.

First Author (Year)	Outcomes						
	Patient Experience with TH[1]	Provider Perspective	Program Evaluation		Patient Costs Saved[2]	Services Provided	Intervention or Clinical Outcomes
			Feasibility	Barriers & Facilitators			
1. Batsis (2019)	+[3]		+				✓[4]
2. Batsis (2020)	✓	+		+	✓		
3. Bauer (2021)	+		+				+
4. Cheung (2021)	+		+		✓	+	
5. Dang (2018)	+		+			✓	
6. Davis (2019)	+	✓	+		✓		
7. Day (2021)	+	+				+	
8. Demirci (2019)	+		+				
9. Ferucci (2022)	+	+		+			
10. Finley (2021)	+						
11. Fletcher (2022)	+		+				+
12. Goldstein (2022)	+	+					
13. Greteman (2022)	✓						
14. Holtz (2022)	+			+			
15. Hutchinson (2022)	+	+	+				+
16. Ihrig (2019)	✓				+		
17. Jordan (2021)	+	+					
18. Lindsay (2017)	✓	✓	+	+	✓		
19. Locke (2019)	+				✓		+
20. Schlitten-hardt (2016)	✓	✓	+				+
21. Silvestrini (2021)	+						+
22. Solomons (2018)	✓						+
23. Talarico (2020)	✓					+	+
24. Whealin (2017)	+						

[1] TH, telehealth
[2] Travel cost saved in time, distance, and/or monetary savings
[3] +, Primary study outcome
[4] ✓, Secondary study outcome

Table 2.6. Quantitative patient experience outcomes assessed, by review-identified category and reporting study.

Outcome Category	Number of Articles	Outcome Assessed	Number of Articles	Articles Reporting
Patient Satisfaction	12	Overall Satisfaction	6	Batsis et al. (2019), Dang et al., Davis et al., Ihrig, Solomons et al., Talarico
		Preference for Telehealth	5	Dang et al., Locke et al., Schlittenhardt, Solomons et al., Whealin et al.
		Comparing to In-Person	4	Batsis et al. (2019), Cheung et al., Davis et al., Hutchinson et al.
		Continue with Telehealth	6	Batsis et al. (2019), Dang et al., Davis et al., Solomons et al., Talarico, Whealin et al.
		Acceptability	4	Batsis et al. (2019), Cheung et al., Ferucci et al., Whealin et al.
Characteristics of Telehealth Care	10	Overall Quality	5	Batsis et al. (2019), Davis et al., Ferucci et al., Solomons et al., Whealin et al.
		Privacy	7	Dang et al., Ihrig, Locke et al., Schlittenhardt, Solomons et al., Talarico, Whealin et al.
		Convenience	4	Dang et al., Davis et al., Locke et al., Whealin et al.
		Comfort	3	Locke et al., Talarico, Whealin et al.
		Physical Exam	2	Dang et al., Ferucci et al.
Patient-Provider Rapport	10	Communication	7	Batsis et al. (2019), Dang et al., Davis et al., Ferucci et al., Holtz et al., Hutchinson et al., Whealin et al.
		Patient-provider relationship	3	Dang et al., Locke et al., Whealin et al.
		Provider Characteristics	3	Cheung et al., Holtz et al., Ihrig
Technology Elements	12	Audio and Visual Quality	7	Batsis et al. (2019), Cheung et al., Dang et al., Holtz et al., Schlittenhardt, Solomons et al., Talarico
		Technical Issues or Concerns	4	Bauer et al., Ferucci et al., Locke et al., Whealin et al.
		Comfort with Telehealth Technology	6	Batsis et al. (2019 & 2020), Ferucci et al., Greteman et al., Solomons et al., Whealin et al.
		Video Experience	1	Bauer
Access	9	Perceived Healthcare Access	6	Batsis et al. (2019), Dang et al., Locke et al., Schlittenhardt, Solomons et al., Whealin et al.
		Patient Savings	5	Batsis et al. (2019), Davis et al., Ferucci et al., Locke et al., Whealin et al.
		Telehealth Usage	2	Ferucci et al., Greteman et al.
		Rurality	1	Batsis et al. (2020)

References

1. Bolin JN, Bellamy GR, Ferdinand AO, Vuong AM, Kash BA, Schulze A, et al. Rural healthy people 2020: New decade, same challenges. J Rural Health. 2015;31(3):326-33. doi: 10.1111/jrh.12116.

2. National Quality Forum . A core set of rural-relevant measures and measuring and improving access to care: 2018 recommendations from the MAP Rural Health Workgroup. Washington, DC.: National Quality Forum; 2018 Aug. 31.

3. Larson E, Andrilla C, Garberson L. Supply and distribution of the primary care workforce in rural America: 2019. Seattle, WA.: WWAMI Rural Health Research Center, University of Washington; 2020 June. Policy brief #167.

4. Meit M, Knudson A, Gilbert T, Tzy-Chyi Yu A, Tanenbaum E, Ormson E, et al. The 2014 update of the rural-urban chartbook. Rural Health Reform Policy Research Center; 2014 October.

5. Moy E, Garcia MC, Bastian B, Rossen LM, Ingram DD, Faul M, et al. Leading causes of death in nonmetropolitan and metropolitan areas—United States, 1999-2014. MMWR CDC Surveill Summ. 2017 Jan 13;66(1):1-8. PMID: 28081058. doi: 10.15585/mmwr.ss6601a1.

6. Dorsey ER, Topol EJ. State of telehealth. N Engl J Med. 2016;375(2):154-61. doi: 10.1056/NEJMra1601705.

7. World Health Organization . Telemedicine: opportunities and developments in member states. Report on the second global survey on eHealth. Geneva, CH: World Health Organization; 2010. ISBN: 9241564148.

8. Totten AM, McDonagh MS, Wagner JH. The evidence base for telehealth: Reassurance in the face of rapid expansion during the COVID-19 Pandemic. White Paper Commentary.

Rockville, MD. Agency for Healthcare Research and Quality; 2020 May. AHRQ Publication No. 20-EHC015.

9. Centers for Medicare & Medicaid Services . Medicare Telemedicine Health Care Provider Fact Sheet. 2020 [April 21, 2023].

10. Samson LW, Tarazi W, Turrini G, Sheingold S. Medicare beneficiaries' use of telehealth in 2020 — Trends by beneficiary characteristics and location. Washington, DC. : Office of the Assistant Secretary for Plannnig and Evaluation, U.S. Department of Health and Human Services; 2021 December. Issue Brief No. HP-2021-27.

11. Center for Connected Health Policy/Public Health Institute . An Analysis of Private Payer Telehealth Coverage During the COVID-19 Pandemic. National Telehealth Policy Resource Center; 2021.

12. Weiner JP, Bandeian S, Hatef E, Lans D, Liu A, Lemke KW. In-person and telehealth ambulatory contacts and costs in a large US insured cohort before and during the COVID-19 pandemic. JAMA Netw Open. 2021;4(3). doi: 10.1001/jamanetworkopen.2021.2618.

13. Demeke HB, Merali S, Marks S, Pao LZ, Romero L, Sandhu P, et al. Trends in use of telehealth among health centers during the COVID-19 pandemic—United States, June 26-November 6, 2020. MMWR Morb Mortal Wkly Rep. 2021;70(7):240-4. doi: 10.15585/mmwr.mm7007a3.

14. Shaver J. The state of telehealth before and after the COVID-19 pandemic. Prim Care. 2022 Dec;49(4):517-30. PMID: 36357058. doi: 10.1016/j.pop.2022.04.002.

15. Cantor JH, McBain RK, Pera MF, Bravata DM, Whaley CM. Who is (and is rot) receiving telemedicine care during the COVID-19 pandemic. Am J Prev Med. 2021 2021/09/01/;61(3):434-8. doi: 10.1016/j.amepre.2021.01.030.

16. Poeran J, Cho LD, Wilson L, Zhong H, Mazumdar M, Liu J, et al. Pre-existing disparities and potential implications for the rapid expansion of telemedicine in response to the coronavirus disease 2019 pandemic. Med Care. 2021 Aug 1;59(8):694-8. PMID: 34054024. doi: 10.1097/mlr.0000000000001585.

17. Lee EC, Grigorescu V, Enogieru I, Smith SR, Samson LW, Conmy AB, et al. Updated national survey trends in telehealth utilization and modality (2021-2022). Washington, DC.: Office of the Assistant Secretary for Planning and Evaluation, US Department of Health and Human Services; 2023 April. Issue Brief No. HP-2023-09.

18. Chen J, Li KY, Andino J, Hill CE, Ng S, Steppe E, et al. Predictors of audio-only versus video telehealth visits during the COVID-19 pandemic. J Gen Intern Med. 2022 Apr;37(5):1138-44. PMID: 34791589. doi: 10.1007/s11606-021-07172-y.

19. Drake C, Lian T, Cameron B, Medynskaya K, Bosworth HB, Shah K. Understanding telemedicine's "new normal": Variations in telemedicine use by specialty line and patient demographics. Telemed J E Health. 2022 Jan;28(1):51-9. PMID: 33769092. doi: 10.1089/tmj.2021.0041.

20. Hsiao V, Chandereng T, Lankton RL, Huebner JA, Baltus JJ, Flood GE, et al. Disparities in telemedicine access: A cross-sectional study of a newly established infrastructure during the COVID-19 pandemic. Appl Clin Inform. 2021;12(03):445-58. doi: 10.1055/s-0041-1730026.

21. Eberly LA, Kallan MJ, Julien HM, Haynes N, Khatana SAM, Nathan AS, et al. Patient characteristics associated with telemedicine access for primary and specialty ambulatory care during the COVID-19 pandemic. JAMA Netw Open. 2020 Dec 1;3(12):e2031640. PMID: 33372974. doi: 10.1001/jamanetworkopen.2020.31640.

22. Eruchalu CN, Bergmark RW, Smink DS, Tavakkoli A, Nguyen LL, Bates DW, et al. Demographic disparity in use of telemedicine for ambulatory general surgical consultation during the COVID-19 pandemic: Analysis of the initial public health emergency and second phase periods. Journal of the American College of Surgeons. 2022;234(2):191-202. PMID: 00019464-202202000-00014. doi: 10.1097/xcs.0000000000000030.

23. Luo J, Tong L, Crotty BH, Somai M, Taylor B, Osinski K, et al. Telemedicine adoption during the COVID-19 pandemic: Gaps and inequalities. Appl Clin Inform. 2021;12(4):836-44. doi: 10.1055/s-0041-1733848.

24. Benjenk I, Franzini L, Roby D, Chen J. Disparities in audio-only telemedicine use among Medicare beneficiaries during the Coronavirus Disease 2019 Pandemic. Med Care. 2021 Nov 1;59(11):1014-22. PMID: 34534186. doi: 10.1097/mlr.0000000000001631.

25. Hsiao V, Chandereng T, Huebner JA, Kunstman DT, Flood GE, Tevaarwerk AJ, et al. Telemedicine use across medical specialties and diagnoses. Appl Clin Inform. 2023 Jan;14(1):172-84. PMID: 36858112. doi: 10.1055/s-0043-1762595.

26. Rodriguez JA, Betancourt JR, Sequist TD, Ganguli I. Differences in the use of telephone and video telemedicine visits during the COVID-19 pandemic. Am J Manag Care. 2021;27(1):21-6. doi: 10.37765/ajmc.2021.88573.

27. Frank L, Basch E, Selby JV. The PCORI perspective on patient-centered outcomes research. JAMA. 2014;312(15):1513-4. doi: 10.1001/jama.2014.11100.

28. Doyle C, Lennox L, Bell D. A systematic review of evidence on the links between patient experience and clinical safety and effectiveness. BMJ Open. 2013;3(1):e001570. doi: 10.1136/bmjopen-2012-001570.

29. Bailey JE, Gurgol C, Pan E, Njie S, Emmett S, Gatwood J, et al. Early patient-centered outcomes research experience with the use of telehealth to dddress disparities: Scoping review. J Med Internet Res. 2021 2021/12/7;23(12):e28503. doi: 10.2196/28503.

30. Kruse CS, Krowski N, Rodriguez B, Tran L, Vela J, Brooks M. Telehealth and patient satisfaction: A systematic review and narrative analysis. BMJ Open. 2017;7(8). doi: 10.1136/bmjopen-2017-016242.

31. Orlando JF, Beard M, Kumar S. Systematic review of patient and caregivers' satisfaction with telehealth videoconferencing as a mode of service delivery in managing patients' health. PLoS One. 2019;14(8). doi: 10.1371/journal.pone.0221848.

32. Butzner M, Cuffee Y. Telehealth interventions and outcomes across rural communities in the United States: Narrative review. J Med Internet Res. 2021;23(8). doi: 10.2196/29575.

33. Aashima, Nanda M, Sharma R. A review of patient satisfaction and experience with telemedicine: A virtual solution during and beyond COVID-19 pandemic. Telemed J E Health. 2021;27(12):1325-31. doi: 10.1089/tmj.2020.0570.

34. Alsabeeha NH, Atieh MA, Balakrishnan MS. Older adults' satisfaction with telemedicine during the COVID-19 pandemic: A systematic review. Telemed J E Health. 2023;29(1):38-49. doi: 10.1089/tmj.2022.0045.

35. Harkey LC, Jung SM, Newton ER, Patterson A. Patient satisfaction with telehealth in rural settings: A systematic review. Int J Telerehabil. 2020;12(2):53-64. doi: 10.5195/ijt.2020.6303.

36. Chaudhry H, Nadeem S, Mundi R. How satisfied are patients and surgeons with telemedicine in orthopaedic scare During the COVID-19 Pandemic? A systematic review and

meta-analysis. Clin Orthop Relat Res. 2021 Jan 1;479(1):47-56. PMID: 33009231. doi: 10.1097/corr.0000000000001494.

37. Steindal SA, Nes AAG, Godskesen TE, Dihle A, Lind S, Winger A, et al. Patients' experiences of telehealth in palliative home care: Scoping review. J Med Internet Res. 2020;22(5). doi: 10.2196/16218.

38. Brundisini F, Giacomini M, DeJean D, Vanstone M, Winsor S, Smith A. Chronic disease patients' experiences with accessing health care in rural and remote areas: a systematic review and qualitative meta-synthesis. Ont Health Technol Assess Ser. 2013;13(15). doi: http://www.hqontario.ca/en/documents/eds/2013/full-report-OCDM-rural-health-care.pdf.

39. Douthit N, Kiv S, Dwolatzky T, Biswas S. Exposing some important barriers to health care access in the rural USA. Public Health. 2015;129(6):611-20. doi: 10.1016/j.puhe.2015.04.001.

40. Cheesmond NE, Davies K, Inder KJ. Exploring the role of rurality and rural identity in mental health help-seeking behavior: A systematic qualitative review. Rural Ment Health. 2019;43(1):45-59. doi: 10.1037/rmh0000109.

41. Pullyblank K. A scoping literature review of rural beliefs and attitudes toward telehealth utilization. West J Nurs Res. 2023;45(4):375-84. PMID: 36324263. doi: 10.1177/01939459221134374.

42. U.S. Department of Health and Human Services . Telehealth policy changes after the COVID-19 public health emergency. Washington, D.C.2023 [cited 2023 6/22/2023]; Available from: https://telehealth.hhs.gov/providers/telehealth-policy/policy-changes-after-the-covid-19-public-health-emergency.

43. Knapp A, Harst L, Hager S, Schmitt J, Scheibe M. Use of Patient-Reported Outcome Measures and Patient-Reported Experience Measures within evaluation studies of telemedicine applications: Systematic review. J Med Internet Res. 2021 2021/11/17;23(11). doi: 10.2196/30042.

44. Peters MDJ, Godfrey C, McInerney P, Munn Z, Tricco AC, Khalil H. Chapter 11: Scoping Reviews (2020 version). In: Aromataris E, Munn Z, editors. JBI Manual for Evidence Synthesis: JBI; 2020. p. 406-51.

45. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. 2018 Oct 2;169(7):467-73. PMID: 30178033. doi: 10.7326/m18-0850.

46. Peters MD, Godfrey CM, Khalil H, McInerney P, Parker D, Soares CB. Guidance for conducting systematic scoping reviews. JBI Evid Implement. 2015;13(3):141-6. doi: 10.1097/XEB.0000000000000050.

47. Peters MDJ, Marnie C, Tricco AC, Pollock D, Munn Z, Alexander L, et al. Updated methodological guidance for the conduct of scoping reviews. JBI Evid Synth. 2020;18(10):2119-26. PMID: 02174543-202010000-00004. doi: 10.11124/jbies-20-00167.

48. Levac D, Colquhoun H, O'Brien KK. Scoping studies: Advancing the methodology. Implement Sci. 2010 2010/09/20;5(1). doi: 10.1186/1748-5908-5-69.

49. Hsieh H-F, Shannon SE. Three approaches to qualitative content analysis. Qual Health Res. 2005;15(9):1277-88. doi: 10.1177/1049732305276687.

50. LaVela SL, Gallan A. Evaluation and measurement of patient experience. Patient Exp J. 2014;1(1):28-36. doi: 10.35680/2372-0247.1003.

51. Ahmed F, Burt J, Roland M. Measuring patient experience: Concepts and methods. Patient. 2014;7:235-41. doi: 10.1007/s40271-014-0060-5.

52. Hollander J, Ward M, Alverson D, Bashshur R, Darkins A, DePhillips H. Creating a framework to support measure development for telehealth. Washington, DC. National Quality Forum; 2017 August 31.

53. Munn Z, Peters MD, Stern C, Tufanaru C, McArthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. BMC Med Res Methodol. 2018;18(143). doi: 10.1186/s12874-018-0611-x.

54. Harrison R, Jones B, Gardner P, Lawton R. Quality assessment with diverse studies (QuADS): An appraisal tool for methodological and reporting quality in systematic reviews of mixed-or multi-method studies. BMC Health Serv Res. 2021;21(144). doi: 10.1186/s12913-021-06122-y.

55. Sirriyeh R, Lawton R, Gardner P, Armitage G. Reviewing studies with diverse designs: the development and evaluation of a new tool. J Eval Clin Pract. 2012;18(4):746-52. doi: 10.1111/j.1365-2753.2011.01662.x.

56. Moher D, Liberati A, Tetzlaff J, Altman DG, Group P. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. PLoS Med. 2009;6(7). doi: 10.1371/journal.pmed.1000097.

57. Batsis JA, McClure AC, Weintraub AB, Kotz DF, Rotenberg S, Cook SB, et al. Feasibility and acceptability of a rural, pragmatic, telemedicine-delivered healthy lifestyle programme. Obes Sci Pract. 2019;5(6):521-30. doi: 10.1002/osp4.366.

58. Batsis JA, McClure AC, Weintraub AB, Sette D, Rotenberg S, Stevens CJ, et al. Barriers and facilitators in implementing a pilot, pragmatic, telemedicine-delivered healthy lifestyle

program for obesity management in a rural, academic obesity clinic. Implement Sci Commun. 2020;1(1):1-9. doi: 10.1186/s43058-020-00075-9.

59. Bauer A, Amspoker AB, Fletcher TL, Jackson C, Jacobs A, Hogan J, et al. A resource building virtual care programme: Improving symptoms and social functioning among female and male rural veterans.

Eur J Psychotraumatol. 2021;12(1). doi: 10.1080/20008198.2020.1860357.

60. Cheung KL, Tamura MK, Stapleton RD, Rabinowitz T, LaMantia MA, Gramling R. Feasibility and acceptability of telemedicine-facilitated palliative care consultations in rural dialysis units. J Palliat Med. 2021;24(9):1307-13. doi: 10.1089/jpm.2020.0647.

61. Dang S, Gomez-Orozco CA, van Zuilen MH, Levis S. Providing dementia consultations to veterans using clinical video telehealth: results from a clinical demonstration project. Telemed J E Health. 2018;24(3):203-9. doi: 10.1089/tmj.2017.0089.

62. Davis LE, Harnar J, LaChey-Barbee LA, Pirio Richardson S, Fraser A, King MK. Using teleneurology to deliver chronic neurologic care to rural veterans: Analysis of the first 1,100 patient visits. Telemed J E Health. 2019;25(4):274-8. doi: 10.1089/tmj.2018.0067.

63. Day SC, Day G, Keller M, Touchett H, Amspoker AB, Martin L, et al. Personalized implementation of video telehealth for rural veterans (PIVOT-R). Mhealth. 2021;7(24). doi: 10.21037/mhealth.2020.03.02.

