MINNESOTA STUDY OF TELEHEALTH EXPANSION AND PAYMENT PARITY

MN EHR CONSORTIUM

Prepared for:

Minnesota Department of Health

Prepared by:

MN EHR Consortium

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Executive Summary

Introduction

Telehealth is an innovative mode of healthcare delivery using real-time two-way interactive communications that includes audio-visual (video) and audio-only (telephone) modalities. The Minnesota Telehealth Act of 2021 expanded the definition and purview of telehealth to include telephone encounters but also sought to better understand its implications. The Minnesota Telehealth Act of 2021 directed the Minnesota Department of Health (MDH) to conduct an evaluation of the impact of telehealth expansion and payment parity on access to healthcare, quality and outcomes, patient satisfaction, equity, and costs. This analysis, by the Minnesota Electronic Health Records Consortium (MNEHRC), represents one component of a comprehensive evaluation.

Using electronic health records (EHR) data, the MNEHRC evaluation sought to answer three questions of interest to MDH:

- How has outpatient use of telehealth changed, and have these changes differed for specific groups of Minnesotans?
- What is the prevalence of audio-only (telephone) and audio-visual (video) telehealth use, and how were these two modalities used by different subgroups?
- How has the expansion of telehealth impacted quality of care, and to what extent does this differ by modality?

Methods

The MN EHR Consortium is a group of people from 11 large health systems serving patients in Minnesota committed to the collaborative use of EHR data to improve the health of Minnesotans. Health systems participating in this analysis are: Allina Health, CentraCare, Children's Minnesota, Essentia Health, Hennepin Healthcare, HealthPartners, M Health Fairview, and Sanford Health. The MNEHRC uses a distributed data model, where each health system runs the same code in their own data environments, and then reports back aggregate or summary data to the coordinating site, such that no individual level data is accessed or shared.

For this analysis, we defined outpatient telehealth encounters as a synchronous encounter with a provider using either video or telephone. These encounters include both scheduled telehealth

encounters (which are typically billed) as well as other encounters that may not be billed, such as impromptu phone calls from a provider to a patient. We categorized healthcare professionals as (a) providers, which included physicians, nurse practitioners, physician assistants, and psychiatrists; and (b) mental health providers, which included psychiatrists, psychologists, as well as other people who provide mental healthcare (e.g., counselors, therapists). For the descriptive analysis of telehealth utilization over time and the prevalence of video and telephone encounters, all patients served by the participating health systems between 2018 and 2022 were included.

To assess the impact of telehealth on quality of care, we conducted a difference-in-difference analysis comparing the changes in outcomes from before the COVID-19 pandemic (January 2019-December 2019) to post-telehealth expansion (January 2022-December 2022) among patients with depression, Type 2 diabetes mellitus (DM), and asthma who received care from providers with high telehealth use compared to providers with low telehealth use.

Results

Almost two million Minnesotans were included in this MNEHRC analysis. Key findings are organized below by evaluation question:

How has outpatient use of telehealth changed, and have these changes differed for specific groups of Minnesotans? Telehealth use peaked early in the public health emergency and decreased after that. Utilization remained higher post-2020 expansion compared to the pre-pandemic period. Overall, telehealth utilization was highest for Black or African American Minnesotans and people living in urban and exurban areas. Telehealth use was the lowest for American Indian/Alaska Native Minnesotans and children aged 18 years and less. The greatest change in telehealth utilization was for mental healthcare. Minnesotans utilized telehealth for mental healthcare substantially more in the post-expansion period than they did pre-pandemic. In the post-expansion period, there was particularly high telehealth use for mental healthcare among working age Minnesotans (ages 19-65), those living in less socially vulnerable Zip Codes, and those with insurance other than Medicaid.

