Telehealth and Post-Stroke Gender-Based Care Inequities

Brigham Walker
Kelsey Owsley
Roberto Bravo
Lizheng Shi
Michele Longo
Abdullah Alsulimani

This presentation was made possible by the Health Resources and Services Administration (HRSA) of the US Department of Health and Human Services (HHS) as part of the National Telehealth Centers of Excellence Award (U66RH31459). The contents are those of the author(s) do not necessarily represent the official views of nor an endorsement by the HRSA, HHS or the US Government.

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Background

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Strokes are costly and follow-up is necessary to mitigate recurrence

- Stroke is one of the top causes of death and disability in the US, with an estimated financial burden of over $50 billion between 2019-2020 (Martin et al., 2024)

- Stroke prevalence increased by 7.8% nationwide between 2011–2013 to 2020–2022 (Imoisili et al., 2024)

- Patients who survive initial strokes are at a significantly increased risk for subsequent strokes (Sabih et al., 2024; Uzuner & Uzuner, 2023)
  - 12% recurrence risk at five years (Flach et al., 2020)
  - Recurrence risk varies based on type of initial stroke and patient characteristics (Mohan et al., 2011)

Stroke follow-up care is essential and underutilized

- Many stroke survivors are left with mobility limitations that affect their independence and quality of life, necessitating post-stroke care (Tsao et al., 2023)

- Majority (87%) of stroke survivors report having unmet needs in at least 1 of 5 domains—activities and participation, environmental factors, body functions, post-acute care, and secondary prevention—with secondary prevention being the top reported unmet need (Olaiya et al., 2017)

- Uptake of post-stroke care is low in the United States
  - Approximately 4 in 10 stroke patients receive no follow-up services (Prvu Bettger et al., 2015)

There are gender-based inequities

- Women experience 53% of all strokes (Martin et al., 2024)
- Women have higher 30-day mortality risk and experience worse outcomes (Appelros et al., 2009; S. Gall et al., 2018; Phan et al., 2017)
- Women, compared to men, suffer increased disability, and require more post-stroke care (Cherian, 2023)
- Gender-based differences among women from minority groups are compounded by additional, and unique, challenges related to cultural norms, socioeconomic disparities, and limited access to healthcare (Esparza et al., 2023; Jacobs & Ellis, 2021)

Gender-based differences are multifactorial

- Gender-based differences in post-stroke care, while observed, are poorly understood (Poggesi et al., 2021)

- Potential reasons: by age at presentation, health status prior to stroke, stroke type and severity, and the use of anticoagulants at discharge (S. L. Gall et al., 2010; Phan et al., 2017; Reeves & Lisabeth, 2010)

- Older age at presentation in women results in less recovery potential for brain cells, mobility limitations, and limited access to post-stroke care (Luker et al., 2011; Phan et al., 2017; Reeves et al., 2014)

Telehealth could bridge the gap

- Telehealth positioned to address post-stroke gender-based care inequities
- Women more likely to use telehealth (Lucas & Villarroel, 2022; Narcisse et al., 2024; Spaulding et al., 2024; Wong et al., 2023)
- Growing body of evidence supporting the effectiveness of telehealth in addressing gaps of care among stroke survivors (Deshmukh & Madhavan, 2023; Hicks & Cimarolli, 2018; Rivera et al., 2023; Sharrief et al., 2023)

Methods

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Data

- Data from the Arkansas All Payer Claims Database (APCD) for care between the years 2016 to 2022

- Patients with at least one ICD-9 or ICD-10 diagnosis code for an ischemic or hemorrhagic stroke were included
  - Total annual unique patients
  - Annual unique patients with at least one telehealth visit (identified using CPT and place of service codes)
  - Annual unique patients with a secondary stroke (identified using ICD-9 or ICD-10 codes)

Analytical Strategy

- Regression analysis to assess patterns of telehealth uptake and secondary stroke by gender (i.e., male versus female) and insurance (i.e., Medicaid versus commercial) in the pandemic era versus prior to the pandemic era
  - Number of stroke patients
  - Utilization of telehealth among stroke patients
  - Secondary strokes

- Regressions were specified to evaluate differences in:
  - Pandemic vs. pre-pandemic era levels
  - Pandemic vs. pre-pandemic era trends

Results

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Summary Statistics: Arkansas Medicaid and Commercial Stroke Patients, 2013-2023

Variable	Value
Rural	44.7%
Non-Rural	55.3%
Medicaid	69.0%
Commercial	31.0%
Female	57.9%
Male	42.1%
At Least One Telehealth Visit	0.22%
At Least One Secondary Stroke	25.5%

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Demographics: Arkansas Medicaid and Commercial Stroke Patients, 2013-2023

Variable	Value
White	21.3%
Black/African American	8.9%
Asian	2.2%
Other Race	1.7%
Unknown/Missing	73.3%
Hispanic/Latino	0.77%
Unknown-Black	5.8%
Non-Hispanic/Latino	7.2%
Unknown-White	11.4%
Unknown-Other Race	35.1%
Unknown/Missing	42.2%