64. Demirci J, Kotzias V, Bogen DL, Ray KN, Uscher-Pines L. Telelactation via mobile app: Perspectives of rural mothers, their care providers, and lactation consultants. Telemed J E Health. 2019;25(9):853-8. doi: 10.1089/tmj.2018.0113.

65. Ferucci ED, Choromanski TL, Arnold RI, Richards JK, Jessen CM. Perspectives of patients and providers on the use of telemedicine for chronic disease specialty care in the Alaska Tribal Health System. Telemed J E Health. 2022;28(4):535-43. doi: 10.1089/tmj.2021.0175.

66. Finley BA, Palitsky R, Charteris E, Pacheco C, Kapoor D. Outpatient telecardiology perceptions among rural, suburban, and urban veterans utilizing in-person cardiology versus telecardiology services: A mixed methods analysis. J Rural Health. 2021;37(4):812-20. doi: 10.1111/jrh.12586.

67. Fletcher TL, Boykin DM, Helm A, Dawson DB, Ecker AH, Freshour J, et al. A pilot open trial of video telehealth-delivered exposure and response prevention for obsessive-compulsive disorder in rural Veterans. Mil Psychol. 2022;34(1):83-90. doi: 10.1080/08995605.2021.1970983.

68. Goldstein KM, Perry KR, Lewinski A, Walsh C, Shepherd-Banigan ME, Bosworth HB, et al. How can equitable video visit access be delivered in primary care? A qualitative study among rural primary care teams and patients. BMJ Open. 2022;12(8). doi: 10.1136/bmjopen-2022-062261.

69. Greteman BB, Garcia-Auguste CJ, Gryzlak BM, Kahl AR, Lutgendorf SK, Chrischilles EA, et al. Rural and urban differences in perceptions, behaviors, and health care disruptions during the COVID-19 pandemic. J Rural Health. 2022;38(4):932-44. doi: DOI: 10.1111/jrh.12667.

70. Holtz B, Mitchell K, Hirko K, Ford S. Using the technology acceptance model to characterize barriers and opportunities of telemedicine in rural populations: Survey and interview study. JMIR Form Res. 2022;6(4). doi: 10.2196/35130.

71. Hutchinson RN, Anderson EC, Ruben MA, Manning N, John L, Daruvala A, et al. A Formative Mixed-Methods Study of Emotional Responsiveness in Telepalliative Care. Journal of palliative medicine. 2022;25(8):1258-67.

72. Ihrig C. Travel cost savings and practicality for low-vision telerehabilitation. Telemed J E Health. 2019;25(7):649-54. doi: 10.1089/tmj.2018.0092.

73. Jordan DN, Jessen CM, Ferucci ED. Views of patients and providers on the use of telemedicine for chronic disease specialty care in the Alaska native population. Telemed J E Health. 2021;27(1):82-9. doi: 10.1089/tmj.2019.0284.

74. Lindsay JA, Hudson S, Martin L, Hogan JB, Nessim M, Graves L, et al. Implementing video to home to increase access to evidence-based psychotherapy for rural veterans. J Technol Behav Sci. 2017;2(3):140-8. doi: 10.1007/s41347-017-0032-4.

75. Locke ER, Thomas RM, Woo DM, Nguyen EH, Tamanaha BK, Press VG, et al. Using video telehealth to facilitate inhaler training in rural patients with obstructive lung disease. Telemed J E Health. 2019;25(3):230-6. doi: 10.1089/tmj.2017.0330.

76. Schlittenhardt M. Tele-continence care: A novel approach for providers. Urol Nurs. 2016;36(5). doi: 10. 7257/1053-816X.2016.36.5.217.

77. Silvestrini M, Indresano J, Zeliadt SB, Chen JA. “There’s a huge benefit just to know that someone cares”: A qualitative examination of rural veterans’ experiences with TelePain. BMC Health Serv Res. 2021;21(1111). doi: 10.1186/s12913-021-07133-5.

78. Solomons NM, Lamb AE, Lucas FL, McDonald EF, Miesfeldt S. Examination of the patient-focused impact of cancer telegenetics among a rural population: Comparison with traditional in-person services. Telemed J E Health. 2018;24(2):130-8. doi: 10.1089/tmj.2017.0073.

79. Talarico I. The use of telehealth to increase mental health services access and promote medication adherence in rural locations. 2020. doi: 10.1097/JXX.0000000000000495.

80. Whealin JM, King L, Shore P, Spira J. Diverse veterans' pre-and post-intervention perceptions of home telemental health for posttraumatic stress disorder delivered via tablet. Int J Psychiatry Med. 2017;52(1):3-20. doi: 10.1177/0091217417703291.

81. Gage H, Grainger L, Ting S, Williams P, Chorley C, Carey G, et al. Specialist rehabilitation for people with Parkinson's disease in the community: A randomised controlled trial. Health Serv Deliv Res. 2014 2014;2(51). PMID: 25642574. doi: 10.3310/hsdr02510.

82. Noble NE, Paul CL, Carey ML, Sanson-Fisher RW, Blunden SV, Stewart JM, et al. A cross-sectional survey assessing the acceptability and feasibility of self-report electronic data collection about health risks from patients attending an Aboriginal Community Controlled Health Service. BMC Med Inform Decis Mak. 2014;14. doi: 10.1186/1472-6947-14-34.

83. Holtz BE. Patients perceptions of telemedicine visits before and after the coronavirus disease 2019 pandemic. Telemed J E Health. 2021;27(1):107-12. doi: 10.1089/tmj.2020.0168.

84. Yip MP, Mackenzie A, Chan J. Patient satisfaction with telediabetes education in Hong Kong. J Telemed Telecare. 2002;8(1):48-51. PMID: 11809085. doi: 10.1258/1357633021937460.

85. Bull C, Byrnes J, Hettiarachchi R, Downes M. A systematic review of the validity and reliability of patient-reported experience measures. Health Serv Res. 2019;54(5):1023-35. doi: 10.1111/1475-6773.13187.

86. Airola E. Learning and use of eHealth among older adults living at home in rural and nonrural Settings: Systematic review. J Med Internet Res. 2021;23(12). doi: 10.2196/23804.

87. Roberts ET, Mehrotra A. Assessment of disparities in digital access among Medicare beneficiaries and implications for telemedicine. JAMA Intern Med. 2020;180(10):1386-9. doi: 10.1001/jamainternmed.2020.2666.

88. Lam K, Lu AD, Shi Y, Covinsky KE. Assessing telemedicine unreadiness among older adults in the United States during the COVID-19 pandemic. JAMA Intern Med. 2020;180(10):1389-91. doi: 10.1001/jamainternmed.2020.2671.

89. Johnson KM. Rural America lost population over the past decade for the first time in history. Durham, NH. Carsey School of Public Policy, University of New Hampshire; 2022. National Issue Brief #160.

90. Almathami HKY, Win KT, Vlahu-Gjorgievska E. Barriers and facilitators that influence telemedicine-based, real-time, online consultation at patients' homes: Systematic literature review. J Med Internet Res. 2020;22(2). doi: 10.2196/16407.

91. Lythreatis S, Singh SK, El-Kassar A-N. The digital divide: A review and future research agenda. Technol Forecast Soc Change. 2022 2022/02/01/;175:121359. doi: https://doi.org/10.1016/j.techfore.2021.121359.

92. NPR, Harvard TH Chan School of Public Health . Life in Rural America: Part II. May 2019. Available at: https://www.hsph.harvard.edu/horp/npr-harvard/life-in-rural-america/.

93. Zahnd WE, Bell N, Larson AE. Geographic, racial/ethnic, and socioeconomic inequities in broadband access. J Rural Health. 2022;38(3):519-26. doi: 10.1111/jrh.12635.

94. Acharya M, Shoults CC, Hayes CJ, Brown CC. Association between broadband capacity and social vulnerability factors in the United States: A county-level spatial analysis. Popul Health Manag. 2022;25(6):798-806. doi: 10.1089/pop.2022.0189.

95. Chagpar AB. Sociodemographic factors affecting telemedicine access: A population-based analysis. Surgery. 2022;171(3):793-8. doi: 10.1016/j.surg.2021.08.059.

96. Rush KL, Seaton CL, Corman K, Hawe N, Li EPH, Dow-Fleisner SJ, et al. Virtual care prior to and during COVID-19: Cross-sectional survey of rural and urban adults. JMIR Form Res. 2022;6(8). doi: 10.2196/37059.

97. Mason AN, Brown M, Mason K. Telemedicine patient satisfaction dimensions moderated by patient demographics. Healthcare. 2022;10(6). doi: 10.3390/healthcare10061029.

98. Chang JE, Lai AY, Gupta A, Nguyen AM, Berry CA, Shelley DR. Rapid transition to telehealth and the digital divide: Implications for primary care access and equity in a post-COVID era. Milbank Q. 2021;99(2):340-68. doi: 10.1111/1468-0009.12509.

99. Henning-Smith CE, Hernandez AM, Hardeman RR, Ramirez MR, Kozhimannil KB. Rural counties with majority Black Or Indigenous Populations suffer the highest rates of premature death in the US. Health Aff (Millwood). 2019 Dec;38(12):2019-26. PMID: 31794313. doi: 10.1377/hlthaff.2019.00847.

100. James CV, Moonesinghe R, Wilson-Frederick SM, Hall JE, Penman-Aguilar A, Bouye K. Racial/ethnic health disparities among rural adults—United States, 2012–2015. MMWR Surveillance Summaries. 2017;66(23):1. PMID: 29145359. doi: 0.15585/mmwr.ss6623a1.

101. Kozhimannil KB, Henning-Smith C. Racism and health in rural America. Journal of Health Care for the Poor and Underserved. 2018;29(1):35-43. doi: 10.1353/hpu.2018.0004.

102. Johnson KM, Lichter DT. Growing racial diversity in rural America: Results from the 2020 Census. Durham, NH. Carsey School of Public Policy, University of New Hampshire; 2022. National Issue Brief #163.

103. Larson EH, Patterson DG, Garberson LA, Andrilla CHA. Supply and distribution of the behavioral health workforce in rural America. Seattle, WA. Data Brief #160: WWAMI Rural Health Research Center, University of Washington; 2016 September. Data Brief #160.

104. Totten AM, Womack DM, Griffin JC, McDonagh MS, Davis-O'Reilly C, Blazina I, et al. Telehealth-guided provider-to-provider communication to improve rural health: A systematic review. J Telemed Telecare. 2022;0(0). PMID: 36567431. doi: 10.1177/1357633x221139892.

105. Golembiewski EH, Gravholt DL, Roldan VDT, Naranjo EPL, Vallejo S, Bautista AG, et al. Rural patient experiences of accessing care for chronic conditions: A systematic review and thematic synthesis of qualitative studies. Ann Fam Med. 2022;20(3):266-72. doi: 10.1370/afm.2798.

106. Duane J-N, Blanch-Hartigan D, Sanders JJ, Caponigro E, Robicheaux E, Bernard B, et al. Environmental considerations for effective telehealth encounters: A narrative review and implications for best practice. Telemed J E Health. 2022;28(3):309-16. doi: 10.1089/tmj.2021.0074.

107. Lucas JW, Villarroel MA. Telemedicine use among adults: United States, 2021. Hyattsville, MD.: National Center for Health Statistics; 2022 October. NCHS Data Brief No. 445.

108. Chu C, Cram P, Pang A, Stamenova V, Tadrous M, Bhatia RS. Rural telemedicine use before and during the COVID-19 Pandemic: Repeated cross-sectional study. J Med Internet Res. 2021 Apr 5;23(4). PMID: 33769942. doi: 10.2196/26960.

109. Lee J, Capra G, Klobucar T. Forging new paths to integrate rural veterans' care nationwide. J Rural Health. 2016;32(4):374-6. doi: 10.1111/jrh.12214.

Chapter 3

Demographic and Encounter Characteristics of Rural California Telehealth Utilizers

Introduction

In the United States, rural populations experience worse outcomes related to the most common health conditions, as well as a higher burden of morbidity and mortality compared to urban populations [1-5]. These rural health disparities are often more pronounced among rural populations of color, who make up about 20% of rural United States residents [3, 6, 7]. Rural health disparities negatively impact rural social systems and prevent rural communities from thriving [8].

A major contributor to rural health disparities is limited healthcare access, a chronic issue with multifaceted causes, including structural factors that constrain the overall availability of healthcare in rural areas [4, 8-10]. Long-term trends in healthcare organization and rural economies have resulted in reduction of services or closure for hundreds of rural healthcare facilities nationwide, including hospitals, nursing homes, and pharmacies [3, 8, 11]. Maldistribution of the healthcare workforce between urban and rural areas also limits rural healthcare access with severe shortages of rural healthcare providers, including in primary care but most extreme among specialist providers [4, 12-15].

Telehealth, the virtual delivery of healthcare using communication technologies, is seen as one way to improve rural healthcare access, by connecting rural patients to remote healthcare providers where they already practice [16-18]. Despite this promise, widespread scale-up of telehealth provision was not realized until the coronavirus disease (COVID-19) pandemic, which necessitated an abrupt shift away from in-person care in March 2020. Subsequent telehealth reimbursement expansions by both the Centers for Medicare and Medicaid Services (CMS) and private insurers resulted in rapid, dramatic increases in the share of healthcare encounters conducted via telehealth [19-21].

More than three years after the declaration of the COVID-19 Public Health Emergency (PHE), however, a picture has emerged of the mixed impact this rapid expansion has had on telehealth access. While the rapid expansion of telehealth appears to have improved access for some patients [19], evidence showed that telehealth utilization followed historical healthcare and telehealth access disparity trends [22], revealing lower use among patients who are rural dwelling [19, 21, 23, 24], lower income [21, 23], uninsured [25], and belong to certain race/ethnicity groups [19, 23]. Furthermore, the use of video versus audio-only telehealth modalities introduces a new dimension of disparity. It remains unclear whether audio-only or telephone visits support the same care quality as video [26-29], and video use has been shown to vary by age [29-33], income [32, 33], education [31-33], insurance [29, 30, 32, 33], race and ethnicity [29-34], patient language [29, 31, 32, 34], rurality [29, 34, 35], and area broadband availability [29, 32]. However, studies report sometimes contradictory telehealth and video visit utilization across patient characteristics, and findings vary by region [19, 23, 33], healthcare setting, specialty, and diagnosis [30, 31, 35].

Given the complexity of telehealth utilization, further research is needed to more fully understand how specific patient populations are using telehealth. This is of particular importance in specialized healthcare settings, where access barriers may be more pronounced, and among populations already at risk of access disparities, such as rural and populations of color. The purpose of this paper is to describe the demographic characteristics of a population of rural-dwelling adults in California who utilized telehealth services at a large urban academic medical center. We also describe visit characteristics of these patients' most recent telehealth encounters, including video or telephone modality. Finally, we explore the relationship of patient

demographic and telehealth encounter characteristics with the degree of patient rurality and with modality of patients' most recent telehealth encounter.

Data and Methods

Data and Study Setting

Data in this retrospective study was obtained from the electronic health records (EHR) of a large health system providing diverse specialty care, located in a major urban center in California. This health system also operates a network of primary care clinics in the larger metropolitan area; all but one are located in urban ZIP codes (see *Assigning Rurality*, below).

Data from patients with telehealth encounters at the health system in the one-year period from December 2021 to December 2022 was included in this study. We selected this timeframe as a later phase of the COVID-19 PHE, when telehealth care was well-established but in-person restrictions had been loosened and telehealth utilization had settled from its peak pandemic levels. For this study, telehealth visits were defined as video-enabled and telephone encounters between a patient and any provider type.

This study was reviewed by the university's institutional review board. As a retrospective chart review of de-identified patient data that had been previously collected as part of clinical care and quality improvement, it was deemed exempt from the requirement for informed consent and HIPAA authorization.

Study Population

All adult patients (≥18 years) in the health system residing in a rural California ZIP code who had at least one telehealth encounter in the study period (12/2021 – 12/2022) were included in the dataset. The study population was drawn from a geographically disperse area of California and included residents of ZIP codes in a radius hundreds of miles from the health center.

Assigning Rurality

Rural patients were identified using Rural-Urban Commuting Area (RUCA) Codes [36] ZIP code approximations from the Washington, Wyoming, Alaska, Montana, Idaho (WWAMI) Rural Health Research Center (RHRC) [37]. RUCA codes are assigned to US Census tracts based on population density, measures of urbanization, and daily commuting flows. The WWAMI RHRC database combines RUCA values from census tracts that comprise specific ZIP code areas [38]. We used a four-level urban-rural categorization of RUCA codes [39] (see Appendix): Urban; Large Rural City/Town (micropolitan), the most populous or least rural level; Small Rural Town; and Isolated Small Rural Town, the most rural level. All California ZIP codes in the three rural categories were included.

Patient Demographic Variables

We extracted the following patient demographic characteristics (see Table 3.1 for definitions): ZIP code, age, gender, race/ethnicity, preferred language, payer, and patient-portal activation status. Each patient was then grouped by ZIP code into one of the three rurality levels described above. EHR data at the health system does not have separate variables for race and ethnicity (e.g., Hispanic ethnicity); we used labels in the EHR (e.g., Latinx). Some categories of race/ethnicity and preferred language had very few observations in the Small Rural Town and Isolated Rural Town levels, and we combined categories of these variables for association tests.

Patients of the health system can create a patient portal, an online account to securely access personal health information and services such as provider messaging. At this health system, a patient portal account is not required for video visits. Patient-portal activation status was collected as a proxy for digital or eHealth literacy. Payer or insurance type was categorized as either Medicaid, Medicare, or Other Insurance.

Telehealth Encounter Variables

For each patient's most recent telehealth encounter in the period December 2021 to December 2022, we extracted telehealth modality, type of provider for the visit, and specialty area or clinic. There were 94 unique specialties represented in encounters; to allow tests of association, the research team condensed these into five categories (see Table 3.1). Telehealth modality was either video or telephone. Telephone visits were charted as "scheduled telephone" or "telephone" encounters; the latter are unscheduled calls to patients, for example to provide lab results. Although scheduled and unscheduled telephone encounters may differ in content, we collapsed these categories in order to compare telephone and video modalities. Furthermore, unscheduled telephone encounters made up a small proportion of all telehealth encounters.

Data Analysis

Statistical analysis was conducted from July 1 to October 17, 2023. We conducted descriptive statistical analysis of all patient demographic and telehealth encounter variables, with distribution of categorical variables and measures of central tendency for patient age, the only continuous variable. Descriptive statistics were calculated for the total sample, by rurality level, and by telehealth modality.

Pearson's chi-square test or Fisher's Exact test were used as appropriate to assess for significant associations between categorical variables. Because age was negatively skewed in this sample, the Kruskal-Wallis H test was used to test associations with continuous age.

Data were analyzed with Stata BE/17.0 (StataCorp, College Station, TX). For this study, statistical significance was determined at *P*-values <.05.

Results

Sample Population

There were 9,359 unique patients with an address in a rural California ZIP code who had at least one telehealth encounter with the health system from December 2021 to December 2022 (see Table 2). The majority lived in Large Rural Town ZIP codes (68.3%; *n* = 6,393); 16.5% (*n* = 1,543) lived in Small Rural Town ZIP codes and 15.2% (*n* = 1,423) lived in Isolated Rural Town ZIP codes. Of 506 rural ZIP codes in California, 331 were represented in the sample. One quarter of patients (25.2%) lived in just six ZIP codes, which were all Large Rural Towns, and 50.7% of patients lived in 21 ZIP codes, of which 19 were Large Rural Town and two Small Rural Town ZIP codes.

Demographic and Telehealth Encounter Characteristics by Rurality

Demographic and telehealth encounter characteristics are presented by rurality level in Table 2. Mean age of the sample was 56.1 years (median = 59.4, SD = 17.0) and increased as rurality increased. There was a statistically significant difference in age between the three rurality levels (Kruskal-Wallis H test, $X^2(df = 2) = 52.2$, $P<.001$). Dichotomous age, under and over 65 years, was also significantly associated with level of rurality ($X^2(df = 2) = 18.3$, $P<.001$). Patients 65 years or older made up 37.2% of the sample (*n* = 3,485); the proportion of those over 65 was lower in Large Rural Town ZIP codes (35.8%) and higher in Small Rural Town and Isolated Rural Town ZIP codes (39.3% and 41.3%, respectively). Level of rurality and gender were not significantly associated ($X^2(2) = 3.2$, $P=.21$).

The majority of rural telehealth patients (69.5%, *n* = 6,508) were White, 14.5% were Latinx (*n* = 1,352), 10.2% were another race/ethnicity, and 5.9% had unknown race/ethnicity. Race/ethnicity was significantly associated with rurality level ($X^2(df = 6) = 83.9$, $P<.001$).