What is the prevalence of audio-only (telephone) and audio-visual (video) telehealth, and how were these two modalities used by different subgroups? Overall, telephone encounters were more common than video encounters over the analysis period. The opposite was true when limiting

encounters to those for mental health. Telephone encounters were common pre-pandemic and continued to be common in the post-expansion period. The use of video encounters increased during the peak of the pandemic, especially for mental health. Post-expansion, overall utilization decreased, but less so for video encounters for mental health. Video encounters were used more by younger adults, while telephone encounters were used more by older age groups. Video encounters did not differ markedly by race or ethnicity, but telephone encounters were most used by Black or African American Minnesotans and least by American Indian or Alaska Native Minnesotans.

How has the expansion of telehealth impacted quality of care, and to what extent does this differ by modality? With the exception of PHQ-9 assessments among those with depression, there were no differences in the change in quality of care from 2019 to 2022 when comparing providers with high versus low telehealth use among patients with depression, DM, and asthma. This was true for processes of care, quality measures, and rates of emergency department encounters and hospitalizations for patients with depression, diabetes, and asthma.

Summary

The utilization of telehealth increased during the early portion of the pandemic but has since come down, albeit to levels that remain higher than those seen pre-pandemic. Increases in telehealth use for mental healthcare were greater and sustained. We are unable to ascertain how changes in utilization translate to increased access to mental healthcare. Changes in quality of care were similar between patients seen by providers with high and low telehealth use. It is clear from this analysis that telehealth was a crucial part of healthcare delivery during the early part of the pandemic and continues to play an important role in the healthcare landscape in Minnesota. With this in mind, careful attention should be paid to the role of telehealth access across Minnesota. The quality analysis findings of this study are reassuring while the demographic utilization patterns highlight areas for potential interventions to improve access to telehealth.

Introduction

Key public health questions related to telehealth use in Minnesota:

Telehealth is an innovative mode of healthcare delivery using real-time two-way interactive communications that includes audio-visual (video) and audio-only (telephone) modalities. Telehealth has transformed the way patients and providers can interact.[1] The onset of the COVID-19 pandemic acted as a catalyst, dramatically reshaping the role that telehealth plays in our healthcare ecosystem. With physical distancing and quarantine measures in place, healthcare providers sought alternative methods to continue offering care, pushing telehealth to the forefront. This rapid adoption led to an increased volume of telehealth appointments, along with a notable expansion in the providers involved and the conditions being treated.[2,3] Traditional "brick-and-mortar" healthcare systems began actively integrating telehealth, addressing both acute and chronic conditions, most notably, mental and behavioral health.[4,5]

Minnesota, mirroring global trends, witnessed a profound shift in how healthcare was delivered during this time. As elucidated by an analysis of the Minnesota All Payer Claims Database, telehealth claims surged from a mere 1% in 2019 to a peak of 36% in April 2020.[6] In part this was a result of executive orders at the state and federal levels that increased availability of and access to healthcare services via telehealth (mostly by easing restrictions that were in place prior to March 2020). The Minnesota Legislature, recognizing the potential benefits and challenges of increasing telehealth access, codified many of these changes with the Minnesota Telehealth Act of 2021.[7] Prior to this legislation, payment parity requirements for video and in-person care were in place but audio-only (telephone) services were not included. The Telehealth Act of 2021 expanded the definition and purview of telehealth to include telephone encounters but also sought to better understand its implications.

The Minnesota Telehealth Act of 2021 directed the Minnesota Department of Health (MDH) to conduct an evaluation of the impact of telehealth expansion and payment parity on access to healthcare, quality and outcomes, patient satisfaction, equity, and costs. MDH conducted a comprehensive evaluation, involving multiple qualitative and quantitative analyses. MDH's evaluation aims to determine telehealth's impact on numerous facets including access to services, patient outcomes, healthcare disparities, and costs. By understanding these nuances, policymakers,

providers, and patients can harness the true potential of telehealth, ensuring a more accessible, equitable, and effective healthcare system in Minnesota. The evaluation presented in this report is one component of MDH's overall evaluation.