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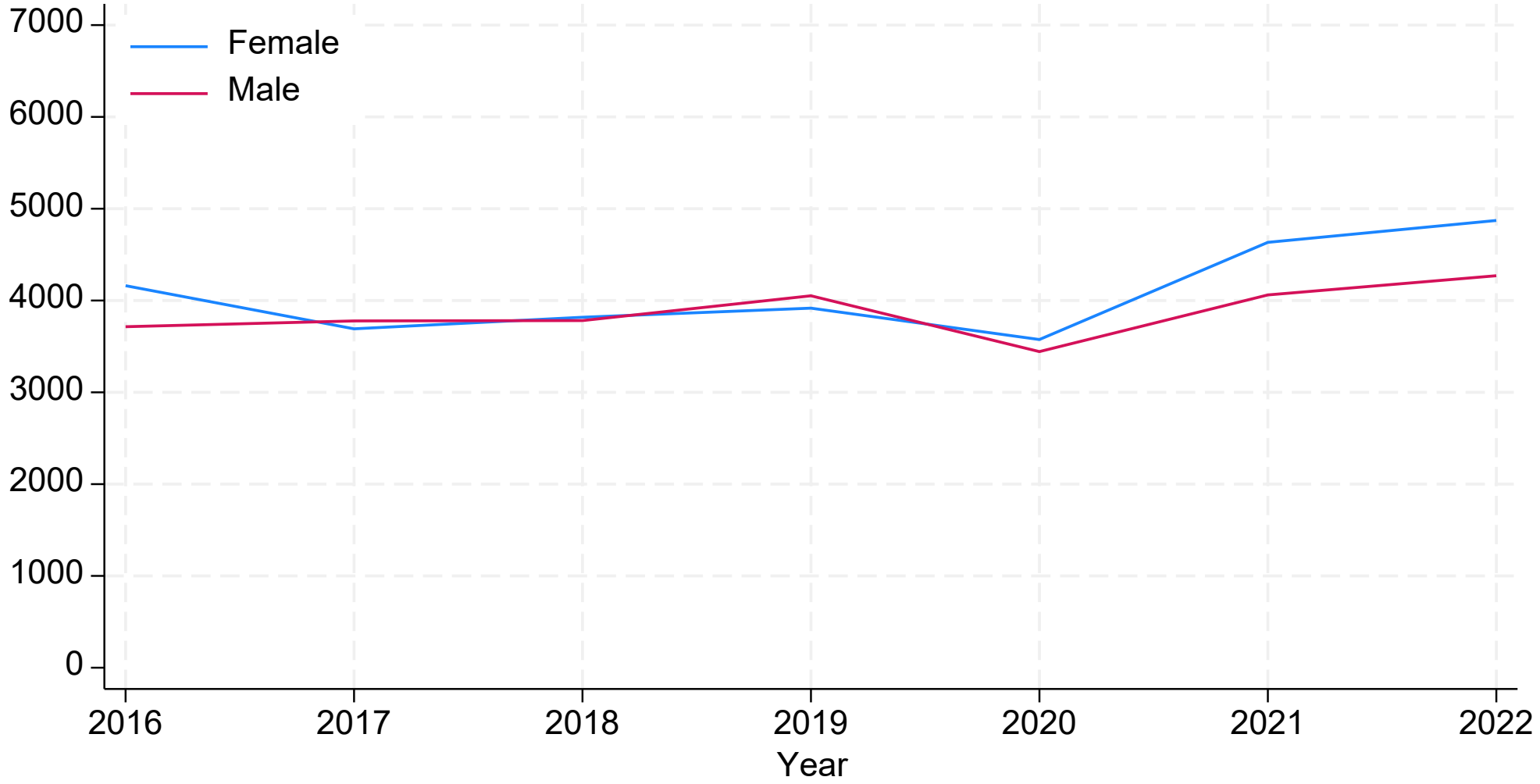
Number of Arkansas Medicaid Stroke Patients, by Gender & Year



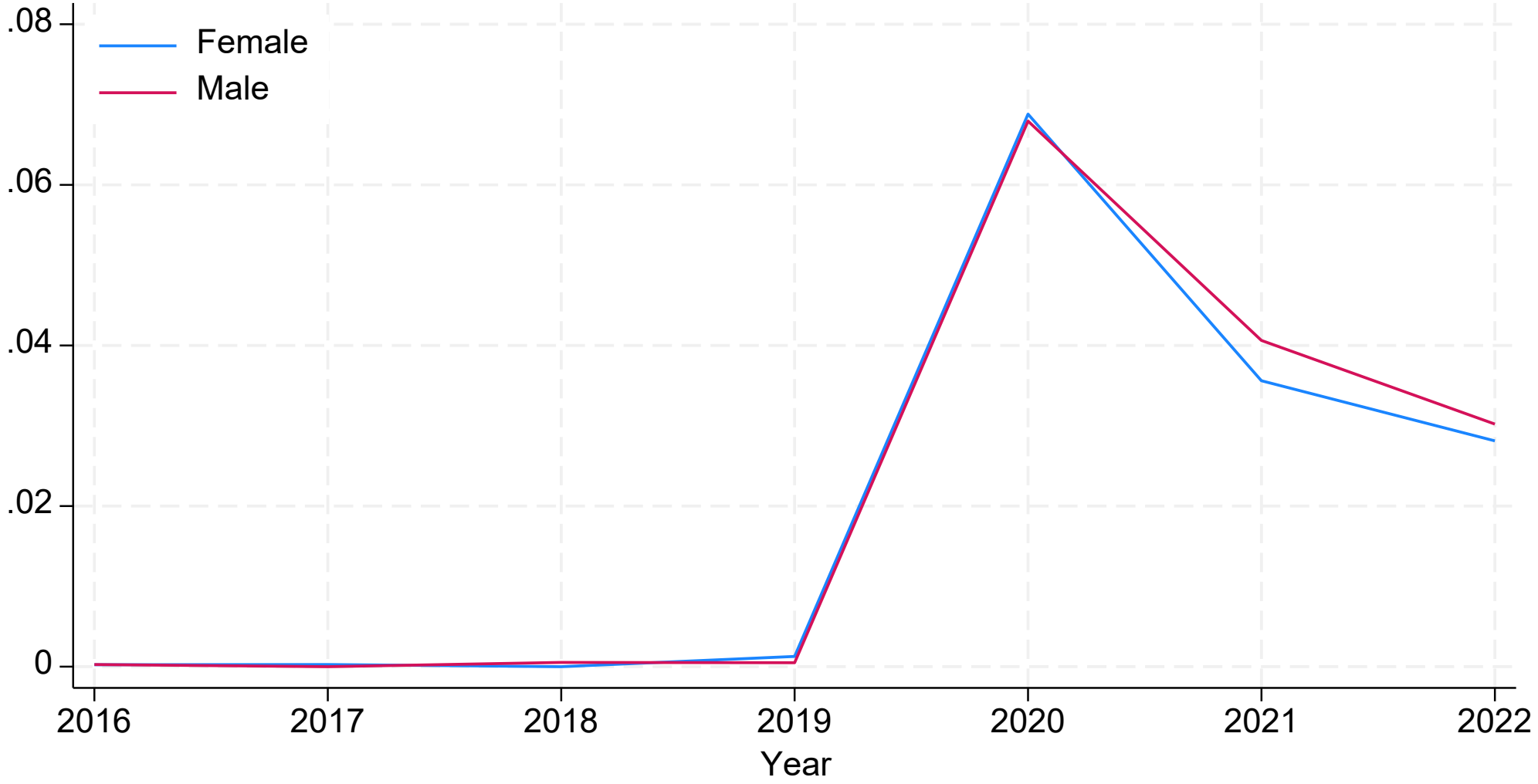
Differences in Total Stroke Patient Levels