Isolated Rural Town ZIP codes had less racial/ethnic diversity: 77.4% of patients in these ZIP codes were White. By contrast, Latinx patients made up a slightly larger share of the Small Rural Town grouping, at 16.3%. Race/ethnicity categories represented in the category Combined Other included Asian (1.5%, *n* = 142), Black or African American (1.1%, *n* = 105), Native American or Alaska Native (1.7%, *n* = 161), and Other (3.6%, *n* = 340).

English was the preferred language for 95.4% of the sample, with 4.1% of telehealth patients preferring Spanish, and 0.5% preferring one of 21other languages. Language and rurality level were significantly associated (Fisher's Exact, two-tailed *P*<.001). Aligning with Latinx race/ethnicity, the highest proportion of primary Spanish-speakers was in the Small Rural Town grouping (5.6%), while the proportion in the Isolated Rural Town grouping was substantially lower (1.2%).

At 44.8% of the sample, the largest payer group was Medicare (*n* = 4,193) followed by Other Insurance at 35.3% (*n* = 3,304), and MediCal at 19.9% of the sample (*n* = 1,862). Payer was significantly associated with rurality level ($X^2(4) = 40.8$, *P*<.001). Nearly a quarter (23.3%, *n* = 975) of Medicare recipients were aged 18 to 64 years. There were more Medicare recipients in Small Rural Town and Isolated Rural Town (48.1% and 49.3%, respectively), compared to Large Rural Town ZIP codes (35.9%). More MediCal patients were in Large Rural Town compared to Small and Isolated Rural Town ZIP codes, while the Isolated Rural Town grouping had notably fewer Other Insurance patients.

Physicians were the most common provider, providing 76.9% of visits (*n* = 7,200), and provider type was significantly associated with level of rurality ($X^2(10) = 21.8$, *P*=.016). The proportions of specialty types were similar across levels of rurality, with the notable exceptions of surgical specialties and oncology and cancer center care, which both made up higher

proportions of encounters with patients in Small Rural Town and Isolated Rural Town ZIP codes. However, specialty and rurality level were not significantly associated ($X^2(8) = 14.7$, $P=.07$). While portal activation status was not significantly associated with rurality level ($X^2(4) = 2.2$, $P=.69$), notably, more patients in Isolated Rural Town ZIP codes had active patient portals, at 92.4% compared to 91.6% of the sample as a whole.

Telehealth Modality by Rurality, Demographic, and Telehealth Encounter Characteristics

Most telehealth encounters were video visits, at 92.9% of most recent telehealth encounters (n = 8,690), while 7.1% (n = 669) were telephone visits (see Table 3). Before collapsing telephone encounter types, unscheduled telephone encounters comprised 0.7% of patients' most-recent telehealth encounters (69 of 9,359); 10.3% of telephone encounters (69 of 669) were unscheduled. Mean age was significantly associated with modality of telehealth encounter (Kruskal-Wallis H test, $X^2(1) = 32.8$, P<.001), as was dichotomous age ($X^2(1) = 19.3$, P<.001). Video users were younger than telephone patients, with a mean age of 55.8 years (median = 59.0, ±17.00) compared to 59.7 (63.0, ±16.2). Patients 65 years or older had 8.7% of their telehealth encounters as telephone, compared to only 6.3% of those under 65 years.

Telehealth modality differed substantially by race/ethnicity. Telephone use was highest among Latinx patients, nearly two percentage points higher (9.1%) than the sample and 2.5 percentage points higher than among White patients (6.6%). The category unknown/declined also used more telephone visits, at 8.4% of these patients' encounters. Race/ethnicity was significantly associated with most recent telehealth encounter modality ($X^2(3) = 12.0$, P=.008). Similarly, preferred Spanish language speakers had nearly double the telephone use compared to preferred English language patients, at 12.3% and 7.0%, respectively. Preferred language was significantly associated with telehealth modality (Fisher's Exact, two-tailed P<.001).

Payer was significantly associated with modality of patients' most recent telehealth visit, $X^2(2) = 27.9$, P<.001. With 8.4% of their telehealth encounters as telephone, Medicare patients had the highest use of telephone modality, followed by MediCal patients with 7.8% telephone. Patients with Other Insurance had the lowest telephone use at 5.3% of their encounters. Among patients within the Other category, rate of telephone visits was 4.7% for commercial insurance, 5.3% for Covered California, 4.8% for other insurance, and 17.7% for self-pay patients. However, we did not test these categories for association with telehealth modality.

Patient portal status was significantly and strongly associated with telehealth encounter modality ($X^2(2) = 219.7$, P<.001). Patients with activated portals had 94% of their encounters as video, while those with portals that were pending activation had only 78.9% of their encounters as video. Provider and modality of most recent telehealth encounter were significantly associated (Fisher's Exact, two-tailed P<.001). Finally, specialty and telehealth modality were also significantly associated (Fisher's Exact, two-tailed P<.001). Surgical specialties, oncology and cancer center care, and primary care demonstrated some variation in utilization of the two modalities, while medical specialties and women's health specialties were more consistent.

Rurality level was not significantly associated with telehealth modality ($X^2(2) = 2.4$, P=.30), and distribution of telehealth modality differed only marginally among patients in Small and Isolated Rural Town ZIP codes. Female patients used slightly fewer telephone visits than male patients (6.7% of telehealth encounters compared to 7.7%, respectively). However, gender and telehealth modality were not statistically significant, (X^2 (1) = 3.3, P=.07).

Patient Portal Activation Status

A large majority of the sample (91.6%, n = 8, 577) had activated patient portals, while 7.4% (n = 693) were pending activation, and 1.0% (n = 89) were inactivated (Table 3.4). Female

or male patient gender and patient portal activation status were significantly associated, ($X^2(2) = 37.8$, $P<.001$). Substantially more female patients than male patients had activated patient portals (93.2% compared to 89.7%). Patient age was also significantly associated with patient portal status (Kruskal-Wallis H test, $X^2(2) = 35.7$, $P<.001$). Mean age was slightly higher among patients with portals pending activation (56.9 years, median = 60.4, ±18.2) than among those with active portals (55.9 years, 59.1, ±16.9), and was highest among patients with inactivated patient portals, at 66.3 years (67.2, ±11.7).

Patient portal activation status varied substantially between race/ethnicity groups. More White patients had activated patient portals (93.7%) than Latinx patients (87.5% activated portals), Other race/ethnicity patients (90.3%), and unknown race/ethnicity patients, which had the lowest proportion of activated portals, at 79.6%. However, we were not able to test the association of portal status with race/ethnicity: Chi squared analysis not appropriate due to small cell counts, and our statistical software could not execute Fisher's Exact test with this number of variable categories. A similar distribution of patient portal activation was seen for patients who preferred Spanish language: fewer Spanish-speaking patients had activated patient portals, with only 77.0% compared to 92.3% among English speaking patients. The association of preferred language with portal status was statistically significant (Fisher's exact, two-tailed $P<.001$).

Fewer patients with Medicare insurance had activated patient portals (90.7%) than patients with Other Insurance types (95.0%). The majority of patients with inactivated portal status were Medicare patients, who comprised 61.8% of this group, compared to 24.7% Other Insurance patients and 13.5% MediCal patients. However, patients with MediCal had the lowest level of active portals, at 87.8%. Payer was significantly associated with patient portal activation status, $X^2(4) = 106.3$, $P<.001$.

Discussion

In this study, we used three levels of rurality to characterize a population of rural-dwelling California adults who utilized telehealth services at an urban medical center from December 2021 to December 2022. Patients who lived in more rural ZIP codes were older and a much higher proportion were White and primary English speakers. This aligns with other research showing that rural populations tend to be on average older and less racially and ethnically diverse [3, 4]. Older age among more rural patients is of particular concern, as challenges associated with more rural status (e.g., distance to services, weather impacts) may be more impactful for older adults, compounding healthcare access challenges. Older adults also have lower digital access [40] and higher telehealth unreadiness [41], evidenced by fewer video visits and lower patient portal use among older patients in our study. Interventions to increase healthcare access through telehealth utilization among rural older adults could include patient digital education and measures to support rural connectivity.

A quarter of our sample was comprised of patients from race/ethnicity groups other than White, in line with the rural United States as a whole [42]. However, at the time of the 2020 US Census [43], the percent of residents in rural California counties[5] [44] who were Asian (2.1%), Black or African American (1.69%), Hispanic or Latino (22.8%), and American Indian or Alaska Native (5.4%; AI/AN) was substantially higher than in our sample. While these data do not support a direct comparison because of different rurality measures, this may indicate that fewer rural individuals from these race/ethnicity groups are utilizing telehealth at this urban health center. This is significant given evidence that rural AI/AN and populations of color have worse

[5] The smallest scale for which U.S. Census data is consistently available. The U.S. Census Bureau QuickFacts data tool provides statistics for all counites and for cities and towns with a population of 5,000 or more. Many rural areas have a population below 5,000.

health outcomes than rural White populations [6, 7, 45]. Rural AI/AN and populations of color experience complex barriers to realizing health as a result of legacies of colonization and slavery [6, 46]. For these populations, patient-centeredness and cultural tailoring [47] will be of central importance for successful implementation and equitable utilization of telehealth services.

Our findings align with existing research showing higher video visit use by White patients than other race/ethnicity groups [30-33]. In our rural sample, patients who were Latinx had the lowest video visit use despite being younger and living less rurally, characteristics of patients who had more video visits overall. These findings agree with a majority of studies showing lower video use among Hispanic or Latino patients [31, 32, 48], although Drake et al. found higher video use among rural and urban Hispanic patients in North Carolina [30]. Research has also found that while Hispanic or Latino individuals used less video visits, they had higher overall telehealth use compared to non-Hispanic White individuals [25, 33, 49]. We did not include a comparison to in-person patients at the health center, and more research is needed to explore how rural Latino patients utilize in-person versus telehealth specialty services at distant health centers.

Video use disparity was greatest among Spanish-speaking patients in our rural sample. Multiple other studies have shown that patients with Limited-English Proficiency (LEP) have fewer video and more telephone visits than English-proficient patients [29, 31, 32, 34]. Patients with LEP experience multiple barriers to healthcare access overall and, consequentially, worse health outcomes [50]. Video visit disparities may exacerbate this issue. While video access is limited by patient-level LEP barriers, such as mistrust and perceived discrimination [51, 52], clear provider- and system-level barriers also exist. LEP patients may not be offered video visits [26, 34], lack of language concordant front office staff poses challenges to LEP patients in

obtaining appointments [51] and coordinating care [52], and difficulties bringing an interpreter on video platforms may also deter providers from offering video visits to LEP patients [26, 53]. Integrated video translation services, LEP community outreach and digital access assessment, and availability of language-concordant outreach materials, front office or call center staff, and patient portals have all been identified as important areas for intervention [50, 53].

The patterns we found of lower video visit use among patient subgroups are similar to those reported in studies early in the COVID-19 pandemic [29-32]. Our video use findings also concur with more recent national data [33]. The persistence of video visit disparities after the initial phases of the COVID-19 PHE, when systems- and patient-level telehealth barriers were likely highest related to implementation and scale-up challenges, underscores the need for ongoing research and policy attention to understand this issue. As others have noted [26, 28, 29], telephone visits likely support overall access for vulnerable populations; therefore, while efforts should be made to address video barriers, policy should continue to support telephone visit availability and reimbursement.

As a proxy measure of digital engagement, an unactive patient portal may indicate patients at risk of digital access disparities [54, 55], and our findings appear to substantiate this. Video visits were less common among patients whose portals were inactive or pending activation than among those with active portals, a finding we anticipated based on other studies [32, 35, 48]. On the other hand, our finding that neither telehealth modality nor patient portal status were significantly associated with rurality level was unexpected. Previous research has found that rural patients were significantly less likely to have video visits [29, 35] and significantly less likely to have an activated patient portal [48]. However another study found that while rurality

was not associated with three measures of technology access, video and portal use were both positively associated with living in isolated rural Census tracts [56].

In this context, our findings contribute to a complex picture of digital access and telehealth utilization patterns among rural populations. One potential explanation for our finding of no association is that these other studies used non-rural comparison groups, while our sample was entirely rural. Another potential explanation is the use of different methodologies to define rurality, for example RUCA codes versus Rural-Urban Continuum Codes, as well as different geographic units, such as Census tract, ZIP code, or county [57, 58]. Finally, rural populations in the United States are heterogeneous [8, 42, 59], and these findings may represent meaningful variation in these rural populations.

Strengths and Limitations

The application of RUCA ZIP code approximations to group patients by three levels of rurality was a strength of this study, allowing comparisons of patient demographics and telehealth utilization between rurality level. Low representation of patients from several race/ethnicity groups in our sample and the choice to collapse several categories of race/ethnicity to enable tests of association were limitations of our study. The categories of race/ethnicity we combined represent distinct populations of rural residents, who experience particular structural barriers to health, and focused researched with these patients is needed. Services provided by nurse practitioners, physician assistants, or other provider types may have been billed under the physician billing code, potentially inflating the number of physician encounters. Our data did not support comparison to non-rural telehealth utilizers or rural in-person patients, and further research is needed to explore how these groups differ in utilization of specialty care at an urban medical center. Our data are from just one health system, and results may not be applicable in

other settings. Finally, our study timeframe did not allow for addressing longitudinal changes in telehealth use among rural patients at this health center; further research is needed to clarify possible changes in demographics or telehealth utilization over time.

Conclusion

In this sample of rural patients who utilized telehealth at an urban medical center, video visit use and patient portal activation were lower among patients who were older, Latino race/ethnicity, primary Spanish speakers, and publicly insured. Targeted policies are needed to support appropriate video visit utilization in populations at risk of access barriers. More study is needed to fully characterize rural telehealth users, specifically rural populations of color. Future studies should apply sampling methods that account for the relatively fewer people of color living in rural areas in order to support statistical analysis of these groups. Research is also needed to elucidate the nature of relationships between patient demographic factors and telehealth modality use among rural patients utilizing telehealth at distant urban medical centers.

Table 3.1. Patient demographic and telehealth encounter variables in dataset.

Variable Name	Description
Patient Demographic Variables	
ZIP Code	United States ZIP code of patient's residence address
Level of Rurality	Patients' ZIP codes were used to group patients into one of three rurality levels (from least to most rural): Large Rural Town; Small Rural Town; or Isolated Rural Town
Age	Exact age at time of first telehealth encounter and dichotomous age, under 65 years and 65 years or older.
Gender	Four categories: female, male, unknown, or non-binary. Unknown and non-binary had too few observations to support tests of association and were excluded from analyses.
Patient-identified Race/ethnicity	Four categories included in analyses: White, Latinx, Unknown/declined, and Combined Other. Categories included in Combined Other were Asian, Black or African American, Multi-race/ethnicity, Native American or Alaska Native, Native Hawaiian or Other Pacific Islander, Other, and Southwest Asian and North African.
Preferred Language	Three categories included in analyses: English, Spanish, and Other. Other included 21 additional languages.
Payer	Type of Health Insurance, three categories: Medicare, MediCal, and Other Insurance. Other included commercial health plans; Covered California insurance[a]; self-pay[b]; and several other less common insurance options
Patient Portal Activation Status	*Activated:* Portal account set up completed; does not indicate recency of account creation or access *Pending activation:* Patient issued an activation code but had not yet completed account set-up *Inactivated:* Account creation not completed before the activation code expired after 30 days
Telehealth Encounter Variables	
Telehealth Modality	Mode of telehealth delivery, video or telephone:
Provider	Healthcare professional charted for the telehealth encounter: Physician, Nurse Practitioner, Physician Assistant, and Other. Other included resource providers, counselors, chaplains, resident physicians, and all other provider types.
Specialty Area	*Primary care:* included primary care and family medicine; *medical specialties:* any non-surgical specialties; *surgical specialties*, including surgical oncology; *oncology and cancer center care,* all non-surgical cancer-related care; and *women's and maternal health,* including fetal health and neonatology.

[a] California's subsidized health insurance marketplace created by the Affordable Care Act
[b] Self-pay or out-of-pocket, when no insurance is billed.

Table 3.2. Demographic and most recent telehealth encounter characteristics of all patients residing in rural zip codes[a] with at least one telehealth visit[b] in the period December 2021 – December 2022, presented by level of rurality.[c]

	Total	Large Rural Town	Small Rural Town	Isolated Rural Town	Chi-square (*df*)/ Fisher's Exact[d]	*P* value
Level of Rurality, *n*(%)	9,359 (100)	6,393 (68.3)	1,543 (16.5)	1,423 (15.2)		
Gender, *n*(%)						
Female	5,158 (55.1)	3,529 (55.2)	825 (53.5)	804 (56.5)	3.2 (2)	.21
Male	4,175 (44.6)	2,844 (44.5)	717 (46.5)	614 (43.2)		
Total[e]	9,333 (99.7)	6,373 (99.7)	1,542 (99.9)	1,418 (99.7)		
Mean age, years [Median, SD[f]]	56.1 [59.4, ±17.0]	55.2 [58.4, ±17.2]	57.7 [60.7, ±16.5]	58.5 [62.1, ±16.0]	52.2 (2)[g]	**<.001**
Age, years						
18–64	5,874 (62.7)	4,102 (64.2)	937 (60.7)	835 (58.7)	18.3 (2)	**<.001**
65+	3,485 (37.2)	2,291 (35.8)	606 (39.3)	588 (41.3)		
Total	9,359 (100)	6,393 (100)	1,543 (100)	1,423 (100)		
Race/ethnicity, *n*(%)						
White	6,508 (69.5)	4,351 (68.1)	1,056 (68.4)	1,101 (77.4)	83.9 (6)	**<.001**
Latinx	1,352 (14.5)	1,004 (15.7)	251 (16.3)	97 (6.8)		
Other Race/Ethnicity	951 (10.2)	664 (10.4)	147 (9.5)	140 (9.8)		
Unknown/Declined	548 (5.9)	374 (5.8)	89 (5.8)	85 (6.0)		
Total	9,359 (100)	6,393 (100)	1,543 (100)	1,423 (100)		
Preferred Language, *n*(%)						
English	8,926 (95.4)	6,082 (95.1)	1,443 (93.5)	1,401 (98.5)	Fisher's exact, two-tailed	**<.001**
Spanish	383 (4.1)	279 (4.4)	87 (5.6)	17 (1.2)		
Other	50 (0.5)	32 (0.5)	13 (0.8)	5 (0.3)		

	Total	Large Rural Town	Small Rural Town	Isolated Rural Town	Chi-square (*df*)/ Fisher's Exact[d]	*P* value
Preferred Language, *continued*						
Total	9,359 (100)	6,393 (100)	1,543 (100)	1,423 (100)		
Payer						
Medicare	4,193 (44.8)	2,749 (43.0)	742 (48.1)	702 (49.3)	40.8 (4)	**<.001**
Other Insurance	3,304 (35.3)	2,293 (35.9)	560 (36.3)	451 (31.7)		
MediCal[h]	1,862 (19.9)	1,351 (21.1)	241 (15.6)	270 (19.0)		
Total	9,359 (100)	6,393 (100)	1,543 (100)	1,423 (100)		
Patient Portal Activation						
Activated	8,577 (91.6)	5,851 (91.5)	1,411 (91.5)	1,315 (92.4)	2.2 (4)	.69
Pending Activation	693 (7.4)	481 (7.5)	119 (7.7)	93 (6.5)		
Inactivated	89 (1.0)	61 (1.0)	13 (0.8)	15 (1.1)		
Total	9,359 (100)	6,393 (100)	1,543 (100)	1,423 (100)		
Provider of Most Recent Telehealth Encounter						
Physician	7,200 (77.0)	4,192 (76.8)	1,176 (76.2)	1,112 (78.1)	15.7 (6)	**.015**
Nurse Practitioner	1,194 (12.8)	829 (13.0)	202 (12.1)	163 (11.5)		
Other Providers	500 (5.3)	363 (5.7)	69 (4.5)	68 (4.8)		
Physician Assistant	465 (5.0)	289 (4.5)	96 (6.2)	80 (5.6)		
Total	9,359 (100)	6,393 (100)	1,543 (100)	1,423 (100)		
Specialty of Most Recent Telehealth Encounter						
Medical Specialties	4,360 (46.6)	3,001 (46.9)	713 (46.2)	646 (45.4)	14.7 (8)	.07
Surgical Specialties	2,692 (28.8)	1,822 (28.5)	460 (29.8)	410 (29.8)		
Oncology and Cancer Center	1,763 (18.8)	1,167 (18.3)	302 (19.6)	294 (20.7)		

	Total	Large Rural Town	Small Rural Town	Isolated Rural Town	Chi-square (*df*)/ Fisher's Exact[d]	*P* value
Specialty of Most Recent Telehealth Encounter, *continued*						
Women's, Maternal, and Fetal Specialties	427 (4.6)	317 (5.0)	52 (3.4)	58 (4.1)		
Primary Care	117 (1.2)	86 (1.6)	16 (1.0)	15 (1.0)		
Total	9,359 (100)	6,393 (100)	1,543 (100)	1,423 (100)		

[a] Zip code rurality designated using the WWAMI Rural Health Research Center's (RHRC) zip code approximations of the USDA's Economic Research Service Census tract-based Rural-Urban Commuting Area (RUCA) Codes.
[b] Including all visits categorized as video visit, scheduled telephone encounter, telemedicine, and telephone.
[c] Levels of rurality, from least rural (i.e., most populous) to most rural: Large Rural City/Town (micropolitan) focused; Small Rural Town Focused; and Isolated Small Rural Town Focused (http://depts.washington.edu/uwruca/ruca-uses.php). Patients were grouped by ZIP code.
[d] Association with level of rurality assessed with Chi square test, Fisher's Exact test, or Kruskall-Wallis H test, as appropriate.
[e] The gender categories "unspecified" and "non-binary" were excluded from the analysis due to small size.
[f] SD, standard deviation.
[g] Chi-square value with ties from the Kruskal-Wallis H test of association, for continuous age at first telehealth encounter with level of rurality.
[h] California's State Medicaid program.