Key public health questions addressed in this evaluation:

The COVID-19 public health emergency necessitated a rapid increase in telehealth utilization. Now that the emergency has subsided, it is essential to evaluate the impact of telehealth for Minnesotans and to examine if this impact differs for some groups. The results of this evaluation will inform ongoing and future state telehealth policies. This report will address three main questions:

- **How has outpatient use of telehealth changed, and have these changes differed for specific groups of Minnesotans?**
- **What is the prevalence of audio-only (telephone) and audio-visual (video) telehealth use, and how were these two modalities used by different subgroups?**
- **How has the expansion of telehealth impacted quality of care, and to what extent does this differ by modality?**

Contributions of the Minnesota Electronic Health Records Consortium:

The Minnesota Study of Telehealth will be informed by several evaluations, each relying on unique data sources, allowing MDH to get a broad picture of the impacts of telehealth expansion and payment parity. This evaluation uses data from the Minnesota Electronic Health Records Consortium (MNEHRC), a collaboration among many of the largest health systems in the state. There are several unique contributions this evaluation makes to MDH's understanding of the impacts of telehealth.

- **Demographic information**: Electronic health records (EHR) have a high degree of completeness for demographic information. One of the key questions we aim to answer in this evaluation is whether telehealth use and the impacts of telehealth differ for various groups of Minnesotans. Answering this question requires complete and accurate demographic information. Because patient demographic information, including race and ethnicity, is collected directly from patients according to standardized best practices and entered into the EHR, these records tend to have low levels of missing demographic data.[8]
- **Census tract information**: Patient addresses are present in electronic health records data, allowing for participating sites to attribute patients to a census tract. Census tract analyses

allow us to learn about neighborhood factors that may impact health and access to health care such as socioeconomic and rural-urban statuses.

- **Comprehensive data source**: The MNEHRC is a unique collaboration between 11 of the largest health systems in Minnesota. Most Minnesotans receive at least some of their care at one of the participating health systems, making the MNEHRC a comprehensive data source for answering important public health questions.[9,10]
- **Provider-level information**: Two questions about telehealth utilization that this evaluation aims to address are what role the provider has in the frequency of telehealth utilization and what is the quality of care delivered via telehealth. These questions require encounter-level data, meaning data generated by health care providers as a result of the provision of health care services. The MNEHRC summarizes encounter-level data from electronic health records of participating health care systems to allow this study to examine the provider-patient relationship with a focus on the modality of care delivered.

Methods

Data Source and Model.

The MN EHR Consortium (MNEHRC) is a partnership between 11 large health systems serving patients in Minnesota and public health agencies committed to the collaborative use of EHR data to improve the health of Minnesotans. This telehealth evaluation, conducted under a contract between MDH and the MNEHRC, was coordinated at the University of Minnesota and included data from 8 health systems: Allina Health, CentraCare, Children's Minnesota, Essentia Health, Hennepin Healthcare, HealthPartners, M Health Fairview, and Sanford Health. Information regarding Medicaid status was provided by the Minnesota Immunization Information Connection (MIIC).

The MNEHRC maintains a distributed data model, meaning all EHR data are maintained by the health systems on their own secure servers. Each health system has translated its EHR database to a common data model, Observational Medical Outcomes Partnership (OMOP), so each site's database includes the same tables, variables, and formats. Code is developed centrally, and then each health system runs the code with their data on their own OMOP database. Health systems then share only their aggregate results with the central coordinating site. Individual level data are never shared

outside of each health system. This distributed data network is set up to protect patient privacy. MDH does not have access to individual-level or system-level EHR data and only viewed aggregate results from all the health systems and summaries as displayed in this report.

Telehealth Definition.