	Female Patients	Male Patients
Pandemic	463 (-561 to 1487) p=0.30	93 (-553 to 740) p=0.73

Differences in Total Stroke Patient Trends

	Female Patients	Male Patients
Pre-Trends	-61 (-383 to 261) p=0.59	102* (-21 to 224) p=0.08
Post-Trends	649** (178 to 1119) p=0.02	413*** (179 to 647) p=0.01

Telehealth Use Rate Among Arkansas Medicaid Stroke Patients, by Gender & Year



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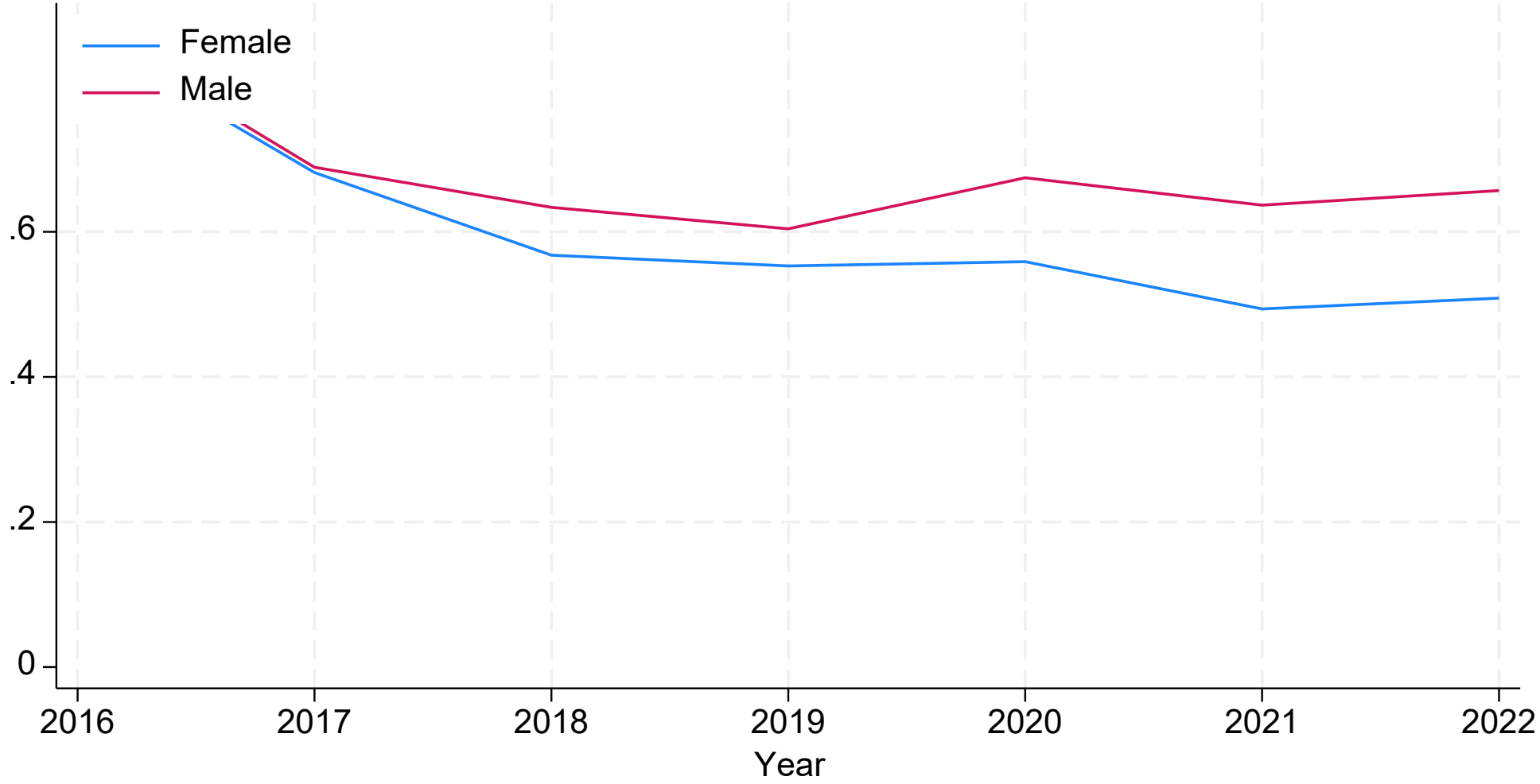
Differences in Telehealth Use Levels