Table 3.3. Modality (telephone or video) of most recent telehealth encounter by patient demographic and telehealth encounter characteristics for all patients residing in rural zip codes[a] with at least one telehealth visit[b] in the period December 2021 – December 2022.

	Video	Telephone	Total	Chi-square (*df*)/ Fisher's Exact[c]	*P* value
Telehealth Visit Modality, *n*(%)	8,690 (92.9)	669 (7.1)	9,359 (100)		
Level of Rurality,[d] *n*(%)					
Large Rural Town	5,954 (93.1)	439 (6.9)	6,393 (68.3)	2.4 (2)	.30
Small Rural Town	1,423 (92.2)	120 (7.8)	1,543 (16.5)		
Isolated Rural Town	1,313 (92.3)	110 (7.7)	1,423 (15.2)		
Total	8,690 (92.9)	669 (7.1)	9,359 (100)		
Gender, *n*(%)					
Female	4,812 (93.3)	346 (6.7)	5,158 (55.1)	3.3 (1)	.07
Male	3,854 (92.3)	321 (7.7)	4,175 (44.6)		
Total[e]	8,666 (92.9)	667 (7.1)	9,333 (99.7)		
Mean age, years [Median, ±SD[f]]	55.8 [59.0, ±17.0]	59.7 [63.0, ±16.2]	56.1 [59.4, ±17.0]	32.8 (1)[g]	**<.001**
Age, years					
≥64	5,507 (93.8)	367 (6.3)	5,874 (62.8)	19.3 (1)	**<.001**
65+	3,183 (91.3)	302 (8.7)	3,485 (37.2)		
Total	8,690 (92.9)	669 (7.1)	9,359 (100)		
Race/ethnicity, *n*(%)					
White	6,078 (93.4)	430 (6.6)	6,508 (69.5)	12.0 (3)	**.008**
Latinx	1,229 (90.9)	123 (9.1)	1,352 (14.4)		
Other	881 (92.6)	70 (7.4)	951 (10.2)		
Unknown/Declined	502 (91.6)	46 (8.4)	548 (5.9)		
Total	8,690 (92.9)	669 (7.1)	9,359 (100)		
Preferred Language, *n*(%)					
English	8,305 (93.0)	621 (7.0)	8,926 (95.4)	Fisher's Exact, two-tailed	**<.001**
Spanish	336 (87.7)	47 (12.3)	383 (4.1)		
Other	49 (98.0)	1 (2.0)	50 (0.5)		
Total	8,690 (92.9)	669 (7.1)	9,359 (100)		
Payer, *n*(%)					
Medicare	3,843 (91.7)	350 (8.4)	4,193 (44.8)	27.9 (2)	**<.001**
Other Insurance	3,130 (94.7)	174 (5.3)	3,304 (35.3)		

	Video	Telephone	Total	Chi-square (*df*)/ Fisher's Exact[c]	*P* value
Payer, *continued*					
MediCal[h]	1,717 (92.2)	145 (7.8)	1,862 (19.9)		
Total	8,690 (92.9)	669 (7.1)	9,359 (100)		
Patient Portal Activation, *n*(%)					
Activated	8,062 (94.0)	515 (6.0)	8,577 (91.6)	219.7 (2)	**<.001**
Pending Activation	547 (78.9)	146 (21.1)	693 (7.4)		
Inactivated	81 (91.0)	8 (9.0)	89 (1.0)		
Total	8,690 (92.9)	669 (7.1)	9,359 (100)		
Provider of Most Recent Telehealth Encounter, *n*(%)					
Physician	6,799 (94.4)	401 (5.6)	7,200 (76.9)	292.9 (3)	**<.001**
Nurse Practitioner	1,095 (91.7)	99 (8.3)	1,194 (12.8)		
Other Providers	371 (74.2)	129 (25.8)	500 (5.3)		
Physician Assistant	425 (91.4)	40 (8.6)	465 (5.0)		
Total	8,690 (92.9)	669 (7.1)	9,359 (100)		
Specialty of Most Recent Telehealth Encounter, *n*(%)					
Medical Specialties	4,041 (92.7)	319 (7.3)	4,360 (46.6)	Fisher's Exact, two-tailed	**<.001**
Surgical Specialties	2,469 (91.7)	223 (8.3)	2,692 (28.8)		
Oncology and Cancer Center	1,670 (94.7)	93 (5.3)	1,763 (18.8)		
Women's, Maternal, and Fetal Specialties	395 (92.5)	32 (7.5)	427 (4.6)		
Primary Care	115 (98.3)	2 (1.7)	117 (1.2)		
Total	8,690 (92.9)	669 (100)	9,359 (100)		

[a] Zip code rurality designated using the WWAMI Rural Health Research Center's (RHRC) zip code approximations of the USDA's Economic Research Service Census tract-based Rural-Urban Commuting Area (RUCA) Codes.
[b] Including all visits categorized as video visit, scheduled telephone encounter, telemedicine, and telephone.
[c] Association with modality assessed with Chi square test, Fisher's Exact test, or Kruskall-Wallis H test, as appropriate.
[d] Levels of rurality, from least rural (i.e., most populous) to most rural: Large Rural City/Town (micropolitan) focused; Small Rural Town Focused; and Isolated Small Rural Town Focused (http://depts.washington.edu/uwruca/ruca-uses.php). Patients were grouped by ZIP code.
[e] The gender categories "unspecified" and "non-binary" were excluded from the analysis due to small size.
[f] SD, standard deviation.
[g] Chi-square value with ties from the Kruskal-Wallis H test of association, for continuous age at first telehealth encounter with level of rurality.
[h] California's State Medicaid program.

Table 3.4. Electronic patient portal activation status by patient demographic and telehealth encounter characteristics by for all patients residing in rural zip codes[a] with at least one telehealth visit[b] in the period December 2021 – December 2022.

	Activated	**Pending**	**Inactivated**	**Total**	**Chi-square (*df*)/ Fisher's Exact[c]**	***P* value**
Activation Status, *n*(%)	8,577 (91.6)	693 (7.4)	89 (1.0)	9,359 (100)		
Gender, *n*(%)						
Female	4,806 (93.2)	318 (6.2)	34 (0.6)	5,158 (55.1)	37.8 (2)	**<.001**
Male	3,746 (89.7)	374 (9.0)	55 (1.3)	4,175 (44.6)		
Total[d]	8,552 (91.6)	692 (7.4)	89 (1.0)	9,333 (99.7)		
Mean age, years [Median, SD[e]]	55.9 [59.1, ±16.9]	56.9 [60.4, ±18.2]	66.3 [67.2, ±11.7]	56.1 [59.4, ±17.0]	35.7 (2)[f]	**<.001**
Age, years						
18–64	5,415 (92.2)	419 (7.1)	40 (0.7)	5,874 (62.8)	14.2 (2)	**.001**
65+	3,162 (90.7)	274 (7.9)	49 (1.4)	3,485 (37.2)		
Total	8,577 (91.6)	693 (7.4)	89 (1.0)	9,359 (100)		
Race/ethnicity, *n*(%)						
White	6,099 (93.7)	342 (5.3)	67 (1.0)	6,508 (69.5)	n/a[g]	
Latinx	1,183 (87.5)	158 (11.7)	11 (0.8)	1,352 (14.5)		
Other Race/Ethnicity	859 (90.3)	83 (8.7)	9 (1.0)	951 (10.2)		
Unknown/Declined	436 (79.6)	110 (20.1)	2 (0.4)	548 (5.9)		
Total	8,577 (91.6)	693 (7.4)	89 (1.0)	9,359 (100)		
Preferred Language, *n*(%)						
English	8,241 (92.3)	599 (6.7)	86 (1.0)	8,926 (95.4)	Fisher's Exact, two-tailed	**<.001**
Spanish	295 (77.0)	86 (22.5)	2 (0.5)	383 (4.1)		
Other	41 (82.0)	8 (16.0)	1 (2.0)	50 (0.5)		

	Activated	Pending	Inactivated	Total	Chi-square (*df*)/ Fisher's Exact[c]	*P* value
Preferred Language, *continued*						
Total	8,577 (91.6)	693 (7.4)	89 (1.0)	9,359 (100)		
Payer						
Medicare	3,802 (90.7)	336 (8.0)	55 (1.3)	4,193 (44.8)	106.3 (4)	**<.001**
Other Insurance	3,140 (95.0)	142 (4.3)	22 (0.7)	3,304 (35.3)		
MediCal[h]	1,635 (87.8)	215 (11.6)	12 (0.6)	1,862 (19.9)		
Total	8,577 (91.6)	693 (7.4)	89 (1.0)	9,359 (100)		

[a] Zip code rurality designated using the WWAMI Rural Health Research Center's (RHRC) zip code approximations of the USDA's Economic Research Service Census tract-based Rural-Urban Commuting Area (RUCA) Codes.
[b] Including all visits categorized as video visit, scheduled telephone encounter, telemedicine, and telephone.
[c] Association with modality assessed with Chi square test, Fisher's Exact test, or Kruskall-Wallis H test, as appropriate.
[d] The gender categories "unspecified" and "non-binary" were excluded from the analysis due to small size.
[e] SD, standard deviation.
[f] Chi-square value with ties from the Kruskal-Wallis H test of association, for continuous age at first telehealth encounter with level of rurality.
[g] n/a, not applicable: Chi square analysis not appropriate due to small cell counts, and our statistical software could not execute Fisher's exact test with this number of variable categories.
[h] California's State Medicaid program.

References

1. Garcia MC, Rossen LM, Bastian B, Faul M, Dowling NF, Thomas CC, et al. Potentially excess deaths from the five leading causes of death in metropolitan and nonmetropolitan counties - United States, 2010-2017. MMWR Surveill Summ. 2019 Nov 8;68(10):1-11. PMID: 31697657. doi: 10.15585/mmwr.ss6810a1.

2. Curtin SC, Spencer MR. Trends in death rates in urban and rural areas: United States, 1999-2019. National Center for Health Statistics; Hyattsville, MD; 2021 September. NCHS Data Brief No. 417. p. 1-8. PMID: 34582331.

3. Barton B, Romsai TB, Hahn C. Chartbook on Rural Healthcare: National Healthcare Quality and Disparities Report. Agency for Healthcare Research and Quality; Rockville, MD; 2021 November. AHRQ Pub. No. 22-0010. PMID: 35263059.

4. Meit M, Knudson A, Gilbert T, Tzy-Chyi Yu A, Tanenbaum E, Ormson E, et al. The 2014 update of the rural-urban chartbook. Rural Health Reform Policy Research Center; 2014 October.

5. Yaemsiri S, Alfier JM, Moy E, Rossen LM, Bastian B, Bolin J, et al. Healthy People 2020: Rural areas lag in achieving targets for major causes of death. Health Aff (Millwood). 2019 Dec;38(12):2027-31. PMID: 31794308. doi: 10.1377/hlthaff.2019.00915.

6. Henning-Smith CE, Hernandez AM, Hardeman RR, Ramirez MR, Kozhimannil KB. Rural counties with majority Black Or Indigenous Populations suffer the highest rates of premature death in the US. Health Aff (Millwood). 2019 Dec;38(12):2019-26. PMID: 31794313. doi: 10.1377/hlthaff.2019.00847.

7. James CV, Moonesinghe R, Wilson-Frederick SM, Hall JE, Penman-Aguilar A, Bouye K. Racial/ethnic health disparities among rural adults—United States, 2012–2015. MMWR Surveillance Summaries. 2017;66(23):1. PMID: 29145359. doi: 0.15585/mmwr.ss6623a1.

8. Henning-Smith CE. Determinants of health in rural communities. In: Inungu JN, Minelli MJ, editors. Foundations of rural public health in America. Burlington, MA: Jones & Bartlett Learning; 2021. p. 17-29.

9. National Quality Forum . A core set of rural-relevant measures and measuring and improving access to care: 2018 recommendations from the MAP Rural Health Workgroup. Washington, DC.: National Quality Forum; 2018 Aug. 31.

10. Douthit N, Kiv S, Dwolatzky T, Biswas S. Exposing some important barriers to health care access in the rural USA. Public Health. 2015;129(6):611-20. doi: 10.1016/j.puhe.2015.04.001.

11. O'Hanlon CE, Kranz AM, DeYoreo M, Mahmud A, Damberg CL, Timbie J. Access, quality, and financial performance of rural hospitals following health system affiliation. Health Affairs. 2019;38(12):2095-104. doi: 10.1377/hlthaff.2019.00918.

12. Burrows E, Suh R, Hamman D. Policy Brief: Health Care Workforce Distribution and Shortage Issues in Rural America. . 2012.

13. Larson E, Andrilla C, Garberson L. Supply and distribution of the primary care workforce in rural America: 2019. Seattle, WA.: WWAMI Rural Health Research Center, University of Washington; 2020 June. Policy brief #167.

14. Larson EH, Patterson DG, Garberson LA, Andrilla CHA. Supply and distribution of the behavioral health workforce in rural America. Seattle, WA. Data Brief #160: WWAMI Rural Health Research Center, University of Washington; 2016 September. Data Brief #160.

15. Larson E, Andrilla H, Kearney J, Garberson L, Patterson D. The distribution of the general surgery workforce in rural and arban America in 2019. Seattle, WA. WWAMI Rural Health Research Center, University of Washington; 2021 March. Policy Brief.

16. Dorsey ER, Topol EJ. State of telehealth. N Engl J Med. 2016;375(2):154-61. doi: 10.1056/NEJMra1601705.

17. Lin C-CC, Dievler A, Robbins C, Sripipatana A, Quinn M, Nair S. Telehealth in health centers: key adoption factors, barriers, and opportunities. Health Affairs. 2018;37(12):1967-74. doi: 10.1377/hlthaff.2018.05125.

18. Tuckson RV, Edmunds M, Hodgkins ML. Telehealth. New England Journal of Medicine. 2017;377(16):1585-92. doi: 10.1056/NEJMsr1503323.

19. Samson LW, Tarazi W, Turrini G, Sheingold S. Medicare beneficiaries' use of telehealth in 2020 — Trends by beneficiary characteristics and location. Washington, DC. : Office of the Assistant Secretary for Plannnig and Evaluation, U.S. Department of Health and Human Services; 2021 December. Issue Brief No. HP-2021-27.

20. Weiner JP, Bandeian S, Hatef E, Lans D, Liu A, Lemke KW. In-person and telehealth ambulatory contacts and costs in a large US insured cohort before and during the COVID-19 pandemic. JAMA Netw Open. 2021;4(3). doi: 10.1001/jamanetworkopen.2021.2618.

21. Cantor JH, McBain RK, Pera MF, Bravata DM, Whaley CM. Who is (and is rot) receiving telemedicine care during the COVID-19 pandemic. Am J Prev Med. 2021 2021/09/01/;61(3):434-8. doi: 10.1016/j.amepre.2021.01.030.

22. Poeran J, Cho LD, Wilson L, Zhong H, Mazumdar M, Liu J, et al. Pre-existing disparities and potential implications for the rapid expansion of telemedicine in response to the coronavirus

disease 2019 pandemic. Med Care. 2021 Aug 1;59(8):694-8. PMID: 34054024. doi: 10.1097/mlr.0000000000001585.

23. Lucas JW, Villarroel MA. Telemedicine use among adults: United States, 2021. Hyattsville, MD.: National Center for Health Statistics; 2022 October. NCHS Data Brief No. 445.

24. Demeke HB, Merali S, Marks S, Pao LZ, Romero L, Sandhu P, et al. Trends in use of telehealth among health centers during the COVID-19 pandemic—United States, June 26-November 6, 2020. MMWR Morb Mortal Wkly Rep. 2021;70(7):240-4. doi: 10.15585/mmwr.mm7007a3.

25. Karimi M, Lee EC, Couture SJ, Gonzales A, Grigorescu V, Smith SR, et al. National survey trends in telehealth use in 2021: Disparities in utilization and audio vs. video services. US Department of Health & Human Services.. 2022 Feb 1.

26. Ganguli I, Orav EJ, Hailu R, Lii J, Rosenthal MB, Ritchie CS, et al. Patient characteristics associated with being offered or choosing telephone vs video virtual visits among Medicare beneficiaries. JAMA Netw Open. 2023 Mar 1;6(3). PMID: 36988958. doi: 10.1001/jamanetworkopen.2023.5242.

27. Juergens N, Huang J, Gopalan A, Muelly E, Reed M. The association between video or telephone telemedicine visit type and orders in primary care. BMC Med Inform Decis Mak. 2022 Nov 19;22(1):302. PMID: 36403030. doi: 10.1186/s12911-022-02040-z.

28. Chang JE, Lai AY, Gupta A, Nguyen AM, Berry CA, Shelley DR. Rapid transition to telehealth and the digital divide: Implications for primary care access and equity in a post-COVID era. Milbank Q. 2021;99(2):340-68. doi: 10.1111/1468-0009.12509.

29. Chen J, Li KY, Andino J, Hill CE, Ng S, Steppe E, et al. Predictors of audio-only versus video telehealth visits during the COVID-19 pandemic. J Gen Intern Med. 2022 Apr;37(5):1138-44. PMID: 34791589. doi: 10.1007/s11606-021-07172-y.

30. Drake C, Lian T, Cameron B, Medynskaya K, Bosworth HB, Shah K. Understanding telemedicine's "new normal": Variations in telemedicine use by specialty line and patient demographics. Telemed J E Health. 2022 Jan;28(1):51-9. PMID: 33769092. doi: 10.1089/tmj.2021.0041.

31. Eruchalu CN, Bergmark RW, Smink DS, Tavakkoli A, Nguyen LL, Bates DW, et al. Demographic disparity in use of telemedicine for ambulatory general surgical consultation during the COVID-19 pandemic: Analysis of the initial public health emergency and second phase periods. Journal of the American College of Surgeons. 2022;234(2):191-202. PMID: 00019464-202202000-00014. doi: 10.1097/xcs.0000000000000030.

32. Rodriguez JA, Betancourt JR, Sequist TD, Ganguli I. Differences in the use of telephone and video telemedicine visits during the COVID-19 pandemic. Am J Manag Care. 2021;27(1):21-6. doi: 10.37765/ajmc.2021.88573.

33. Lee EC, Grigorescu V, Enogieru I, Smith SR, Samson LW, Conmy AB, et al. Updated national survey trends in telehealth utilization and modality (2021-2022). Washington, DC.: Office of the Assistant Secretary for Planning and Evaluation, US Department of Health and Human Services; 2023 April. Issue Brief No. HP-2023-09.

34. Benjenk I, Franzini L, Roby D, Chen J. Disparities in audio-only telemedicine use among Medicare beneficiaries during the Coronavirus Disease 2019 Pandemic. Med Care. 2021 Nov 1;59(11):1014-22. PMID: 34534186. doi: 10.1097/mlr.0000000000001631.

35. Hsiao V, Chandereng T, Huebner JA, Kunstman DT, Flood GE, Tevaarwerk AJ, et al. Telemedicine use across medical specialties and diagnoses. Appl Clin Inform. 2023 Jan;14(1):172-84. PMID: 36858112. doi: 10.1055/s-0043-1762595.