Telehealth encounters were defined as remote, synchronous encounters between a healthcare professional and a patient. Telehealth encounters were further classified as either video or telephone encounters. Video encounters included both an audio and video component, while telephone encounters only included audio. Because of how encounters are documented in the EHR, the telehealth encounters included in this analysis represent both billable encounters (e.g., a scheduled encounter) and non-billable encounters (e.g., a provider calling a patient to follow-up about, discuss results or other questions). Video and telephone encounters were identified using health system codes. Only outpatient encounters were included in this analysis and included video, telephone, and traditional in-person encounters. Encounters such as emergency department visits and hospitalizations were excluded.

Provider Definition.

We classified healthcare providers in two ways. First, healthcare professionals were categorized as providers (e.g., physicians, nurse practitioners, physician assistants, psychologists), mental health providers (e.g., psychiatrists, psychologists, licensed family and marriage therapists), and others (e.g., physical therapists, nurses). Categories were not mutually exclusive – a psychiatrist would be categorized as both a provider and a mental health provider. Second, for our analysis of the impact of telehealth on the change in quality of care, we examined outcomes for patients who received care from high or low telehealth use primary care providers (internal medicine, family medicine, or pediatrics). Further detail about classification by provider telehealth use can be found in the Analysis section.

Patient Inclusion Criteria.

For analyses evaluating the use of outpatient telehealth over time and the prevalence of video and telephone encounters, all patients were included. For analyses of quality of care, we required patients to have at least two outpatient encounters between January 1, 2019 and March 31, 2020

and at least one outpatient encounter between April 1, 2021 and December 31, 2022 in order to ensure they were established patients.

Conditions of Interest and Outcomes.

For the third evaluation question regarding the impact of telehealth use on change in quality of care and health outcomes, we focused on health outcomes for conditions that are of particular interest to MDH. For the conditions of interest, patients were included if they had a diagnosis in the three years prior to the outcome period of interest (i.e., diagnosis in 2016-2018 for outcomes in 2019 and diagnosis in 2019-2021 for outcomes in 2022).

Depression was selected as a condition of interest because the preliminary Minnesota All Payer Claims Database (MN APCD) analyses indicated that telehealth use was high for mental health conditions during the time periods of interest. Outcomes include the number of patients with a depression diagnosis with a recent Patient Health Questionnaire (PHQ-9) assessment, a common depression screening tool; the PHQ-9 level among those assessed (primary outcome, a higher score is indicative of more severe depression); and the number of patients with an emergency department (ED) encounter or hospitalization with an associated diagnosis for a mental health condition.

Type 2 Diabetes Mellitus (DM) is a common chronic condition with objective well-established measures of processes of care and outcomes. Outcomes for DM include:

- The number of patients with DM with an A1c blood test and the value of their most recent test. A1c is a measure of glycemic control and it is recommended that patients with DM have their A1c tested every three to six months.
- The number of patients with DM with a urine albumin-creatinine ratio (UACR) test. This test is recommended annually for patients with DM to monitor kidney function.
- The number of patients with DM with a blood pressure measured in the last year and the most recent blood pressure value.
- The number of patients with DM with an ED encounter or hospitalization for any cause.

Asthma was selected because it is common in the pediatric population. Outcomes for asthma included the number of patients, of all ages, with asthma with an asthma control assessment

(questionnaire) conducted in the last year as an indication of receiving recommended screening; control of asthma on the most recent asthma control assessment (as defined by MN Community Measurement); and the number of patients with an ED encounter or hospitalization for asthma or chronic obstructive pulmonary disease (COPD).[11]

Pregnant patients were included in the analyses as this was of particular interest to MDH. If a patient had multiple pregnancies during the study period, we only included the first. The number of prenatal encounters for the first pregnancy noted in the EHR for each patient were recorded and grouped by type: in-person and telehealth.

Neighborhood factors.

Patient addresses were geocoded to a census tract. For patients whose address was not geocoded, census tracts were assigned using a ZIP Code-census tract probabilistic match based on population weights. A general measure of neighborhood socioeconomic status was defined at the census tract level using the Centers for Disease Control and Prevention's Social Vulnerability Index (SVI).[12] Patients were assigned to an SVI quartile based on their address with SVI 1 indicating the least vulnerable and SVI 4 indicating the most vulnerable neighborhoods. Urban/rural status was also defined at the census tract level using 2010 rural-urban commuting area (RUCA) codes and data from the US Census American Community Survey on the percent of individuals living in rural areas.[10]

Analytic approach.