	Female Patients	Male Patients
Pandemic	0.044**	0.046***
	(0.013 to 0.075)	(0.018 to 0.074)
	p=0.02	p=0.01

Differences in Telehealth Use Trends

	Female Patients	Male Patients
Pre-Trends	<0.001 (<0.001 to 0.001) p=0.30	<0.001 (<-0.001 to <0.001) p=0.20
Post-Trends	-0.020** (-0.035 to -0.006) p=0.02	-0.019*** (-0.029 to -0.009) p=0.01

Secondary Stroke Rate Among Arkansas Medicaid Stroke Patients, by Gender & Year



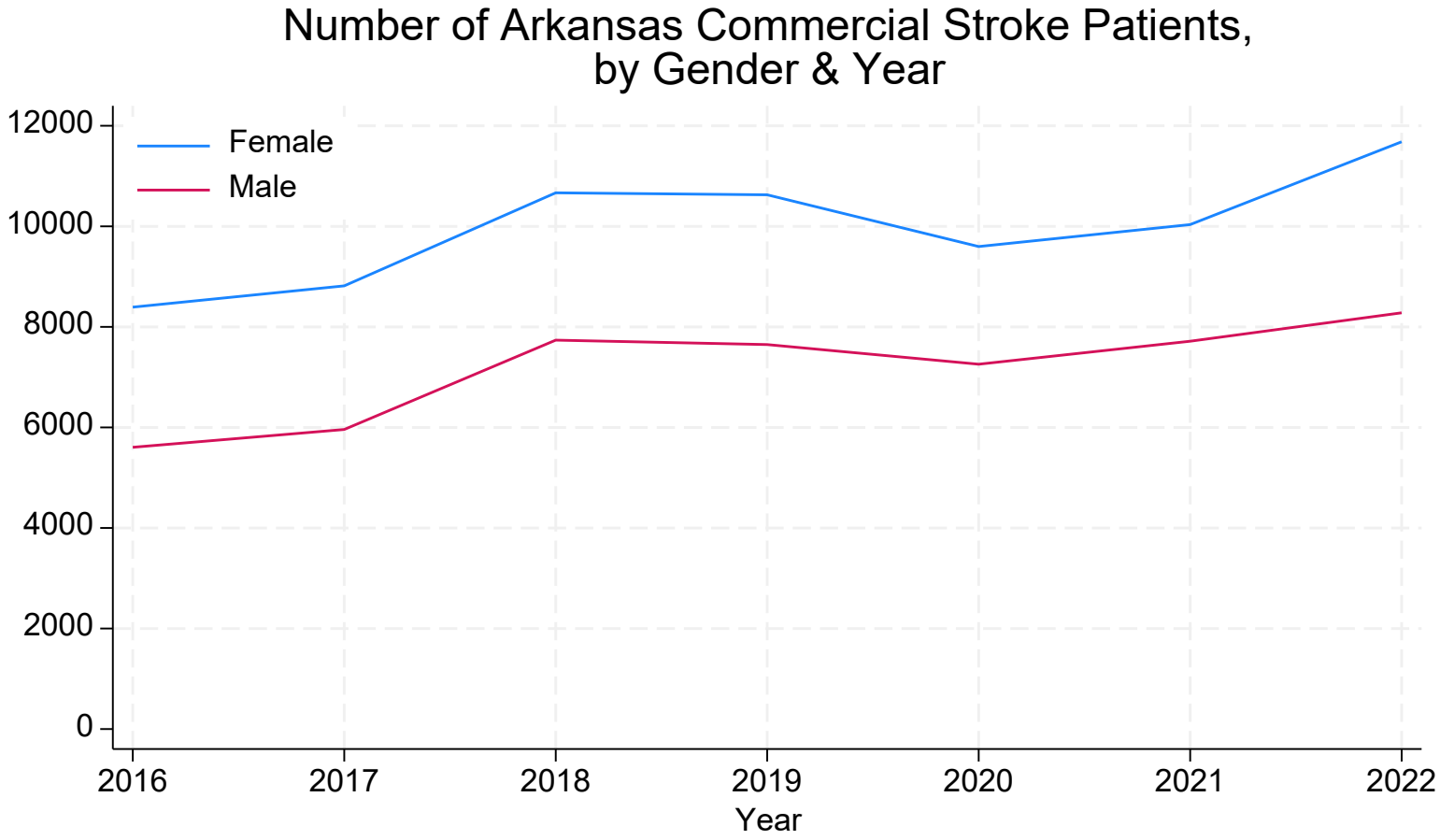
Differences in Secondary Stroke Levels

	Female Patients	Male Patients
Pandemic	-0.149	-0.047
	(-0.350 to 0.052)	(-0.216 to 0.122)
	p=0.12	p=0.51

Differences in Secondary Stroke Trends

	Female Patients	Male Patients
Pre-Trends	-0.108** (-0.204 to -0.011) p=0.04	-0.090* (-0.183 to 0.002) p=0.053
Post-Trends	-0.025 (-0.071 to 0.021) p=0.18	-0.009 (-0.042 to 0.024) p=0.46