36. USDA Economic Research Service . Rural-Urban Commuting Area Codes. 2023 [updated September 25, 2023; cited 2023 November 14]; Available from: https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes.aspx.

37. WWAMI Rural Health Research Center Rural-Urban Commuting Area (RUCA) Codes. 2023 [cited 2023 November 14]; Available from: https://familymedicine.uw.edu/rhrc/ruca/.

38. USDA Economic Research Service Rural-Urban Commuting Area Codes: Documentation. 2023 [updated Monday, September 25, 2023; cited 2023 November 14]; Available from: https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes/documentation/

39. WWAMI Rural Health Research Center . RUCA Data: Using RUCA Data. [cited 2023 November 14]; Available from: http://depts.washington.edu/uwruca/ruca-uses.php.

40. Roberts ET, Mehrotra A. Assessment of disparities in digital access among Medicare beneficiaries and implications for telemedicine. JAMA Intern Med. 2020;180(10):1386-9. doi: 10.1001/jamainternmed.2020.2666.

41. Lam K, Lu AD, Shi Y, Covinsky KE. Assessing telemedicine unreadiness among older adults in the United States during the COVID-19 pandemic. JAMA Intern Med. 2020;180(10):1389-91. doi: 10.1001/jamainternmed.2020.2671.

42. Johnson KM, Lichter DT. Growing racial diversity in rural America: Results from the 2020 Census. Durham, NH. Carsey School of Public Policy, University of New Hampshire; 2022. National Issue Brief #163.

43. United States Census Bureau . QuickFacts. 2023 [cited 2023 November 14]; Available from: https://www.census.gov/quickfacts/fact/map/CA/RHI725222.

44. United States Federal Office of Rural Health Policy . List of rural counties and designated eligible census tracts in metropolitan counties. 2021. Bulletin No. 20-01.

45. Singh GK, Siahpush M. Widening Rural–Urban Disparities in Life Expectancy, U.S., 1969–2009. American Journal of Preventive Medicine. 2014 2014/02/01/;46(2):e19-e29. doi: 10.1016/j.amepre.2013.10.017.

46. Kozhimannil KB, Henning-Smith C. Racism and health in rural America. Journal of Health Care for the Poor and Underserved. 2018;29(1):35-43. doi: 10.1353/hpu.2018.0004.

47. Bailey JE, Gurgol C, Pan E, Njie S, Emmett S, Gatwood J, et al. Early patient-centered outcomes research experience with the use of telehealth to dddress disparities: Scoping review. J Med Internet Res. 2021 2021/12/7;23(12):e28503. doi: 10.2196/28503.

48. Hsiao V, Chandereng T, Lankton RL, Huebner JA, Baltus JJ, Flood GE, et al. Disparities in telemedicine access: A cross-sectional study of a newly established infrastructure during the COVID-19 pandemic. Appl Clin Inform. 2021;12(03):445-58. doi: 10.1055/s-0041-1730026.

49. Williams C, Shang D. Telehealth usage among low-income racial and ethnic minority populations during the covid-19 pandemic: Retrospective observational study. J Med Internet Res. 2023 May 12;25:e43604. PMID: 37171848. doi: 10.2196/43604.

50. Sharma AE, Lisker S, Fields JD, Aulakh V, Figoni K, Jones ME, et al. Language-Specific Challenges and Solutions for Equitable Telemedicine Implementation in the Primary Care Safety Net During COVID-19. J Gen Intern Med. 2023 Nov;38(14):3123-33. PMID: 37653210. doi: 10.1007/s11606-023-08304-2.

51. Uscher-Pines L, Kapinos K, Rodriguez C, Pérez-Dávila S, Raja P, Rodriguez JA, et al. Access challenges for patients with limited English proficiency: a secret-shopper study of in-person and telehealth behavioral health services in California safety-net clinics. Health Affairs Scholar. 2023;1(3). doi: 10.1093/haschl/qxad033.

52. Calo WA, Cubillos L, Breen J, Hall M, Rojas KF, Mooneyham R, et al. Experiences of Latinos with limited English proficiency with patient registration systems and their interactions with clinic front office staff: An exploratory study to inform community-based translational research in North Carolina. BMC Health Serv Res. 2015 Dec 23;15:570. PMID: 26700176. doi: 10.1186/s12913-015-1235-z.

53. Tan-McGrory A, Schwamm LH, Kirwan C, Betancourt JR, Barreto EA. Addressing virtual care disparities for patients with limited English proficiency. Am J Manag Care. 2022 Jan;28(1):36-40. PMID: 35049259. doi: 10.37765/ajmc.2022.88814.

54. Rodriguez JA, Lipsitz SR, Lyles CR, Samal L. Association between patient portal use and broadband access: A national evaluation. Journal of General Internal Medicine. 2020 2020/12/01;35(12):3719-20. doi: 10.1007/s11606-020-05633-4.

55. Chagpar AB. Sociodemographic factors affecting telemedicine access: A population-based analysis. Surgery. 2022;171(3):793-8. doi: 10.1016/j.surg.2021.08.059.

56. Brunner W, Pullyblank K, Scribani M, Krupa N, Fink A, Kern M. Determinants of telehealth technologies in a rural population. Telemed J E Health. 2023 Oct;29(10):1530-9. PMID: 36877537. doi: 10.1089/tmj.2022.0490.

57. Zahnd WE, Del Vecchio N, Askelson N, Eberth JM, Vanderpool RC, Overholser L, et al. Definition and categorization of rural and assessment of realized access to care. Health Serv Res. 2022 Jun;57(3):693-702. PMID: 35146771. doi: 10.1111/1475-6773.13951.

58. Pullyblank K, Krupa N, Scribani M, Chapman A, Kern M, Brunner W. Trends in telehealth use among a cohort of rural patients during the COVID-19 pandemic. Digit Health. 2023 Jan-Dec;9:20552076231203803. PMID: 37799503. doi: 10.1177/20552076231203803.

59. Lichter DT, Johnson KM. Urbanization and the paradox of rural population decline: Racial and regional variation. Socius. 2023;9:1-19. doi: 10.1177/2378023122114.

Chapter 4

Rural Life, Rural Healthcare, and Telehealth:

An Interpretive Phenomenology Study

Introduction

Over the last several decades, inadequate healthcare access has emerged as a foremost concern for the health of rural populations in the United States [1-3]. Severe shortages of rural healthcare providers, particularly specialists, [3-6] and the scaling down or closure of rural healthcare facilities [3, 7] are important access barriers. Limited healthcare access contributes to poor health outcomes for rural populations, who fare worse than their urban counterparts on several measures of mortality [8-10].

Telehealth can help bridge healthcare access gaps and improve rural health outcomes by using communication technologies to circumvent geographic barriers and virtually connect patients to distant healthcare services, [11-13]. Telehealth is effective, provides comparable clinical outcomes to in-person care, and supports patient satisfaction with care [14-16]. However, research also shows that, following the rapid expansion of telehealth services related to the coronavirus disease 2019 (COVID-19) pandemic, telehealth utilization in the United States was unequal across different population groups [17-19]. Specifically, telehealth use was found to be lower among patients who were lower income [19, 20], uninsured [21], belonged to certain race/ethnicity groups [18, 20], and who lived in rural areas [17-20]. These findings raise the concern that rather than improving healthcare access, telehealth may reinforce existing rural healthcare disparities [22-24].

Patient healthcare experiences are an essential determinant of healthcare utilization and effectiveness overall [25, 26]. Crucially, telehealth patient-centered outcomes research has shown that patient-centeredness strongly supports the effectiveness of telehealth interventions to address healthcare disparities [27]. Understanding of rural patient experiences with telehealth is therefore essential to a full understanding of telehealth disparities and potential interventions to

redress them. Furthermore, rural populations are heterogenous [2, 28], necessitating attention to specific rural settings.

In this study, I used interpretive phenomenology qualitative research methods to explore experiences with telehealth services at an urban academic medical center among a population of rural-dwelling patients in California. Primary objectives were to understand how participants' rural contexts shaped their experiences with telehealth and to explore the meaning that they attributed to telehealth. Patient-perceived telehealth benefits and drawbacks, as well as barriers to telehealth use, were also explored.

Methods

Study Design

This study was guided by interpretive phenomenology methods, as developed and popularized by Patricia Benner [29, 30]. Research in this tradition seeks situated, contextual understandings of people, their behaviors, and the meanings they assign to their lives [31]. This purpose reflects the commitment in nursing research and practice to a holistic view of the patient as embedded in multiple worlds outside healthcare settings [29, 31]. Interpretive phenomenology focuses on developing richly descriptive accounts of participants' experiences, which remain near to their everyday lived reality [32-36]. The university's institutional review board approved this study.

Setting

Participants were recruited from among patients at a health system associated with a large academic medical center, located in a major urban center. This health system provides diverse specialty care and draws patients from across California and beyond.

Recruitment and Sample

All adult patients (≥18 years old) living in rural California zip codes who had a video telehealth encounter with the health system within the past six months were eligible for participation. Zip codes were categorized as rural using Rural-Urban Commuting Area (RUCA) Codes [37; and see Appendix]. Recruitment was conducted from November 2022 to March 2023. The university's electronic health record (EHR) recruitment service was used for recruitment. A search of the health system's EHR using eligibility criteria identified just over 6,000 potentially eligible patients. Of these, 100 patients without active electronic patient portal accounts were contacted via a mailed recruitment letter, which described study expectations and procedures and asked interested patients to contact the study team by telephone or email. Four patients contacted the study team in response to mailed recruitment letters but did not respond to follow-up by the study team, so mailed recruitment letters did not yield any participants.

In addition, ten patients with active patient portals were randomly selected every five days and contacted via a patient portal secure message, which used the same study description language as mailed recruitment letters. Patients who received portal messages were able to respond within the recruitment message by clicking "I'm interested" or "No, Thank You" buttons. If a patient indicated interest in participating, the automated recruitment management system notified the author, who then directly contacted the patient via secure message.

A total of 203 patients were contacted in patient portal recruitment: 177 did not respond to the recruitment message, five declined participation, and 21 indicated interest. Five patients who indicated interest via patient portal recruitment did not respond to follow-up; the remaining 16 interested patients were all eligible to participate and comprised the final sample.

The average age of participants was 66.1 years (median = 69), ranging from 43 to 83 years old. Ten participants were female (62.5%). Four were employed, three were unable to work for health reasons, and nine were retired. Average monthly income of the 15 participants who provided this information was $3,940 (median = $1,700), ranging from $600 to $16,000. However, individual income was collected rather than household income; ten participants lived with a spouse or partner and may have had higher household incomes than what they reported individually. Two participants had completed high school, four had completed some college or an associate degree, five had bachelor's degrees, four had master's degrees, and one had a doctoral degree. One participant identified as Chicano, and the rest as White (n = 15, 93.8%). Participants obtained care at the health system for a variety of health conditions, the most common being cancer (n = 6). Per eligibility criteria, all participants had had at least one video telehealth encounter with the health system. Most participants were accessing highly specialized healthcare at the study health system.

Data Collection

Interviews were conducted remotely (four on Zoom video conference and 12 by telephone) from December 2022 to April 2023. Interviews were audio recorded and transcribed verbatim by a HIPAA-compliant transcription service. A semi-structured interview guide addressed participants' rural contexts and experiences with rural living, utilization of rural healthcare, care with the study health system, and experiences with telehealth. Narrative questions were designed to elicit participant experiences, for example "Can you tell me about a time you experienced challenges with telehealth?" while reflexive questions prompted participants to share reflections or interpretations, such as "How is telehealth different from in-person care for you?" Verbal consent was obtained at the outset of interviews, as well as

participant demographic information and communication technology access and utilization. All interview participants were compensated with $20 gift cards.

Data Analysis and Interpretation

Data analysis in interpretive phenomenology is an iterative, hermeneutic process of reading and interpretation of textual data [33, 36, 38]. Hermeneutic analysis involves interpretating text through repeated close readings, then re-examining the data through emergent interpretations [35, 36, 39]. Interpretation in this study began with individually reading each transcript and writing interpretive case summaries for each participant (i.e., case). Analysis between cases followed with manual naming or coding of texts [33, 40].

Naming further developed closeness with the data and supported the identification of narratives and exemplars [33, 40, 41]. Narratives are portions of text that demonstrate participants' experience of the research phenomenon. Exemplars typify certain findings and also showcase variation in the data and participants' experiences [32, 41]. Finally, through continual comparison of narratives and exemplars, patterns of meaning and experience were noted. These patterns were analyzed to form themes related to rural patients' experiences with telehealth at a large urban academic medical center.

Findings

Several themes were identified that characterize rural patients' experiences with telehealth at an urban academic medical center, and which help uncover the meaning these participants ascribe to telehealth in the context of living rurally. These themes are presented below under three organizing concept areas: Rural Healthcare, Rural Contexts, and Telehealth Experiences. All names are pseudonyms. Details of patients' health conditions have been omitted when they may allow participant identification.

Rural Healthcare

In order to contextualize participants' telehealth experiences, I sought to understand their overall healthcare access and utilization. The picture of rural healthcare that emerged was typical of that described in the health services literature, one of shortages, limited access, and quality concerns. The result of this healthcare landscape for participants were experiences of fragmented care and increased demands for patient self-advocacy.

Scarcity

Participants' characterizations of rural healthcare centered around the inadequacy of available services. Tammy, a retired advanced practice registered nurse, summarized the state of local care, *"There's just a lack of providers, generally, to choose from. Scarcity is a real problem here."* The concept of scarcity—the state of being insufficient for the demand—captures participants' experiences of limited rural healthcare. Nearly all participants had experienced challenges in obtaining care, such as waitlists for new patients, long wait times for appointments with established providers, and difficulty scheduling procedures. In a remote rural region, Tracy had faced particular challenges:

> Doctors, they don't have enough room in their schedules to take new clients. So I have been trying for about eight months to get just a regular general practitioner that will take my insurance. And I can't get on the waiting list for a doctor that will see me, either because they're so impacted or because they also don't take my insurance.

Carolyn voiced another perspective on the same issue:

> Because I'm an established patient in the practices that I go to, I don't have to worry about calling someplace and them saying, "We can't take any new patients." And that is really lucky, at this point. It's a situation where once you get into a practice, you do not leave it, or you're going to be passed to the four winds, basically.

In this way, limited healthcare availability curtailed patient options and constrained the potential to "shop around" among providers.

When it came to rural specialty care, several participants stated that there simply were not specialist providers, saying for example, *"There're not specialists around here— the type of specialists I need, they don't exist here*" (Tammy) or *"there's not access to doctors who know a whole lot about my [condition] up here"* (Tracy) and *"They don't have a lot of specialists down here, so... they're sending me all over the place"* (Valerie). Although specialty care shortages were most severe in more rural areas, they were experienced across rural settings. Shelley, who lived in a large town near a major tourist destination, described the local hospital as "full service," but qualified that with *"Again, no oncology services, no full-time cardiology, no pulmonology, no nephrology."* Specialist healthcare shortages were particularly evident among the sample related to oncology care. Several participants were currently or recently in cancer treatment, and all of them had to drive at least one hour to obtain that treatment.

Notably, not all participants identified challenges with obtaining healthcare in their rural area. Whether healthcare was perceived as adequate appeared to be a function of the specific rural setting and patients' healthcare needs. Bryan lived nearest to San Francisco in a more densely populated region, and although he had relatively high healthcare needs, he did not experience issues with local healthcare. By contrast, Brad lived in a remote area with relatively few services but also had low healthcare needs and was satisfied with his local care options.

Another perceived dimension of scarcity was a dearth of quality care. Participants consistently voiced concerns with the quality of the care available locally. When asked if she experienced any challenges with local healthcare, Tammy said,

> Can I say lack of competence? [laughs] Competency is kind of questionable on some people. … I'll give you an example. I drove [my friend] to three pulmonary visits, locally. And *not once* did the guy take the stethoscope off his neck to listen to his lung fields. Now, I mean, there's something wrong with the picture when a pulmonologist doesn't listen to your lungs, and then charts that your lung fields are equal and clear. He [her friend] has COPD!

As a retired healthcare provider, Tammy's expectations for healthcare were informed by her professional knowledge, and she was able to bring that insight to this issue. However, participants with varying levels of health literacy and healthcare utilization perceived their local care to be of low quality. Concerns with local care quality were exemplified by participants seeking second opinions outside of their local area. In this way, patients were not just accessing care that was unavailable locally, but care that they perceived to be of higher quality. Sabrina's emphatic response when asked if she sees any local providers exemplified quality concerns:

> *No [drawn out]. Nope.* Well, there are doctors here, but I don't see any of them. I see my primary care doctor and he's about maybe an hour and a half away.
>
> *[Interviewer: Why don't you see the providers that are closer?]*
>
> Because you're not going to get good care. If you see the hospitals, you're going to run. It's very rundown. Yeah, the quality of care here— rarely anybody sees the doctors here. Nobody really goes there. It's just a very bad healthcare system.

The choice to go beyond the nearest available healthcare to access more distant services is known as rural healthcare bypass, which has important implications for rural healthcare availability [42-44].

While Sabrina's take on local care may read as brusque, participants were discerning and nuanced in assessments of rural healthcare quality, demonstrating insight gained from direct healthcare experiences. Karl was very satisfied with the care provided by his local primary care provider and cardiologist but described how a lesion on his liver was miscategorized as non-cancerous by a local radiologist, an error that delayed his cancer diagnosis by several months. Jeffrey had also identified gradients in healthcare quality in his area:

> The healthcare I get [in a nearby town] is good. [The hospital there] does not have dialysis capability, so I've never been checked in. But I find the ER is excellent. I would say that the best doctors in [this county] are all in the ER, they're not in private practice. Private practices are a little iffy. You take what you get, or what you *can* get.

Demonstrating a reflective understanding of rural healthcare contexts, many participants linked low rural healthcare quality to issues like staffing shortages and high turnover, which they attributed in part to the difficulty of drawing qualified providers to rural areas.

Navigating Fragmented Care

In the context of scarcity, many participants' rural healthcare experiences were characterized by fragmented care. Fragmented care has been defined as "limited, noncontinuous, episodic, and disorganized care across multiple healthcare practitioners and settings" [45, p. 3461]. Although not unique to rural healthcare, fragmented care took an additional toll on rural participants because of the scarcity and geographic dispersal of healthcare services. Most participants had complex health needs and described seeing multiple providers and accessing care at multiple health systems in their local area, as well traveling to adjacent regions to access needed care.

An important dimension of the patient experience of fragmented care was increased demands for care navigation or coordination. For Richard, there was a clear link between rural healthcare staffing issues and his experience of fragmented care when trying to obtain an ultrasound:

> I need an ultrasound … and they were not able to schedule an appointment for me at the [Hospital 1] facility because they don't have adequate staff to run their radiology department. So I had to go to [Hospital 2]. My [local] urologist here is part of the [Hospital 1] system. So … [Hospital 2] doesn't like to communicate with [Hospital 1], and [Hospital 1] doesn't like to communicate with [Hospital 2] because they're competitors. So it's a system that— it works, but it takes a lot of patient advocacy to make it work.

Richard's experience highlights how navigating fragmented care requires high patient involvement in care coordination, and in turn, patient self-advocacy.

These demands were exemplified by Carolyn's journey with lung cancer treatment, beginning with her self-advocacy for a referral to the study health system after her local

radiologist did not plan to biopsy the tumor. After biopsy and genetic analysis of the tumor, oncologists at the study health system recommended Carolyn also undergo chemotherapy:

> And when I saw the very much overworked general oncologist at the cancer center up here, he thought I didn't even need chemotherapy, even though I had already been told by my [Health System] lung oncologist that I did. And so we talked for a long time, and I asked him to call the [Health System] guy, and he did that evening, and he called me back that evening, and said, "You're right, I understand now. So let's get you set up."

With a doctoral degree and former career in biology, Carolyn possessed an understanding of her disease and related treatment that supported her self-advocacy. Despite this, it was clear that these efforts were just another burden in her management of cancer care and survivorship. Richard also characterized the level of self-advocacy required to navigate fragmented care as a burden:

> It's sometimes frustrating and it takes persistence. 'Cause what I find is, one of the examples that I'll use is [Hospital 2] … has a tremendous turnover of employees. So you're always getting people that aren't very efficient at their job, so you have to stay on it. You just have to not give up and continually contact them when you need something. I'm fairly good at that and I get support from my partner in doing it. So between the two of us, we're able to advocate for each other to get what we need. But for people that maybe aren't as persistent, that can be an issue.