Below we describe the analytic approach for each of our evaluation questions.

How has outpatient use of telehealth changed, and have these changes differed for specific groups of Minnesotans? To answer this question, we used a descriptive approach to describe the pattern of changes in telehealth use over time, by patient characteristics. The patient characteristics used to report results by subgroup included age, sex, self-reported race and ethnicity, illness burden (number of comorbidities), whether patients were covered by Medicaid, and area-level factors defined by ZIP Code and census tract (Social Vulnerability Index and rural/urban).

What is the prevalence of audio-only (telephone) and audio-visual (video) telehealth use, and how were these two modalities used by different subgroups? To answer this question, we used the same descriptive approach as above, and stratified the data by video vs. telephone encounters.

How has the expansion of telehealth impacted quality of care, and to what extent does this differ by modality? We answered this question using a difference-in-difference analysis to examine changes in quality of care associated with being a patient who receives care from a high vs. low telehealth use primary care provider.[13] A difference-in-difference analysis allows for the comparison of the change in an outcome before and after an event (in this case, telehealth expansion under the public health emergency) for two different groups. In this case, the groups are patients who receive primary care from either low or high telehealth use primary care providers.

High and low telehealth use providers. Providers identified as primary care (e.g., internal medicine, family medicine, pediatrics) with at least 100 and no more than 10,000 encounters in 2021 were eligible to be the provider of record for this quality of care analysis. Provider telehealth use was defined as the percent of total (in-person and telehealth) encounters an individual provider delivered in 2021 that were via telehealth (video + telephone). A provider was assigned to the high telehealth use group if their percent of telehealth encounters in 2021 was above the median, among all included providers in 2021. Providers were assigned to the low telehealth use group if they were below the median percent of telehealth encounters delivered in 2021. In secondary analyses, a provider was defined as being a high telehealth user if they were above the 66th percentile in terms of percent of telehealth encounters delivered, and a low telehealth user if they were below the 33rd percentile of telehealth delivery in 2021. The middle third of providers was excluded from this secondary analysis.

Patient inclusion and attribution. Our goal was to attribute established patients to their regular primary care provider. We did this in several steps. First, each health system attributed patients to providers based on the plurality of outpatient encounters with an individual provider from January 2019 through March of 2020. If there was a tie, the patient was attributed to the provider where they had an encounter closest to March 31, 2020. If there was still a tie, the patient was randomly assigned to one of the providers. Providers with fewer than 100 or more than 10,000 encounters in 2021 were outliers, and patients assigned to these providers were excluded.

Second, to identify patients who were established with their providers, patients also had to have at least one encounter during the post-telehealth expansion period (April 2020 through December 2021) in addition to the two pre-pandemic encounters to be included in this analysis. Additionally, patients were required to have a prior diagnosis for at least one of the conditions of interest – depression, type 2 diabetes mellitus (DM), and/or asthma. Conditions of interest were identified using diagnosis codes.[14]

Last, we deduplicated patients across health systems. The rationale for this was that while our first two evaluation questions are encounter based, our analysis of the change in quality of care is person-based. People may receive care at more than one health system; this results in more than one record for a single individual across multiple health systems. For this analysis, we assigned each person to one health system. We used a deduplication process that has been tested and validated by the MNEHRC, which involves privacy-preserving linkages using secure one-way hashing.[15] People are assigned to health systems based on the availability of data elements (e.g., if they have been to the emergency department at one health system and receive primary care at another, the system that delivers primary care likely has more complete information).