While Medicaid has similar levels by gender, there are more female commercial stroke patients



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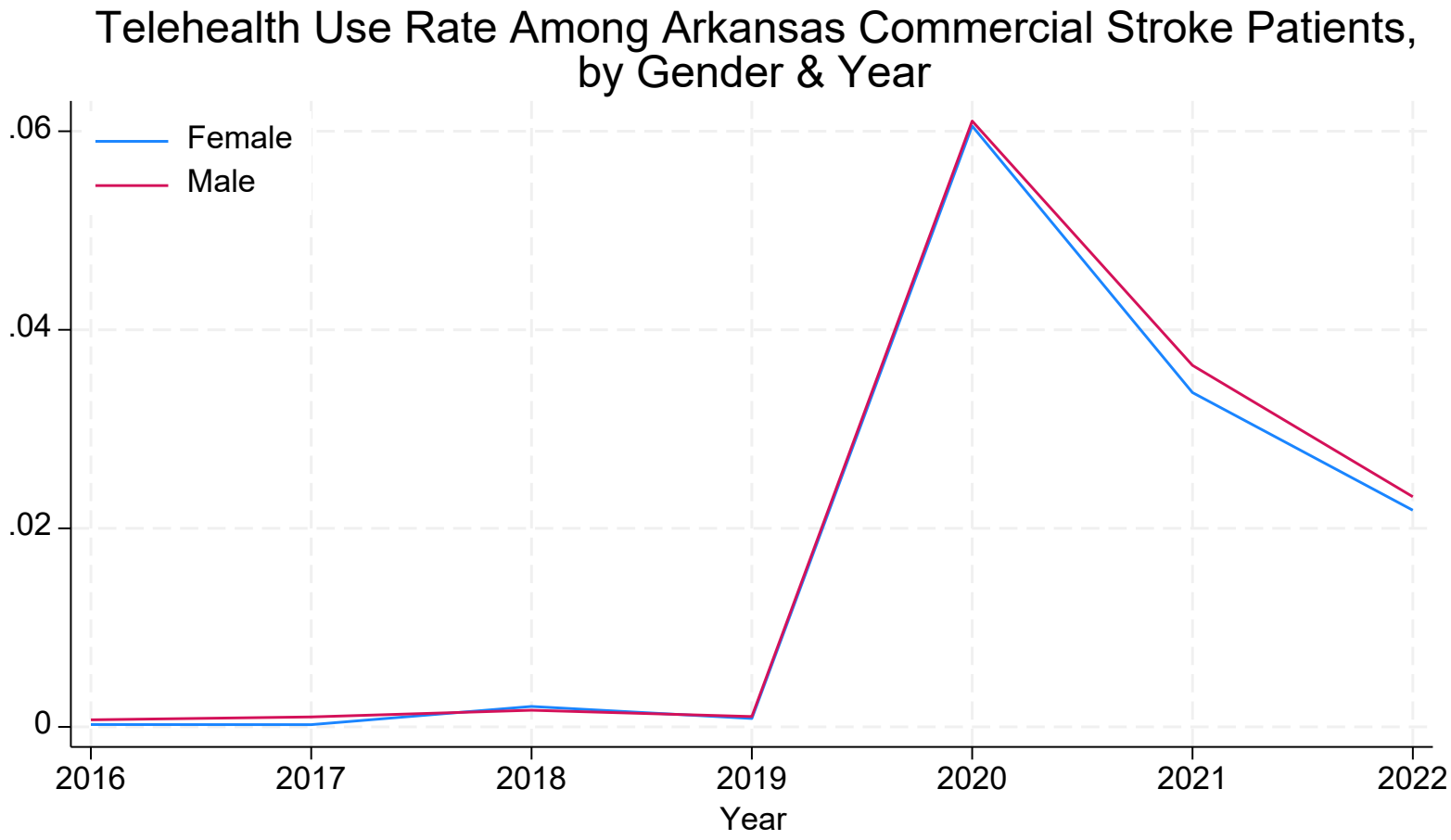
There are nearly identical trends in commercial telehealth utilization