Richard acknowledged that he received support from his partner to navigate care, noting that the demands of self-advocacy may be a barrier for those who are not able to be as persistent.

While care navigation and patient self-advocacy were an ongoing burden for some, others shared different perspectives. Bryan, a transplant patient, had established coordination between his local primary care provider and health system transplant team, saying *"I have all the avenues open for them to talk back and forth and stuff … It's coordinated. It took a while to get it going right, but it's working really good the last five years."* Bryan felt empowered by navigating care. And Martha, an 83-year-old woman, experienced telehealth care as a valuable opportunity to develop her patient self-advocacy.

Applying concepts from interpretive phenomenology, rural healthcare scarcity and the challenges of fragmented care caused a shift in participants' mode of engagement with

healthcare, from ready-to-hand to unready-to-hand modes. In ready-to-hand mode, an individual is unreflexively engaged with the world through practical activity; action proceeds smoothly and as a result, world and equipment go unnoticed [33, 46]. By contrast, unready-to-hand mode is characterized by a breakdown or disturbance in engaged practical activity, illuminating the taken-for-granted aspects of world. This shift had prompted many participants to reflect on healthcare in their areas and its significance for their lived realities, developing interpretations that in turn formed part of their contexts for telehealth use, as discussed below.

Rural Contexts

Participants lived in locales across California: isolated coastal villages and the Coastal Mountain Ranges, remote far Northern California, the Sierra Foothills of Gold Country, and the internationally renowned Wine Country region. These settings embody widely divergent degrees of rurality, characterized by distinct geographies, economies, dimensions of access, and remoteness. Despite these differences, participants shared common experiences and conceptualizations of rurality, which were uncovered in part through narratives on accessing rural healthcare.

Rurality as Taken-for-Granted Background

In the context of rural healthcare, the most prominent features of rurality for participants were distance and travel. It was common for participants to travel an hour or more to access their basic healthcare services. They emphasized that the roads they used were *"shoddy"* (Brad), *"winding country roads"* (Janice) with *"curves, a lot of curves"* (Jeffrey), which added to travel time: *"It's only 50 miles, but the roads are not very good, so it takes an hour and a half one way"* (Carolyn). As with Carolyn, many immediately knew the number of miles they had to

drive for these services, demonstrating the significance of distance and travel to their everyday realities.

Distance and travel demands were most extreme to reach the study health center. Fourteen of the 16 participants had used in-person services there, with all but one driving at least two-and-a-half hours and up to 6 hours one way to reach the health center. This entailed substantial economic burden:

> the cost [for gas] of driving down is probably at least $100 one way. Then I have to stay at a hotel, which is at least $200 a night. And maybe $50 for parking. And then food. So for one trip, it's what? $500 plus wear and tear on my car. Between $500 and $1,000 I guess, depending on where I can stay. (Tracy)

Common to all participants' descriptions of managing travel to the health system was the specter of traffic. Traffic in the San Francisco Bay Area is notoriously congested, and traffic figured in all participants' travel planning. While urban residents certainly experience traffic impacts, rural patients were additionally impacted by the overall duration of their travel and by the contrast from driving conditions in their rural areas. Participants experienced notable nonmaterial burden related to travel and especially traffic, as exemplified by Tammy:

> It's very stressful. So just from the gate, it taints the visit because once your visit is over in person, you know, got to get back in your car and you got to fight the traffic going home.

Besides the stress of driving in traffic, patients also experienced stress from anticipating travel disruptions and the need to be on time, finding parking, and booking accommodations.

Rural distances were experienced not only in terms of travel time to services, however, but also as space. In describing where they lived, several participants mentioned the size of the parcels of land they lived on and of those surrounding them to convey a sense of the space inherent to rural living.

> I live in a house that's on an acre that's next to a house that's on six acres that's next to a house that's on probably 10 acres. So, I don't really have any close neighbors, and I don't have a lot of interaction unless I leave my house, except the goats that live in the meadow next door. (Janice)

With these descriptions, participants also communicated the centrality of lived space to their experiences of rurality. In this regard distance was unequivocally experienced as a positive attribute of rural living. In addition to space, participants evoked other elements of the natural setting, such as wild animals, quiet, low light pollution, and forests. Narratives of participants' rural environments revealed what showed up as meaningful for them, with space and natural setting figuring prominently as valued characteristics.

Although distance and travel were experienced as inconveniences, participants' depictions of these experiences also construed them as quotidian or routine: realities of a rural way of life. As Brad put it in describing the impact of his rural environment, *"Everything up here is, you know … you get it as good as you can and then you learn how to deal with."* Rurality was therefore most often experienced as background for participants, part of their taken-for-granted world.

Rurality Made Conspicuous

However, the full extent of potential inconveniences attendant to rural living became apparent during the course of data collection, when a series of severe winter weather systems heavily impacted the region [47], bringing record-breaking rainfall, snow at unusually low elevations, and high winds. Flooding, infrastructure damage, and days-long power outages affected thousands in California. Many participants referred to these circumstances in their interviews, describing varying degrees of impact in relation to rural living and rural healthcare. Brad described supporting other residents of his rural neighborhood during the snow:

> I was up there starting her generator because she doesn't have the arm strength to start the generator. So I got to walk four miles through the forest to get up to her place to get that thing started. And there's so much snow on the road I was the guy pulling the fire department back onto the road a couple nights ago.

It was Janice, however, who experienced the most direct healthcare impact as a result of these weather events:

> My appointment was early in the morning. And we had a big storm and it knocked down a bunch of trees, so I wasn't able to get out of my driveway. I had to wait two more weeks to get the carcinoma removed.

For participants who did not experience healthcare impacts from the storms, these circumstances nevertheless provoked them to reflect on potential challenges, as with Courtney:

> I probably would've been able to get down the hill and get out for a visit, but it would've been somewhat of a barrier. And especially— I've got an all-wheel drive car that works well, but if someone didn't have that and the amount of snow that we had, I could see how somebody would've not been able to make it to a physical visit. But given that the power was on, you'd be able to make it to a virtual visit.

For several participants, in-person healthcare access was cut off during those periods due to road closures, and for some, power outages would have made telehealth unavailable. These weather events had made conspicuous participants' rural worlds by disrupting their usual way of being. Their taken-for-granted routines of healthcare utilization were exposed, and assumptions of healthcare access were problematized, revealing the full value of telehealth for rural patients.

Telehealth Experiences

Participants' rural contexts and healthcare utilization formed the background of their telehealth utilization and clearly shaped their valuations of telehealth. The ultimate meaning that they assigned to telehealth in the wider context of rural healthcare related fundamentally to its role in supporting rural living.

Rural Connectivity and Patient Workarounds

The only rural telehealth barrier that participants identified, both experienced and hypothetical, was limited connectivity. However, in this study most participants did not personally experience connectivity issues. Those few who did had developed a wide range of workarounds to enable telehealth use. At one extreme, Brad had recently invested nearly $1,500 in an intensive system to enable connectivity. Three other participants had experienced limitations in video connectivity and used what they considered to be a minor workaround of

resorting to telephone visits. Sabrina had employed this workaround related to weather disruptions:

> In bad weather, if I'm not in a right location, then I do have [connectivity] issues. But if I know that there's bad weather coming, then I ask my neurologist or my doctor if he can call me instead of doing the telehealth visit. Sometimes I'm not able to do a video chat because the service is so bad. Then I can do a phone chat.

Helen had also resorted to telephone encounters more than once, saying "*To Zoom— it's a crapshoot."* The other common workaround was getting connectivity support from others. About one-third of participants stated that they had help from family or a friend to set up the video conference application on their device, or to access internet: *"I wouldn't know how to get access to the internet at the level that I currently have it if it wasn't for other people"* (Richard).

However, even participants who did not personally experience these challenges speculated that connectivity could be a telehealth barrier for rural patients, highlighting the prominence of this issue in narratives of rural telehealth. Janice's work with an organization providing support to low-income residents in her rural area lent concrete understanding of another dimension of connectivity barriers, namely affordability:

> Technology depends on people being wealthy enough to be able to afford the technology. And it's not just the computer. It's where you live and where you get your internet and how much you pay for it. All those things. I think about my clients, and there's no way [they could access telehealth]. They have to take a bus and go to the doctor because they can't do it.

Assessments of Telehealth: Drawbacks and Benefits

There was a range in participant-perceived drawbacks to telehealth, with some participants stating a clear preference for in-person care, while others stated that they identified no downsides to telehealth. Among the latter group was Jeffrey, who said:

> I usually have video conferences, so I see my providers and it basically is like sitting across the desk from them. … It's still like I'm meeting them in person. I could see them and they could see me.

Like Jeffrey, Sabrina, Bryan, and Jesse did not identify that interpersonal elements of the care interaction differed appreciably between telehealth and in-person. On the other hand, Tracy stated the clearest preference for in-person:

> It's [telehealth] not what I prefer, because I like building a relationship. It's harder to do that when it's not in-person. … I'm such a people person. I just feel like you can't get the same rapport when you're on a video screen as you can when you're in person.

The loss of in-person interaction elements was identified by about half of these rural patients. More than body language and eye contact, they referred to the intangible aspects of in-person, *"the things that you can't even put your finger on"* (Karl). Martha referred to *"an energy that moves between people"* in person that is lost over video, which this perceptive quote from Courtney captures:

> There's definitely an element that's missing. Because one of the things I really like about [my oncologist] is she comes into the space and then she relaxes and sits with me for a minute and just chats about something. And with the telehealth, you can tell she's still thinking of that, but the space doesn't allow for that as much.

With telehealth, Courtney still perceived her provider's efforts to develop connection, but distinctly perceived less effect from those efforts. This aligns with Carolyn's assessment that *"there's more impact of the interpersonal interaction"* when in-person. Participants also characterized video as *"just a little bit removed"* (Karl) from in-person and as *"easier to distance somebody. It's easier to be kind of uninterested"* on video (Janice).

Those participants who felt that elements of in-person interaction were missing from telehealth qualified these limitations by noting that they may not be improved on in-person. That is, the quality of both telehealth and in-person encounters is largely dependent on provider and patient factors:

> It could depend on the personality of the two parties involved. Because I've been in medical offices person-to-person with doctors who stare at the computer, and I feel like it doesn't even matter that I'm there, instead of someplace else. And I think it's easier for some people than it is for others. Some medical people are more withdrawn than others, and so it probably would vary depending on the characteristics of the provider.

While Carolyn discerns the importance of provider characteristics, Martha and Karl both identified their own personality characteristics, like shyness or "lack of communication," as factors in the healthcare interaction.

Increased access to specialist providers was the primary telehealth benefit for this rural patient population, with most participants explicitly defining the value of telehealth in relation to the dearth of specialist care in their area. Until recently a life-long urban resident, Jesse's view of the specialist deficit in rural areas was formed in contrast to his experience living in the Bay Area. He required ongoing specialty care for a complex health condition and said of telehealth *"where I'm at, this is a lifeline."* The high value rural residents placed on increased specialist access was revealed by Tracy, who indicated a preference for establishing in-person care with a provider before using telehealth. Despite this preference, Tracy also stated that she would use telehealth with a new provider, *"if it meant that I had access to a specialist and didn't have to drive six hours."* Furthermore, several participants viewed telehealth or had used telehealth as an avenue to gain entry to care with a specialist provider, as with Valerie: *"They offered me telehealth first as a way to get in the door, which I'm glad I did because I might've waited another couple months to see her."*

Not surprisingly, all participants identified less travel as a benefit of general telehealth care. However, regarding accessing services at the study health center, reduced need to travel to this urban area was a standout benefit. Without telehealth, participants would travel five to twelve hours round-trip for a 15-minute consultation. Janice offered a pithy summation of the value of telehealth in this context when asked if she would ever choose an in-person visit if telehealth was an option: *"Oh, you mean drive eight hours instead of sitting in my dining room? No."* The benefits of reduced travel to the study health center went beyond saved time and

material resources, to reduced emotional, energetic, and mental strain. Reduced travel was also noted to be safer, and multiple patients related this to weather:

> Things like, we're supposed to come down for a visit and it's snowing, and I can call and go, "Can you convert that in real life visit to a telehealth," and be able to do it without risking life and limb by driving through the snow. (Shelley)

Older participants especially perceived safety benefits:

> Plus, as you get older, your eyesight, your hearing, your driving skills start to go. I don't night drive, so I have to plan. I don't have to worry about any of that with telehealth. (Tammy)

A corollary benefit of reduced travel was increased flexibility in scheduling. Rural patients, particularly the most remote, were limited in the timing of appointments they could take by their need to plan travel. For example,

> You can take those appointments nobody wants to drive to, like 8:00 AM, who wants to drive there at 8:00 AM? If you're asking me to drive, it needs to be between 11:00 am and 3:00 pm. So you can take those late hour appointments or early morning appointments.

The distance and time that Tammy had to travel left her with a small window of in-person visit times that were feasible without an overnight stay near the health center. However, this was a benefit as well for those who were closer to San Francisco, like Bryan:

> It's easier to pick the time, too, for the appointment, if you're doing telehealth. Because so often I have to go in to the clinic on Friday, because he's only there Friday afternoons. Well, that puts me coming home in traffic, and it takes me two hours [double the normal time] to get home.

Defining a Role for Telehealth within Rural Contexts

Participants articulated the role of telehealth by weighing the value of in-person care relative to the burdens of in-person access in rural contexts. While telehealth was viewed as a welcome, high-value, and even essential service in their rural life contexts, participants still situated it as a complement or supplement—rather than a replacement—to in-person care. They used words like *alternative*, *option*, and *choice* when weighing how they saw telehealth fitting into rural healthcare and expressed a desire for flexibility between in-person and telehealth modalities. These rural patients all appreciated the need for in-person visual assessment and

physical exam. However, the majority had chronic conditions necessitating routine follow-up care. As many participants traveled an hour or more to reach even their local providers, telehealth visits were seen as ideal for almost all instances of routine care. Brad offered a succinct calculation of this balance: *"Ninety percent of the stuff is all fine and dandy over the phone. The other ten percent? Now I got to see my doctor in the office."* For these rural patients, telehealth was additionally seen as a way to lay the groundwork for making the most of subsequent in-person care that they had to travel for:

> Especially preliminary introductions to whatever's going to be going on can be done through telehealth. And then, as you get closer to whatever is coming up, let's say a procedure or radiology or whatever, that's when the in person can be valuable. (Karl)

Ultimately, telehealth allowed participants to remain in their familiar, valued rural contexts while obtaining more reliable and more flexible access to care. In this way, telehealth was experienced as supporting participants' rural ways of life. The central importance of rural living to participants was disclosed through their positive descriptions of rural space and natural setting, as well as their implicit acceptance of rural inconveniences—both routine and out of the ordinary. Brad exemplified this aspect of participants' identification with a rural way of life:

> I'm kind of into this being in the woods and not having to leave kind of situation. I've got a whole system all planned out up here. So the telehealth is just part of those systems. I need to be able to call out when it's all smoke and fire and [everything's] gone to damnation up here.

The decisive value and meaning of telehealth for these patients was therefore revealed relative to the value they placed on rural living. As Courtney put it, telehealth *"makes it easier for me to be able to live where I live and still get the care that I want to get, where I want to get it."*

Discussion

In this interpretive phenomenology study, I sought to portray rural patients' experiences with telehealth. Study participants all experienced telehealth as a tremendously positive healthcare service and were unanimously in support of its ongoing utilization in their rural

healthcare. Participants' limited reservations about telehealth were expressly outweighed by its perceived benefits. These findings align with existing research on rural patients' experiences with telehealth in a variety of settings [48-58].

I also explored how participants' rural life contexts shaped their telehealth experiences and their assessments of telehealth. Taken together, findings demonstrate that participants' valuations of telehealth were directly shaped by their rural contexts. Telehealth was seen as a means to circumvent rural inconveniences that create challenges for healthcare access, such as remoteness, travel, and weather, thereby enabling more frequent and more reliable healthcare utilization. Furthermore, against the backdrop of rural healthcare scarcity and inadequacy, telehealth was seen as a means to broaden the care that was available to rural patients, particularly specialist care that was unavailable locally or care that was perceived as higher quality than that available locally. The full meaning that participants ascribed to telehealth was therefore found in understanding of their rural contexts, which situated the value of telehealth as more than mere convenience. Telehealth emerged as a resource to support rural living and participants' rural ways of life.

The second objective was to identify the benefits or drawbacks and barriers of telehealth for rural patients. The primary benefits were reduced travel and increased access to healthcare and specialist providers. Rural patients in a variety of settings commonly name reduced travel time and costs as central telehealth benefits [48-50, 53, 54, 59, 60]; findings add detail regarding the added impact of navigating congested urban traffic for rural patients. Improved provider communication has been identified as a telehealth benefit by rural participants in other qualitative studies [48-50] but only one participant in this study noted this benefit in relation to patient portal messaging with his providers. The focus of interviews was on video and telephone

telehealth experiences. Similarly, while the higher efficiency [50, 52, 61] and convenience [50-54, 59, 60] of telehealth were primary benefits for other rural patients, these figured less prominently, in only a few interviews. Several participants noted the loss of some beneficial elements of interpersonal interaction in telehealth; the degree to which participants experienced this as a drawback varied. Specific elements of this loss that participants named were common to findings from other qualitative studies with rural telehealth patients, such as stilted communication, missed eye contact, and loss of physical conversational cues [50, 52, 55, 62]. However participants here emphasized more intangible elements that may be best captured by the phenomenological concept of lived human relation [38, 63].

Issues such as technical challenges and poor connectivity are common qualitative findings on rural patient-identified telehealth barriers [48, 49, 52, 56]. Findings contribute new detail on the workarounds that rural residents employ to overcome minor connectivity challenges, and furthermore cast this potential barrier as less than prohibitive. Privacy concerns did not factor in these rural patients' evaluations of telehealth services, as Pullyblank (2022) [64] reported in her scoping review of rural beliefs and attitudes toward telehealth use. This could be in part due to the timing of interviews in early 2023, well after the establishment of telehealth's "new normal" following the COVID-19 pandemic. Studies in Pullyblank's review also included populations accessing care for stigmatized conditions such as HIV, which contributed to privacy concerns among those patients. Notably, none of the participants in this study identified challenges or drawbacks related to rural-urban patient-provider cultural disconnect, which other studies have identified as a potential issue for rural patients [65, 66]. However, interviews in the current study did not directly address rural-urban concordance, and this question should be addressed more directly in future qualitative study of rural telehealth patient experiences.

Study Implications

Despite the overwhelmingly positive assessments of telehealth and its ability to increase healthcare access provided by rural patients in this study, caution is urged related to two aspects of findings. First, the sample differed substantively compared to the rest of rural California: 94% of participants identified as White, versus 74% in rural California counties [67, 68], and 63% were aged 65 years and over (versus 25%). Furthermore, the sample was more highly educated, as 63% had a bachelor's degree or higher compared to 23% of residents of California rural counties. Participants overall exhibited high cultural health capital [69], and many also described high social support and community engagement.

Although there was variation in the sample, many participants' demographic and healthcare utilization characteristics demonstrated Link and Phelan's concept of flexible resources, that is, "money, knowledge, power, prestige, and the kinds of interpersonal resources embodied in the concepts of social support and social network" [70]. Participants' resources were exemplified by the fact that all were able to travel to the study health center for in-person care, an option not available to all rural residents. Further, participants had all successfully navigated local care to obtain a specialty referral to the study health center, a resource-intensive process that depends on an effective relationship with a local primary care provider [71]. This may pose a prohibitive barrier for some rural patients, given the challenges they experience in accessing primary care [72].

Second, and relatedly, was the finding that rural patients experienced telehealth partly as a means to access higher quality care than what they perceived to be available in their local communities. In this way, telehealth may act as a form of rural healthcare bypass. Rural healthcare bypass is a complex consumer behavior. Dissatisfaction with local healthcare and

living in an area with low density of primary care providers are positively associated with rural bypass [42, 44, 73], but strength of community ties has been shown to moderate the effect of healthcare dissatisfaction on bypass [42]. Additionally, research shows mixed impacts of factors such as education and age on rural bypass [42, 73, 74], and these relationships have been shown to vary by area social vulnerability level [74]. Level of rurality, proximity to non-rural areas, distance to other hospitals, and commuting flows also impact bypass behaviors [42-44, 73, 74]. Similar to rural telehealth patients in this study, rural patients who chose to use non-local primary care reported bypassing to access better care quality, more selection, and specialty care [73, 74].