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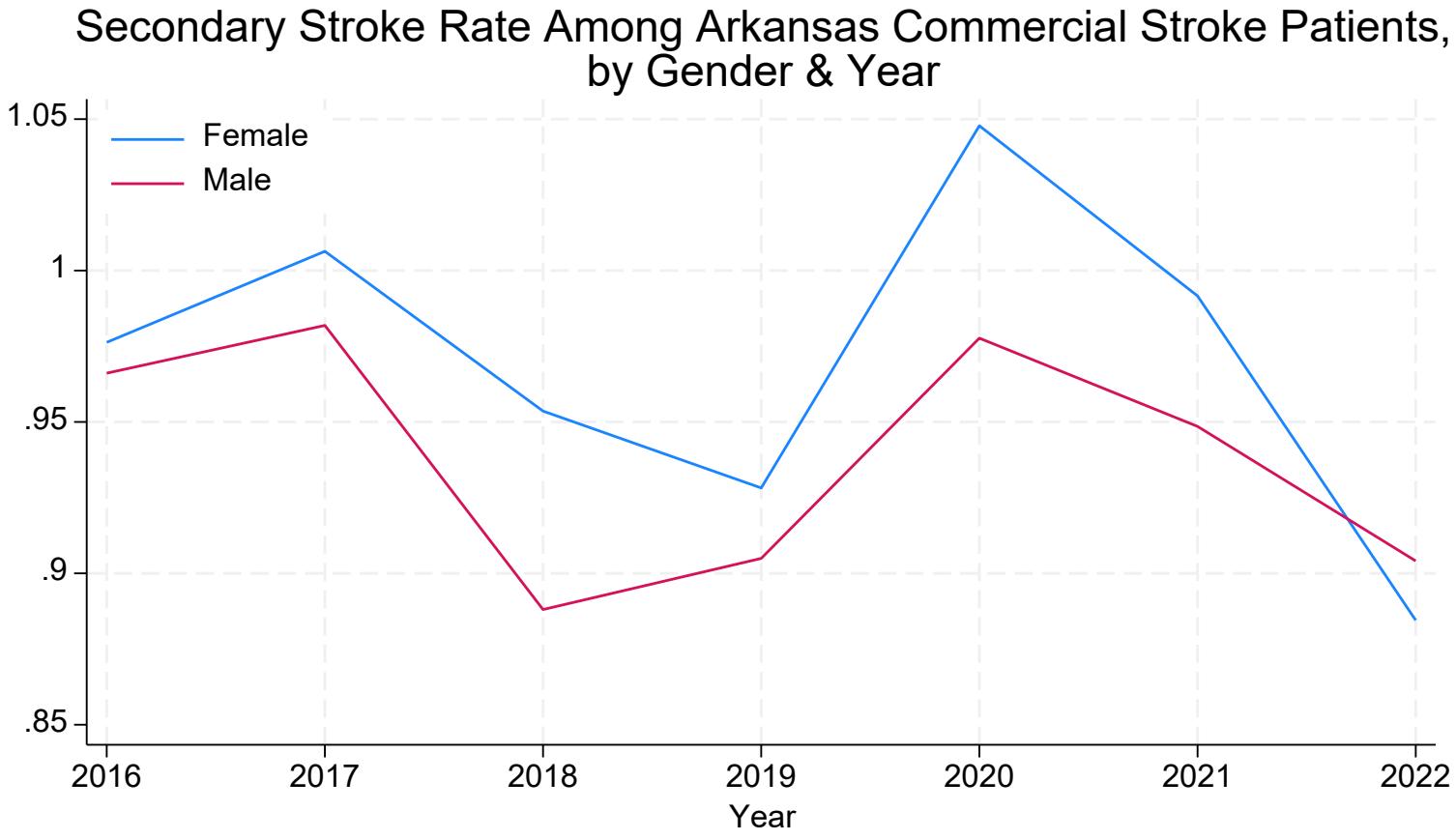
Secondary stroke rates were also higher among the commercially insured, with female patients having higher rates



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Discussion

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Some descriptive observations

- Telehealth utilization rates were similar across genders

- Trajectory of telehealth uptake in the post Covid-19 world
  - Decline following Covid-19 surge
  - Remains higher than pre-pandemic levels
  - Driven by patient preference or insurance/provider challenges?

- Telehealth use coincides with a decrease in secondary stroke rates among stroke patients in Arkansas

Limitations and next steps

- Work is descriptive only and selection into telehealth has yet to be worked out → we plan to use person-level data and IV strategies on provider telehealth utilization to partially address
- Study population limited to a single state
- Unclear whether telehealth works as a substitute for in-person care or a complement → need to incorporate into our analyses

Concerns aside

- This work provides a foundation to further explore the role that telehealth may play in decreasing the risk for a secondary stroke among stroke patients

Thank You!

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Appendix

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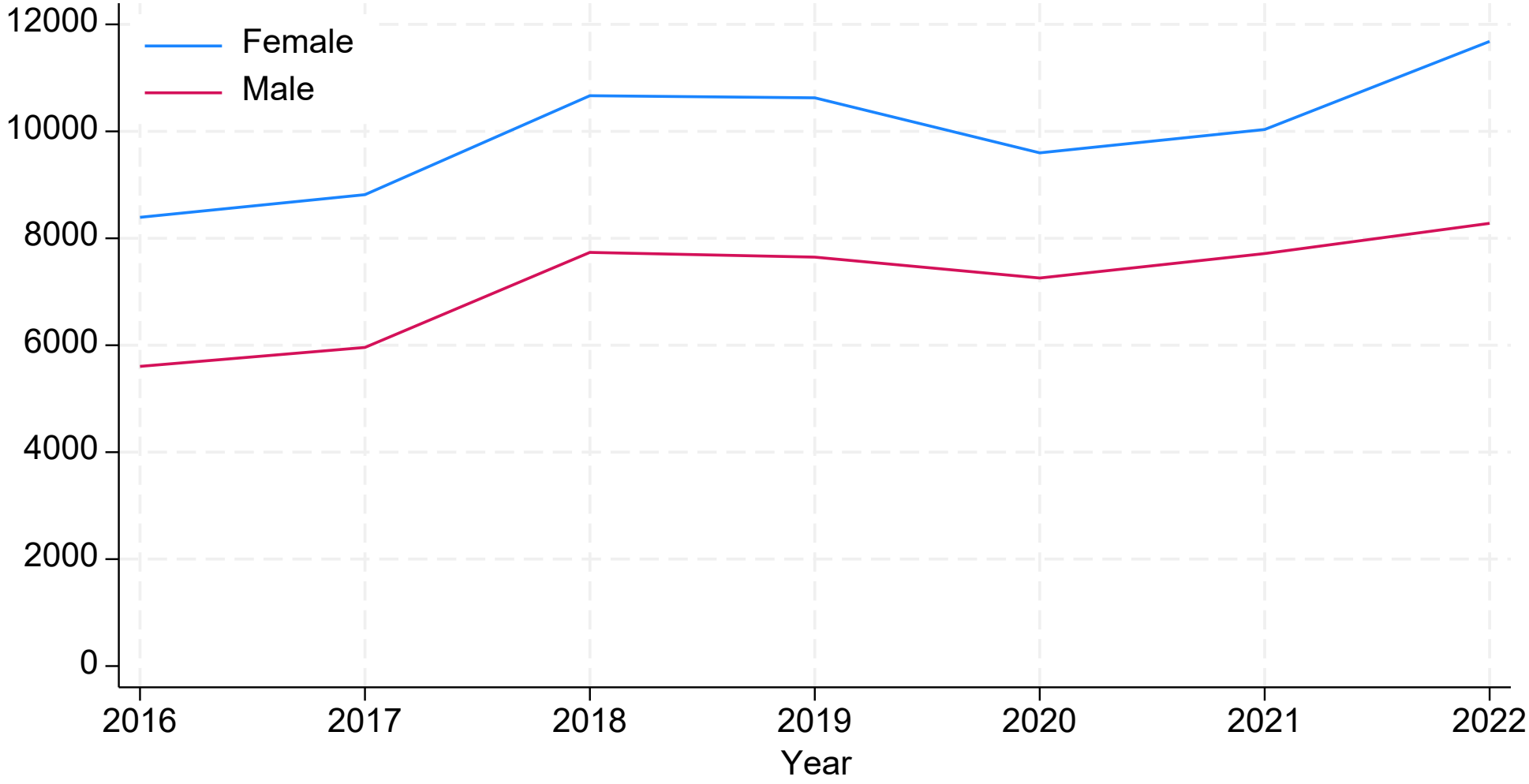
Number of Arkansas Commercial Stroke Patients, by Gender & Year



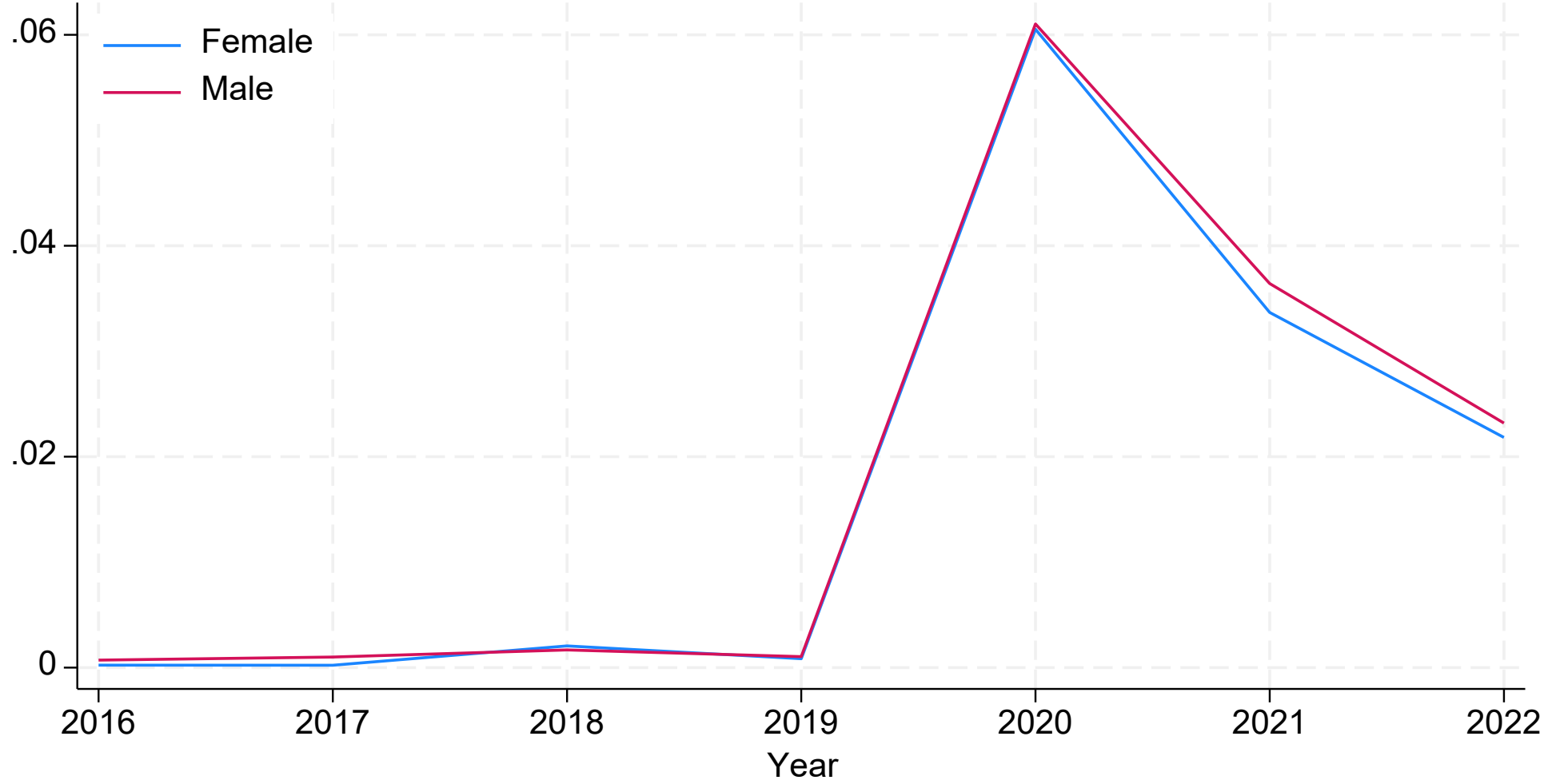
Differences in Levels

	Female Patients	Male Patients
Pandemic	813 (-1,412 to 3,037) p=0.39	1,014 (-625 to 2,653) p=0.17