Rural healthcare bypass has complicated implications for rural health. Although telehealth may benefit patients by supporting access to distant, higher quality care, bypass also decreases revenue for rural healthcare services, undermining their economic viability and increasing the risk of closure [42, 75]. Potential bypass solutions are equally complex and cut to the heart of rural healthcare challenges, namely, how to support rural healthcare quality and workforce development given scarce resources and low demand.

Taken together, participants' mobilization of flexible resources to utilize telehealth to go beyond local healthcare options substantiates concerns that telehealth may create more disparities for marginalized and under-resourced rural populations. Further study is needed to explore telehealth patient experiences with rural patients of lower socioeconomic status and rural minoritized populations. Particular attention is needed regarding how patient experiences relate to dimensions of perceived or realized healthcare access. Policy should address patient-level barriers by supporting measures such as healthcare navigation resources, telehealth-related patient outreach, digital access assessment, and patient digital education. Policy should also

support telehealth development in rural safety net providers, such as Critical Access Hospitals and Federally Qualified Health Centers.

Strengths and Limitations

A strength of this study was the use of RUCA codes and patient ZIP codes to identify eligible rural patients. The sample was entirely rural sample, addressing issues in the rural telehealth literature related to unclear sample rurality. This recruitment strategy sampled from a diverse patient population dispersed across a broad region, to overcome geographic limitations associated with traditional recruitment methods in rural areas, such as flyers or partnering with local clinics.

However, the sample did not reflect the education level and racial and ethnic diversity of rural populations in the study region and is a significant limitation of this study. Additionally, participants were all recruited through the patient portal; mailed recruitment letters did not yield any participants. Patient portal use has been found to be associated with patient demographic characteristics, and an inactive patient portal may indicate patients at risk of digital access disparities [76-78]. Finally, the sample included only patients who had completed a video telehealth visit; connectivity barriers may be perceived as more substantial among patients who have not used video telehealth. These factors should be borne in mind when considering the applicability of findings to other patient groups.

Conclusion

Rural patients in this study had utilized telehealth to access specialty care at a distant urban academic medical center and offered highly positive assessments of the value of telehealth. Their perceptions of telehealth were informed by experiences of rural healthcare scarcity and their rural environments. In these contexts, telehealth emerged as an impactful and positive tool

to support both rural healthcare access and a rural way of life. However, given ongoing disparities in telehealth utilization among populations of color, research is needed to understand the telehealth experiences of rural low-income patients and populations of color. Future studies should employ purposive sampling to recruit samples that reflect the changing racial and ethnic diversity of rural populations. Further research is also needed to understand a potential role of telehealth in rural healthcare bypass.

References

1. Barton B, Romsai TB, Hahn C. Chartbook on Rural Healthcare: National Healthcare Quality and Disparities Report. Agency for Healthcare Research and Quality; Rockville, MD; 2021 November. AHRQ Pub. No. 22-0010. PMID: 35263059.

2. Henning-Smith CE. Determinants of health in rural communities. In: Inungu JN, Minelli MJ, editors. Foundations of rural public health in America. Burlington, MA: Jones & Bartlett Learning; 2021. p. 17-29.

3. Meit M, Knudson A, Gilbert T, Tzy-Chyi Yu A, Tanenbaum E, Ormson E, et al. The 2014 update of the rural-urban chartbook. Rural Health Reform Policy Research Center; 2014 October.

4. Burrows E, Suh R, Hamman D. Policy Brief: Health Care Workforce Distribution and Shortage Issues in Rural America. . 2012.

5. Larson E, Andrilla C, Garberson L. Supply and distribution of the primary care workforce in rural America: 2019. Seattle, WA.: WWAMI Rural Health Research Center, University of Washington; 2020 June. Policy brief #167.

6. Larson E, Andrilla H, Kearney J, Garberson L, Patterson D. The distribution of the general surgery workforce in rural and arban America in 2019. Seattle, WA. WWAMI Rural Health Research Center, University of Washington; 2021 March. Policy Brief.

7. O'Hanlon CE, Kranz AM, DeYoreo M, Mahmud A, Damberg CL, Timbie J. Access, quality, and financial performance of rural hospitals following health system affiliation. Health Affairs. 2019;38(12):2095-104. doi: 10.1377/hlthaff.2019.00918.

8. Garcia MC, Rossen LM, Bastian B, Faul M, Dowling NF, Thomas CC, et al. Potentially excess deaths from the five leading causes of death in metropolitan and nonmetropolitan counties

- United States, 2010-2017. MMWR Surveill Summ. 2019 Nov 8;68(10):1-11. PMID: 31697657. doi: 10.15585/mmwr.ss6810a1.

9. Curtin SC, Spencer MR. Trends in death rates in urban and rural areas: United States, 1999-2019. National Center for Health Statistics; Hyattsville, MD; 2021 September. NCHS Data Brief No. 417. p. 1-8. PMID: 34582331.

10. Yaemsiri S, Alfier JM, Moy E, Rossen LM, Bastian B, Bolin J, et al. Healthy People 2020: Rural areas lag in achieving targets for major causes of death. Health Aff (Millwood). 2019 Dec;38(12):2027-31. PMID: 31794308. doi: 10.1377/hlthaff.2019.00915.

11. Dorsey ER, Topol EJ. State of telehealth. N Engl J Med. 2016;375(2):154-61. doi: 10.1056/NEJMra1601705.

12. Lin C-CC, Dievler A, Robbins C, Sripipatana A, Quinn M, Nair S. Telehealth in health centers: key adoption factors, barriers, and opportunities. Health Affairs. 2018;37(12):1967-74. doi: 10.1377/hlthaff.2018.05125.

13. Tuckson RV, Edmunds M, Hodgkins ML. Telehealth. New England Journal of Medicine. 2017;377(16):1585-92. doi: 10.1056/NEJMsr1503323.

14. Kruse CS, Krowski N, Rodriguez B, Tran L, Vela J, Brooks M. Telehealth and patient satisfaction: A systematic review and narrative analysis. BMJ Open. 2017;7(8). doi: 10.1136/bmjopen-2017-016242.

15. Orlando JF, Beard M, Kumar S. Systematic review of patient and caregivers' satisfaction with telehealth videoconferencing as a mode of service delivery in managing patients' health. PLoS One. 2019;14(8). doi: 10.1371/journal.pone.0221848.

16. Totten AM, Hansen RN, Wagner J, Stillman L, Ivlev I, Davis-O'Reilly C, et al. Telehealth for acute and chronic care consultations. Comparative Effectiveness Review. Rockville, MD: Agency for Healthcare Research and Quality, 2019 No. 216.

17. Demeke HB, Merali S, Marks S, Pao LZ, Romero L, Sandhu P, et al. Trends in use of telehealth among health centers during the COVID-19 pandemic—United States, June 26-November 6, 2020. MMWR Morb Mortal Wkly Rep. 2021;70(7):240-4. doi: 10.15585/mmwr.mm7007a3.

18. Samson LW, Tarazi W, Turrini G, Sheingold S. Medicare beneficiaries' use of telehealth in 2020 — Trends by beneficiary characteristics and location. Washington, DC. : Office of the Assistant Secretary for Plannnig and Evaluation, U.S. Department of Health and Human Services; 2021 December. Issue Brief No. HP-2021-27.

19. Cantor JH, McBain RK, Pera MF, Bravata DM, Whaley CM. Who is (and is rot) receiving telemedicine care during the COVID-19 pandemic. Am J Prev Med. 2021 2021/09/01/;61(3):434-8. doi: 10.1016/j.amepre.2021.01.030.

20. Lucas JW, Villarroel MA. Telemedicine use among adults: United States, 2021. Hyattsville, MD.: National Center for Health Statistics; 2022 October. NCHS Data Brief No. 445.

21. Karimi M, Lee EC, Couture SJ, Gonzales A, Grigorescu V, Smith SR, et al. National survey trends in telehealth use in 2021: Disparities in utilization and audio vs. video services. US Department of Health & Human Services.. 2022 Feb 1.

22. Hirko KA, Kerver JM, Ford S, Szafranski C, Beckett J, Kitchen C, et al. Telehealth in response to the COVID-19 pandemic: Implications for rural health disparities. Journal of the American Medical Informatics Association. 2020;27(11):1816-8. doi: 10.1093/jamia/ocaa156.

23. Kichloo A, Albosta M, Dettloff K, Wani F, El-Amir Z, Singh J, et al. Telemedicine, the current COVID-19 pandemic and the future: a narrative review and perspectives moving forward in the USA. Family Medicine and Community Health. 2020;8(3):e000530. doi: 10.1136/fmch-2020-000530.

24. Zhai Y. A call for addressing barriers to telemedicine: health disparities during the COVID-19 pandemic. Psychotherapy and Psychosomatics. 2020:1. doi: 10.1159/000509000.

25. Frank L, Basch E, Selby JV. The PCORI perspective on patient-centered outcomes research. JAMA. 2014;312(15):1513-4. doi: 10.1001/jama.2014.11100.

26. Doyle C, Lennox L, Bell D. A systematic review of evidence on the links between patient experience and clinical safety and effectiveness. BMJ Open. 2013;3(1):e001570. doi: 10.1136/bmjopen-2012-001570.

27. Bailey JE, Gurgol C, Pan E, Njie S, Emmett S, Gatwood J, et al. Early patient-centered outcomes research experience with the use of telehealth to dddress disparities: Scoping review. J Med Internet Res. 2021 2021/12/7;23(12):e28503. doi: 10.2196/28503.

28. Kozhimannil KB, Henning-Smith C. Racism and health in rural America. Journal of Health Care for the Poor and Underserved. 2018;29(1):35-43. doi: 10.1353/hpu.2018.0004.

29. Brykczynski K, Benner P. The living tradition of interpretive phenomenology. In: Chan G, Brykczynski K, Malone R, Benner P, editors. Interpretive phenomenology in health care research. Indianapolis, IN: Sigma Theta Tau International; 2010. p. 113-41.

30. Benner P. From novice to expert. Excellence and power in clinical nursing practice. 2nd ed: Prentice-Hall (Addison-Wesley); 2000.

31. Benner P. Interpretive phenomenology: Embodiment, caring, and ethics in health and illness. Introduction. Thousand Oaks, CA: Sage Publications; 1994.

32. Benner P. Quality of life: a phenomenological perspective on explanation, prediction, and understanding in nursing science. Advances in Nursing Science. 1985.

33. Benner P, Tanner C, Chesla C. Expertise in nursing practice: Caring, clinical judgment and ethics. 2nd ed. New York, NY: Springer; 2009.

34. Laverty SM. Hermeneutic phenomenology and phenomenology: A comparison of historical and methodological considerations. International Journal of Qualitative Methods. 2003;2(3):21-35.

35. Mackey S. Phenomenological nursing research: Methodological insights derived from Heidegger's interpretive phenomenology. International Journal of Nursing Studies. 2005;42:179-86. doi: 10.1016/j.ijnurstu.2004.06.011.

36. Smith JA, Flowers P, Larkin M. Interpretive phenomenological analysis: Theory, method and research. London, UK: Sage Publications Ltd.; 2009.

37. USDA Economic Research Service . Rural-Urban Commuting Area Codes. 2023 [updated September 25, 2023; cited 2023 November 14]; Available from: https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes.aspx.

38. van Manen M. Researching lived experience: Human science for an action sensitive pedagogy. 2nd ed. New York: Routledge; 2016.

39. Leonard V. A Heideggerian phenomenological perspective on the concept of person. In: Benner P, editor. Interpretive phenomenology: Embodiment, caring, and ethics in health and illness. Thousand Oaks, CA: Sage Publications; 1994. p. 43-63.

40. Crist JD, Tanner C. Interpretation/analysis methods in hermeneutic interpretive phenomenology. Nursing Research. 2003;52(3):202-5.

41. Benner P. The tradition and skill of interpretive phenomenology in studying health, illness, and caring practices. In: Benner P, editor. Interpretive phenomenology: Embodiment, caring, and ethics in health and illness. Thousand Oaks, CA: Sage Publications; 1994. p. 99-127.

42. Sanders SR, Erickson LD, Call VRA, McKnight ML, Hedges DW. Rural health care bypass behavior: How community and spatial characteristics affect primary health care selection. The Journal of Rural Health. 2015;31(2):146-56. doi: https://doi.org/10.1111/jrh.12093.

43. CMS Office of Minority Health . Examining Rural Hospital Bypass for Inpatient Services. Baltimore, MD. Centers for Medicare & Medicaid Services; 2020 December.

44. CMS Office of Minority Health . Examining Rural Hospital Bypass for Outpatient Services. Baltimore, MD. Centers for Medicare & Medicaid Services; November 2021.

45. Joo JY. Fragmented care and chronic illness patient outcomes: A systematic review. Nurs Open. 2023 Jun;10(6):3460-73. PMID: 36622952. doi: 10.1002/nop2.1607.

46. Plager KA. Hermeneutic phenomenology: A methodology for family health and health promotion study in nursing. In: Benner P, editor. Interpretive phenomenology: Embodiment, caring, and ethics in health and illness. Thousand Oaks, CA: Sage Publications, Inc.; 1994.

47. Pitofsky M, Rice D. 'Dangerous' and 'life-threatening': Flooding, snow expected in California as atmospheric river arrives. 2023 [cited 2023 November 17]; Available from: https://www.usatoday.com/story/news/weather/2023/03/09/thursday-weather-forecast-winter-storm/11430335002/.

48. Ferucci ED, Choromanski TL, Arnold RI, Richards JK, Jessen CM. Perspectives of patients and providers on the use of telemedicine for chronic disease specialty care in the Alaska Tribal Health System. Telemed J E Health. 2022;28(4):535-43. doi: 10.1089/tmj.2021.0175.

49. Jordan DN, Jessen CM, Ferucci ED. Views of patients and providers on the use of telemedicine for chronic disease specialty care in the Alaska native population. Telemed J E Health. 2021;27(1):82-9. doi: 10.1089/tmj.2019.0284.

50. Batsis JA, McClure AC, Weintraub AB, Sette D, Rotenberg S, Stevens CJ, et al. Barriers and facilitators in implementing a pilot, pragmatic, telemedicine-delivered healthy lifestyle program for obesity management in a rural, academic obesity clinic. Implement Sci Commun. 2020;1(1):1-9. doi: 10.1186/s43058-020-00075-9.

51. Day SC, Day G, Keller M, Touchett H, Amspoker AB, Martin L, et al. Personalized implementation of video telehealth for rural veterans (PIVOT-R). Mhealth. 2021;7(24). doi: 10.21037/mhealth.2020.03.02.

52. Demirci J, Kotzias V, Bogen DL, Ray KN, Uscher-Pines L. Telelactation via mobile app: Perspectives of rural mothers, their care providers, and lactation consultants. Telemed J E Health. 2019;25(9):853-8. doi: 10.1089/tmj.2018.0113.

53. Finley BA, Palitsky R, Charteris E, Pacheco C, Kapoor D. Outpatient telecardiology perceptions among rural, suburban, and urban veterans utilizing in-person cardiology versus telecardiology services: A mixed methods analysis. J Rural Health. 2021;37(4):812-20. doi: 10.1111/jrh.12586.

54. Fletcher TL, Boykin DM, Helm A, Dawson DB, Ecker AH, Freshour J, et al. A pilot open trial of video telehealth-delivered exposure and response prevention for obsessive-compulsive disorder in rural Veterans. Mil Psychol. 2022;34(1):83-90. doi: 10.1080/08995605.2021.1970983.

55. Goldstein KM, Perry KR, Lewinski A, Walsh C, Shepherd-Banigan ME, Bosworth HB, et al. How can equitable video visit access be delivered in primary care? A qualitative study

among rural primary care teams and patients. BMJ Open. 2022;12(8). doi: 10.1136/bmjopen-2022-062261.

56. Holtz B, Mitchell K, Hirko K, Ford S. Using the technology acceptance model to characterize barriers and opportunities of telemedicine in rural populations: Survey and interview study. JMIR Form Res. 2022;6(4). doi: 10.2196/35130.

57. Lindsay JA, Hudson S, Martin L, Hogan JB, Nessim M, Graves L, et al. Implementing video to home to increase access to evidence-based psychotherapy for rural veterans. J Technol Behav Sci. 2017;2(3):140-8. doi: 10.1007/s41347-017-0032-4.

58. Whealin JM, King L, Shore P, Spira J. Diverse veterans' pre-and post-intervention perceptions of home telemental health for posttraumatic stress disorder delivered via tablet. Int J Psychiatry Med. 2017;52(1):3-20. doi: 10.1177/0091217417703291.

59. Schlittenhardt M. Tele-continence care: A novel approach for providers. Urol Nurs. 2016;36(5). doi: 10. 7257/1053-816X.2016.36.5.217.

60. Silvestrini M, Indresano J, Zeliadt SB, Chen JA. "There's a huge benefit just to know that someone cares": A qualitative examination of rural veterans' experiences with TelePain. BMC Health Serv Res. 2021;21(1111). doi: 10.1186/s12913-021-07133-5.

61. Hutchinson RN, Anderson EC, Ruben MA, Manning N, John L, Daruvala A, et al. A Formative Mixed-Methods Study of Emotional Responsiveness in Telepalliative Care. J Palliat Med. 2022;25(8):1258-67. doi: 10.1089/jpm.2021.0589.

62. Batsis JA, McClure AC, Weintraub AB, Kotz DF, Rotenberg S, Cook SB, et al. Feasibility and acceptability of a rural, pragmatic, telemedicine-delivered healthy lifestyle programme. Obes Sci Pract. 2019;5(6):521-30. doi: 10.1002/osp4.366.

63. Tuohy D, Cooney A, Dowling M, Murphy K, Sixmith J. An overview of interpretive phenomenology as a research methodology. Nurse Researcher. 2013;20(6):17-20. doi: 10.7748/nr2013.07.20.6.17.e315.

64. Pullyblank K. A scoping literature review of rural beliefs and attitudes toward telehealth utilization. West J Nurs Res. 2023;45(4):375-84. PMID: 36324263. doi: 10.1177/01939459221134374.

65. Golembiewski EH, Gravholt DL, Roldan VDT, Naranjo EPL, Vallejo S, Bautista AG, et al. Rural patient experiences of accessing care for chronic conditions: A systematic review and thematic synthesis of qualitative studies. Ann Fam Med. 2022;20(3):266-72. doi: 10.1370/afm.2798.

66. Cheesmond NE, Davies K, Inder KJ. Exploring the role of rurality and rural identity in mental health help-seeking behavior: A systematic qualitative review. Rural Ment Health. 2019;43(1):45-59. doi: 10.1037/rmh0000109.

67. United States Census Bureau . QuickFacts. 2023 [cited 2023 November 14]; Available from: https://www.census.gov/quickfacts/fact/map/CA/RHI725222.

68. United States Federal Office of Rural Health Policy . List of rural counties and designated eligible census tracts in metropolitan counties. 2021. Bulletin No. 20-01.

69. Shim JK. Cultural health capital: A theoretical approach to understanding health care interactions and the dynamics of unequal treatment. J Health Soc Behav. 2010 Mar;51(1):1-15. PMID: 20420291. doi: 10.1177/0022146509361185.

70. Link BG, Phelan J. Social conditions as fundamental causes of disease. J Health Soc Behav. 1995;35(Extra Issue):80-94. PMID: 7560851.

71. Brundisini F, Giacomini M, DeJean D, Vanstone M, Winsor S, Smith A. Chronic disease patients' experiences with accessing health care in rural and remote areas: a systematic review and qualitative meta-synthesis. Ont Health Technol Assess Ser. 2013;13(15). doi: http://www.hqontario.ca/en/documents/eds/2013/full-report-OCDM-rural-health-care.pdf.

72. Larson AE, Zahnd WE, Davis MM, Stange KC, Yoon J, Heintzman JD, et al. Before and during pandemic telemedicine use: An analysis of rural and urban safety-net clinics. American Journal of Preventive Medicine. 2022 2022/12/01/;63(6):1031-6. doi: 10.1016/j.amepre.2022.06.012.

73. Liu JJ, Bellamy G, Barnet B, Weng S. Bypass of local primary care in rural counties: Effect of patient and community characteristics. Ann Fam Med. 2008 Mar-Apr;6(2):124-30. PMID: 18332404. doi: 10.1370/afm.794.

74. Jackson JE, Cope MR, Sanders SR, Pierce H. Privilege and Place: An exploratory study about healthcare bypass behavior. Rural and Remote Health. 2021;21(1):1-13. doi: 10.22605/RRH5952.