Differences in Trends

	Female Patients	Male Patients
Pre-Trends	855** (310 to 1,401) p=0.02	791** (254 to 1,327) p=0.02
Post-Trends	1,042** (349 to 1,735) p=0.02	511*** (449 to 573) p<0.01

Telehealth Use Rate Among Arkansas Commercial Stroke Patients, by Gender & Year



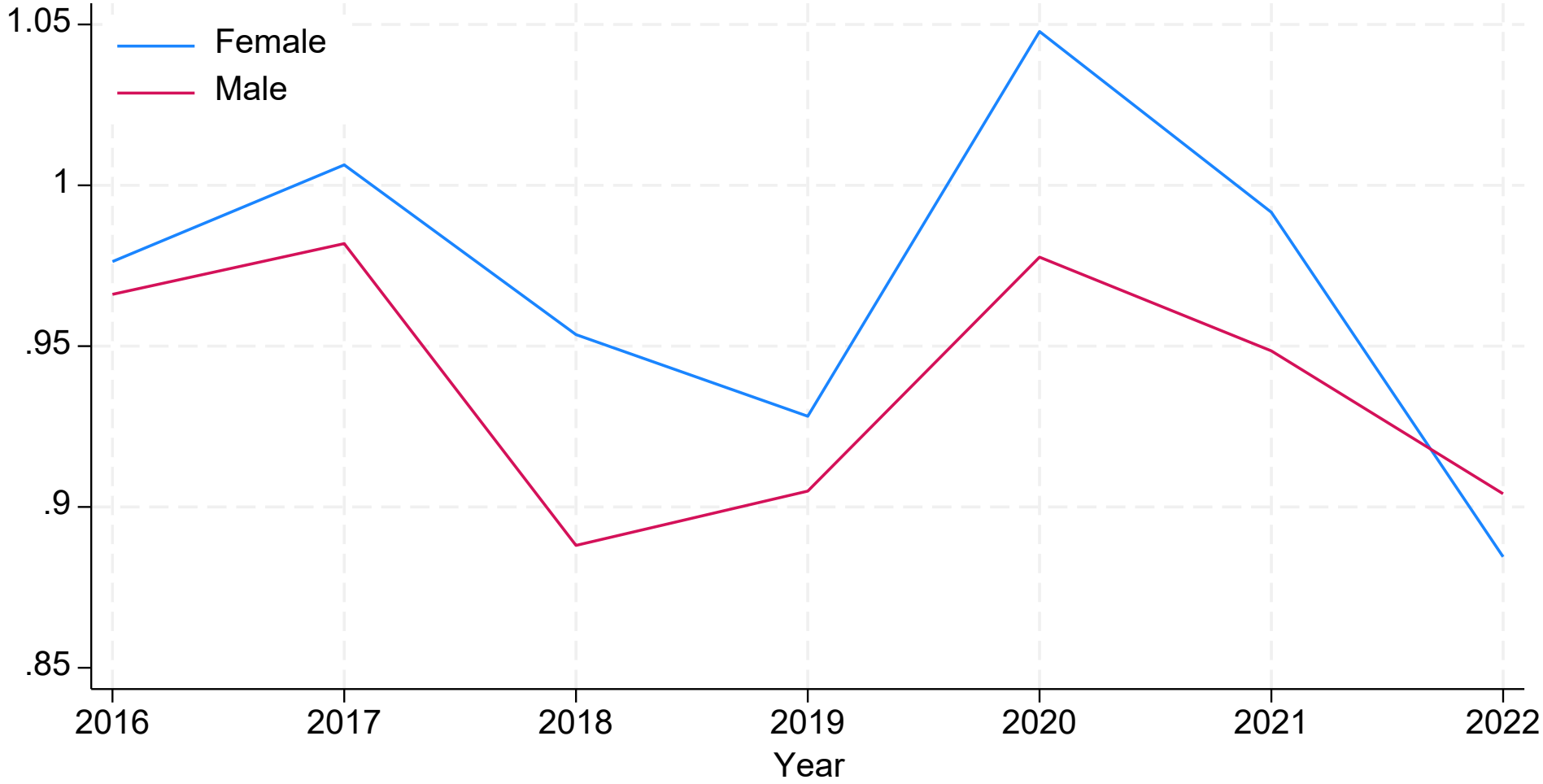
Differences in Levels

	Female Patients	Male Patients
Pandemic	0.038**	0.039**
	(0.009 to 0.066)	(0.012 to 0.067)
	p=0.02	p=0.02

Differences in Trends

	Female Patients	Male Patients
Pre-Trends	<0.001 (-0.001 to 0.001) p=0.32	<0.001 (<-0.001 to 0.001) p=0.41
Post-Trends	-0.019*** (-0.028 to -0.011) p=0.01	-0.019*** (-0.025 to -0.012) p<0.01

Secondary Stroke Rate Among Arkansas Commercial Stroke Patients, by Gender & Year



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Differences in Levels

	Female Patients	Male Patients
Pandemic	0.009 (-0.118 to 0.135) p=0.87	0.008 (-0.072 to 0.089) p=0.80

Differences in Trends

	Female Patients	Male Patients
Pre-Trends	-0.020 (-0.054 to 0.014) p=0.16	-0.028* (-0.060 to 0.004) p=0.07
Post-Trends	-0.082*** (-0.111 to -0.052) p<0.01	-0.037*** (-0.046 to -0.028) p<0.01