75. Malone T, Holmes M. Patterns of hospital bypass and inpatient care-seeking by rural residents. Chapel Hill, NC: North Carolina Rural Health Research Program; April 2020. Findings Brief.

76. Rodriguez JA, Lipsitz SR, Lyles CR, Samal L. Association between patient portal use and broadband access: A national evaluation. Journal of General Internal Medicine. 2020 2020/12/01;35(12):3719-20. doi: 10.1007/s11606-020-05633-4.

77. Chagpar AB. Sociodemographic factors affecting telemedicine access: A population-based analysis. Surgery. 2022;171(3):793-8. doi: 10.1016/j.surg.2021.08.059.

78. Pullyblank K, Krupa N, Scribani M, Chapman A, Kern M, Brunner W. Trends in telehealth use among a cohort of rural patients during the COVID-19 pandemic. Digit Health. 2023 Jan-Dec;9:20552076231203803. PMID: 37799503. doi: 10.1177/20552076231203803.

Chapter 5

Discussion

In this mixed methods dissertation study, I aimed to describe patient experience assessment methods and outcomes with rural telehealth patients in the United States and to explore demographics, utilization, and experiences with telehealth of a population of rural-dwelling adults accessing telehealth services at an urban medical center in California. In this final chapter, I present a summary of study results, synthesize quantitative and qualitative findings, identify remaining knowledge gaps, and discuss implications of the dissertation for practice, research, and policy.

Dissertation Findings

In a scoping review of telehealth patient experience research with rural patients, I found that a majority of studies used questionnaires to assess patient experience. Of these studies, fewer than half used validated survey items, and the comprehensiveness of patient experience measures varied widely. Open-ended survey items, in-depth interviews, or focus groups were also employed in nearly half of studies, either alone or in combination with surveys. Quantitative patient experience outcomes fell under categories of patient satisfaction, telehealth care characteristics, patient-provider rapport, technology elements, and access. Qualitative themes were most often presented as telehealth benefits or facilitators and drawbacks or barriers. Rural patients in included studies were overall highly satisfied with telehealth and appreciated the convenience and increased care access it offered. Drawbacks such as technology challenges were typically seen as minor.

The studies in the scoping review were conducted across the United States and display a diversity of rural settings. However, an important finding of the review was the underrepresentation of rural racial and ethnic diversity in telehealth patient experience studies, with many included study samples having higher proportions of White patients than in the rural

United States population as a whole. Although this may be due in part to regional variation in the racial and ethnic make-up of rural areas, this finding still represents an important weakness of existing research on rural patients' experiences with video telehealth.

In the quantitative study of demographics and telehealth utilization of a population of rural-dwelling California adults, I found significant differences in patient demographics across three levels of rurality. Patients who lived in the more rural ZIP code categories were older and a higher proportion were of White race/ethnicity and preferred English speakers. Latino telehealth patients were substantially younger than White patients in our sample and a higher proportion lived in less rural ZIP code categories. Importantly, the representation of patients who are American Indian/Alaska Native (AIN/AN), Asian, Black or African American, and Latino was lower in our sample than in rural California as a whole, indicating disparities in telehealth utilization compared to patients who are White at the study health enter.

I also found significant differences in telehealth modality and patient portal engagement across several demographic characteristics. Specifically, both video visit use and portal engagement were lower among patients who were male, over 65 years, Latino, primary Spanish speakers, and publicly insured. Another noteworthy finding was that rurality was not significantly associated with telehealth modality or with patient portal activation status. This was unexpected given previous evidence of association between geography and both video visit and portal use, and amid ongoing concern over insufficient internet access in rural areas.

In the qualitative study, interview participants offered in-depth descriptions of their rural contexts, rural healthcare access, and experiences with telehealth at an urban medical center. Rural healthcare presented challenges characterized by scarcity, with limited healthcare resources and perceptions of low care quality. Participants described a positive experience of the

space inherent in rural living, despite the relative inconveniences that remoteness conferred in long travel times. Participants' descriptions of these inconveniences conveyed that they were largely taken-for-granted in their daily lives. This perspective was troubled, however, by severe winter weather events that confronted these rural residents with the precarity of their rural healthcare access. In the contexts of rural healthcare scarcity and rural environmental barriers, telehealth was ultimately seen as a resource to support both rural healthcare access and a rural way of life.

With the finding that qualitative participants perceived telehealth as a means to bypass local care options, I raised the concern that telehealth may exacerbate negative impacts of rural healthcare bypass on local healthcare availability and quality. That is, if telehealth enables more rural patients to use healthcare outside of their communities, local healthcare services may lose revenue and face more challenges to providing adequate, quality care. Importantly, consideration of the samples' demographic characteristics demonstrated that the experiences depicted in this study were not representative of the diversity of rural populations in California. Finally, a consideration of participants' relative advantage in terms of flexible resources and cultural health capital highlighted the ways that this sample may have experienced higher healthcare access than other, less advantaged rural patients.

Synthesis of Quantitative and Qualitative Findings

Qualitative participants were on average older than the population of rural telehealth patients in the demographic analysis. White participants were overrepresented in the qualitative sample compared to the California rural population, similar to qualitative studies included in the scoping review. Qualitative participants were also more highly educated than rural populations in California, with 63% having a bachelor's degree or higher, compared to the 23% average with

bachelor's degrees in rural California counties. These differences highlight rural telehealth patient populations in which more qualitative research attention is needed, namely younger adults, patients of lower socioeconomic status, and patients from minoritized racial and ethnic groups.

The quantitative finding of no significant association between rurality and the two proxies for digital access or comfortability, telehealth modality and patient portal use, offers another point of comparison with qualitative interviews. The experiences portrayed in qualitative interviews largely substantiated. Most participants did not experience connectivity challenges during video visits, and all reported adequate or more than adequate digital access and digital comfortability. However, participants were all video visit users; rural individuals who have not successfully used video telehealth may have lower digital access or comfortability. Additionally, as noted, qualitative participants were more educated, which is associated with higher digital access or comfortability. Notably, three interview participants explicitly stated repeated connectivity challenges that required changing a scheduled video visit to a telephone visit. This raises important questions about the accuracy of telephone and video visit data, both in our study and more broadly, as others have discussed [1].

Implications for Practice, Research, and Policy

The scoping review demonstrated that there is a need for more research to identify and assess existing validated telehealth patient experience and standardized patient satisfaction measures. Comprehensive literature reviews are called for, which should examine available measurement tools by healthcare areas and clinical applications. Given telehealth's larger role in healthcare delivery following COVID-19, there may also be need for development and validation

of new telehealth patient experience measures that differentiate experiences with multiple telehealth modalities.

Qualitative patient experience findings in this study provide implications for provider training and clinical practice. Elements of interpersonal interaction with telehealth clinicians were important to participants, and participants valued efforts by telehealth clinicians to support these aspects of the care encounter. Provider training can include ways to decrease the loss of interpersonal elements that is sometimes experienced via telehealth, supported by relevant research.

Qualitative reports of last-minute changes from scheduled video visits to telephone visits point to the need to evaluate methods to collect video and telephone visit data. This is especially important since collection of accurate, high quality data is essential to supporting equity in telehealth [2]. As Hailu and colleagues [1] suggest, simplifying claims coding and electronic health record systems can facilitate the correct identification of visit modality. Healthcare organizations could also prioritize the importance of accurate charting and billing on this variable and train clinicians and administrative staff accordingly. Finally, researchers can link and compare multiple sources of modality reporting to evaluate the relative validity of different data sources, as Hailu et al. did with Medicare claims data and patient survey results.

The findings of this dissertation indicate that telehealth access for rural populations of color in California is an area for concern. Findings from all three studies also underscore the underrepresentation of rural populations of color in telehealth research. It is essential to more fully characterize how rural populations of color are and are not utilizing telehealth, including variation in utilization by patient race or ethnicity between rural regions and healthcare settings. Studies should consider sampling methods to account for the representation of rural population

subgroups specific to study regions, such as purposive sampling and oversampling among minoritized groups.

Evidence reviews exploring the importance of rural-urban cultural differences to rural telehealth experiences are needed, as is qualitative research addressing these factors in-depth with diverse rural populations. The importance of patient-centered and culturally tailored telehealth implementation [3] is amplified among rural American Indian and Alaska Native populations and rural populations of color, whose experiences with structural barriers and discrimination shape their healthcare experiences [4]. The telehealth views and experiences of rural patients from these populations therefore require focused research attention. Research should also address telehealth patient experiences with rural patients of lower socioeconomic status. Finally, further study is needed to understand how telehealth utilization and patient experiences relate to dimensions of patient-perceived or realized healthcare access. This area could benefit from both quantitative and qualitative inquiry.

Policy should address patient-level telehealth barriers by supporting measures such as healthcare navigation resources, telehealth-related patient outreach, digital access assessment, and patient digital education. Support for such measures is particularly important in rural safety net providers, such as Critical Access Hospitals and Federally Qualified Health Centers, which serve as essential points of access for underserved and disadvantaged rural patient populations. Patients and other stakeholders should be involved in all stages of development, not only for telehealth interventions, but for telehealth outreach and patient support measures as well [3]. However, policy must go beyond patient-level barriers to address structural access barriers. Telehealth payment parity, or equal reimbursement for services provided via telehealth and in-person, is one essential component to supporting telehealth access overall and telehealth equity

for underserved populations in particular [5, 6]. Ensuring equal reimbursement for telehealth services can incentivize and support providers to develop or maintain telehealth services. Finally, policy must continue to support telehealth infrastructure development. The Infrastructure Investment and Jobs Act of 2021 promised substantial funding for broadband access development, with provisions for prioritizing low-access areas, marking an important advance in this area [7]. However, implementation oversight, supported by accurate research and accurate broadband access measures, is needed to ensure funds are allocated where most needed [7-9].

Equally important is the need for policies that target the social determinants of health through systems- and structural-level changes that can bolster the social and economic vitality of rural regions. Policy actions should support access to quality education, meaningful employment in safe workplace environments, increased access to healthy food, and infrastructure development, including community spaces [4, 10-12]. Such actions are needed to foster vital rural communities capable of sustaining the health of rural residents.

Future Directions

This study has contributed important new insight into the topics of rural telehealth utilization and telehealth patient experiences. It has also uncovered new areas for inquiry. For example, how much of a role should telehealth play in filling gaps in rural in-person healthcare? If something is lost when care goes virtual, will remote care be another facet of sub-standard healthcare services for rural patients? Can telehealth be leveraged to increase realized access for disadvantaged rural populations? Will telehealth contribute to rural healthcare bypass and its detrimental impacts on rural healthcare viability? Do cultural differences between urban-based providers and rural telehealth patients impact care quality? These questions remain, pointing the direction for future studies.

Conclusion

In the rural United States, structural barriers combine with individual cultural factors to impede delivery of and access to adequate quality healthcare, building on and perpetuating existing disparities in health and well-being for rural populations. Rural healthcare access can be improved by telehealth options, but research shows disparities in use across the rural-urban divide, as well as between patients of different races and ethnicities.

By furthering knowledge of rural telehealth patient demographics, telehealth utilization, and patient experiences, this study contributes to efforts to address the telehealth utilization gap among rural populations and populations of color. Study results can inform health systems and policymakers to implement effective, accessible, and equitable telehealth services to rural populations.

References

1. Hailu R, Uscher-Pines L, Ganguli I, Huskamp HA, Mehrotra A. Audio-only telemedicine visits: Flaws in the underlaying data make it hard to assess their use and impact. 2022 [cited 2023 November 17]; Available from: https://www.healthaffairs.org/content/forefront/audio-only-telemedicine-visits-flaws-underlying-data-make-hard-assess-their-use-and.

2. Lyles CR, Sharma AE, Fields JD, Getachew Y, Sarkar U, Zephyrin L. Centering health equity in telemedicine. Ann Fam Med. 2022 Jul-Aug;20(4):362-7. PMID: 35879077. doi: 10.1370/afm.2823.

3. Bailey JE, Gurgol C, Pan E, Njie S, Emmett S, Gatwood J, et al. Early patient-centered outcomes research experience with the use of telehealth to dddress disparities: Scoping review. J Med Internet Res. 2021 2021/12/7;23(12):e28503. doi: 10.2196/28503.

4. Kozhimannil KB, Henning-Smith C. Racism and health in rural America. Journal of Health Care for the Poor and Underserved. 2018;29(1):35-43. doi: 10.1353/hpu.2018.0004.

5. Ellimoottil C. Understanding the case for telehealth payment parity. Health Affairs Forefront. 2021. doi: 10.1377/forefront.20210503.625394.

6. Lee H, Singh GK. The impact of telemedicine parity requirements on telehealth utilization in the united states during the COVID-19 pandemic. J Public Health Manag Pract. 2023 Jul-Aug 01;29(4):E147-e56. PMID: 36867510. doi: 10.1097/phh.0000000000001722.

7. Carey L. Experts: Smart distributino of Fedral broadband dollars could boost rural health, job markets, education. Daily Yonder. 2023.

8. Acharya M, Shoults CC, Hayes CJ, Brown CC. Association between broadband capacity and social vulnerability factors in the United States: A county-level spatial analysis. Popul Health Manag. 2022;25(6):798-806. doi: 10.1089/pop.2022.0189.

9. Zahnd WE, Bell N, Larson AE. Geographic, racial/ethnic, and socioeconomic inequities in broadband access. J Rural Health. 2022;38(3):519-26. doi: 10.1111/jrh.12635.

10. Henning-Smith CE, Hernandez AM, Hardeman RR, Ramirez MR, Kozhimannil KB. Rural counties with majority Black Or Indigenous Populations suffer the highest rates of premature death in the US. Health Aff (Millwood). 2019 Dec;38(12):2019-26. PMID: 31794313. doi: 10.1377/hlthaff.2019.00847.

11. Edelman M. Hollowed out Heartland, USA: How capital sacrificed communities and paved the way for authoritarian populism. Journal of Rural Studies. 2021 2021/02/01/;82:505-17. doi: https://doi.org/10.1016/j.jrurstud.2019.10.045.

12. Sageman J. School closures and rural population decline. Rural Sociology. 2022;87(3):960-92. doi: 10.1111/ruso.12437.

Appendix

RUCA Code ZIP Code Approximations

Rural ZIP code was defined using the Washington, Wyoming, Alaska, Montana, Idaho (WWAMI) Rural Health Research Center's (RHRC) ZIP code approximations of the USDA's Economic Research Service (ERS) Census tract-based Rural-Urban Commuting Area (RUCA) Codes. This system of rural-urban designation was chosen because it provides a more granular breakdown of rurality-urbanity than many alternative systems, which are often based at the county level. With high levels of within-county variation in population density and distribution in many California counties, county-level classifications may collapse important rural-urban distinctions. According to the ERS, RUCA Codes avoid this by classifying based on the smaller scale of U.S. census tracts,

> using measures of population density, urbanization, and daily commuting. … The most recent RUCA codes are based on data from the 2010 decennial census and the 2006-10 American Community Survey. The classification contains two levels. Whole numbers (1-10) delineate metropolitan, micropolitan, small town, and rural commuting areas based on the size and direction of the primary (largest) commuting flows [see Table A1]. These 10 codes are further subdivided based on secondary commuting flows, providing flexibility in combining levels to meet varying definitional needs and preferences. (https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes.aspx)

The WWAMI RHRC has created a publicly available sortable database of all United States ZIP codes and their corresponding RUCA Code approximations, the most recent version of which is available for download from the USDA ERS (https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes.aspx). For this database, the RUCA values from census tracts that

comprise specific ZIP code areas were combined as appropriate and assigned to the ZIP code[6]. This database was used for this study to generate a list of ZIP codes in California that are categorized as rural according to the associated secondary RUCA Codes. Secondary RUCA codes represent a further level of rural/urban subdivision based on the secondary, or second largest, commuting flow in a US Census tract, as described in Table A1, below.

Table A1. USDA ERS RUCA Code classification description.

Code	Classification Description
1 Metropolitan area core: primary flow within an urbanized area (UA)	
1.0	No additional code
1.1	Secondary flow 30% to 50% to a larger UA
2 Metropolitan area high commuting: primary flow 30% or more to a UA	
2.0	No additional code
2.1	Secondary flow 30% to 50% to a larger UA
3 Metropolitan area low commuting: primary flow 10% to 30% to a UA	
3.0	No additional code
4 Micropolitan area core: primary flow within an urban cluster (UC) of 10,000 to 49,999 (large UC)	
4.0	No additional code
4.1	Secondary flow 30% to 50% to a UA
5 Micropolitan high commuting: primary flow 30% or more to a large UC	
5.0	No additional code
5.1	Secondary flow 30% to 50% to a UA
6 Micropolitan low commuting: primary flow 10% to 30% to a large UC	
6.0	No additional code
7 Small town core: primary flow within an urban cluster of 2,500 to 9,999 (small UC)	
7.0	No additional code
7.1	Secondary flow 30% to 50% to a UA
7.2	Secondary flow 30% to 50% to a large UC

[6] See https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes/documentation/ for a detailed description of the methods for this process.

Code	Classification Description
8 Small town high commuting: primary flow 30% or more to a small UC	
8.0	No additional code
8.1	Secondary flow 30% to 50% to a UA
8.2	Secondary flow 30% to 50% to a large UC
9 Small town low commuting: primary flow 10% to 30% to a small UC	
9.0	No additional code
10 Rural areas: primary flow to a tract outside a UA or UC	
10.0	No additional code
10.1	Secondary flow 30% to 50% to a UA
10.2	Secondary flow 30% to 50% to a large UC
10.3	Secondary flow 30% to 50% to a small UC
99 Not coded: Census tract has zero population and no rural-urban identifier information	

Note. Primary RUCA Codes are in shaded cells; secondary RUCA Codes follow in rows below primary codes. From the USDA ERS RUCA Code documentation website, https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes/documentation/

The categorization of rural that was used for this study is one of several options proposed by the WWAMI RHRC to group RUCA Codes into broader categories of urban and rural areas (http://depts.washington.edu/uwruca/ruca-uses.php). This study used "Categorization A," which groups RUCA Codes into four groups (see Table A2): Urban focused; Large Rural City/Town (micropolitan) focused; Small Rural Town Focused; and Isolated Small Rural Town Focused.

Table A2. WWAMI RHRC RUCA Code *Categorization A*.

	Rural/Urban Classification	Associated Secondary RUCA Codes
	Urban Focused	1.0, 1.1, 2.0, 2.1, 3.0, 4.1, 5.1, 7.1, 8.1, 10.1
Rural	Large Rural City/Town (Micropolitan) Focused	4.0, 4.2, 5.0, 5.2, 6.0, 6.1
	Small Rural Town Focused	7.0, 7.2, 7.3, 7.4, 8.0, 8.2, 8.3, 8.4, 9.0, 9.1, 9.2
	Isolated Small Rural Town Focused	10.0, 10.2, 10.3, 10.4, 10.5, 10.6

Note. From the WWAMI RHRC RUCA documentation website, http://depts.washington.edu/uwruca/ruca-uses.php

Any UCSF Health patient living in a California ZIP code with a RUCA Code that falls in the last three categories in Table A2 above was considered "rural" and was eligible for inclusion in the demographic analysis and qualitative interviews.

Patients in the quantitative dataset were further grouped into "Large Rural," "Small Rural," and "Isolated Small Rural" categories according to their ZIP codes. According to the WWAMI RHRC,

> divides rural into three relevant and useful categories. In many studies and programs, it makes sense to separate the large rural cities/towns (say a place of 30,000 population with many medical providers) from those places that have 1,000 population and are isolated from urban places. It is clear that under most circumstances these two types of places differ greatly and should be considered separately.
>
> (http://depts.washington.edu/uwruca/ruca-uses.php)

This classification therefore supported a more nuanced description of UCSF Health rural telehealth patients across levels of rurality, which represent meaningful differences in density of population and available resources.

Publishing Agreement

It is the policy of the University to encourage open access and broad distribution of all theses, dissertations, and manuscripts. The Graduate Division will facilitate the distribution of UCSF theses, dissertations, and manuscripts to the UCSF Library for open access and distribution. UCSF will make such theses, dissertations, and manuscripts accessible to the public and will take reasonable steps to preserve these works in perpetuity.

I hereby grant the non-exclusive, perpetual right to The Regents of the University of California to reproduce, publicly display, distribute, preserve, and publish copies of my thesis, dissertation, or manuscript in any form or media, now existing or later derived, including access online for teaching, research, and public service purposes.

DocuSigned by:
Meghan Elizabeth Ferrara
E5D5C09B3F1344F...
Author Signature

12/14/2023
Date