The main estimate of interest in the unadjusted difference-in-difference analysis captures the differential change from 2019 to 2022 in each outcome variable for patients who receive care from high telehealth use providers relative to patients who receive care from low telehealth use providers.[13] The combined results from the health systems were obtained using a random effects meta-analytic model. The random effects model estimates the mean of the distribution of true effects under the assumption that the effect of high telehealth use may differ from one health system to another.

Results

There were 1.9 million people from 8 health systems included in this evaluation (Table 1). In general, the distribution of people in this evaluation is similar to the population of Minnesota except this

evaluation included more people 65 years of age and older and more females, as expected in a medical care-seeking population drawn from EHR data.

How has outpatient use of telehealth changed since the 2020 expansion, and have these changes differed for specific groups of Minnesotans?

There was a sharp increase in the first half of 2020 in the percent of outpatient encounters that were telehealth from a baseline level of less than 25% to about 50% for all encounters (Figure 1) and to about 75% of mental health encounters (Figure 2). Since June of 2020, telehealth use declined but the percent of outpatient encounters that are telehealth was higher in 2021 and 2022, compared to pre-pandemic levels. The median percent of telehealth use in 2021 at each of the health systems ranged from 5-41%. The percent of outpatient mental health encounters that are telehealth remains above 50% for most groups, significantly higher compared to pre-pandemic levels. Figures 1 through 12 show the percent of all outpatient encounters and mental health encounters that were telehealth stratified by age, race/ethnicity, rurality, social vulnerability, sex, and Medicaid status. Groups with a higher percent of telehealth use for all encounters include Black or African American Minnesotans (Figure 3), those living in urban and exurban neighborhoods (Figure 5), and those not insured by the Medicaid program (Figure 11). Telehealth use was slightly higher for females (Figure 9) and those living in less vulnerable neighborhoods (SVI 1) as defined by Social Vulnerability Index (Figure 7). Groups with a lower percent of telehealth use for all encounters include those aged 18 years and younger (Figure 1), American Indian or Alaska Native Minnesotans (Figure 3), and those living in small town and rural neighborhoods (Figure 5). These findings are in the setting of a generally stable number of outpatient encounters across most age groups except for an increase in those aged 18 and younger (Figure 16).

For mental health encounters, groups with a higher percent of telehealth use include those aged 18 to 40 years (Figure 2), Asian Minnesotans (Figure 4), those living in urban and exurban neighborhoods (Figure 6), and those not insured by the Medicaid program (Figure 12). Telehealth use for mental health encounters was slightly higher for females (Figure 10) and those living in less vulnerable neighborhoods (SVI 1) as defined by Social Vulnerability Index (Figure 8). Groups with a lower percent of telehealth use for mental health encounters include those aged 18 years and younger (Figure 2), American Indian or Alaska Native Minnesotans (Figure 4), and those living in small town and rural

neighborhoods (Figure 6). These findings are in the setting of an increasing number of outpatient encounters for mental health in those aged 18 years and younger and a decreasing number of encounters for those age 65 years and older (Figure 17).

What is the prevalence of audio-only (telephone) and audio-visual (video) telehealth, and how were these two modalities used by different subgroups?

The percent of all outpatient encounters that were completed via telephone was higher than the percent of those completed via video for all encounters (Figures 13 and 15), but telephone encounters returned to pre-pandemic levels after the spike in early- to mid-2020. However, the percent of video encounters was near zero before March 2020 and persisted at a steady level, albeit at a lower percent than telephone encounters, in 2021 and 2022. Video encounters were used more by younger adults, while telephone encounters were used more by older age groups. Video encounters did not differ markedly by race/ethnicity, but telephone encounters were most used by Black or African American Minnesotans and least by American Indian or Alaska Native Minnesotans.

The percent of mental health encounters that were video was higher than the percent of mental health encounters that were telephone. Age trends for mental health encounters were similar to those for all encounters, except for greater use of video encounters in children earlier in the pandemic (Figure 14). The percent of encounters that were telephone was similar for all encounters and mental health encounters (Figures 13 and 14).

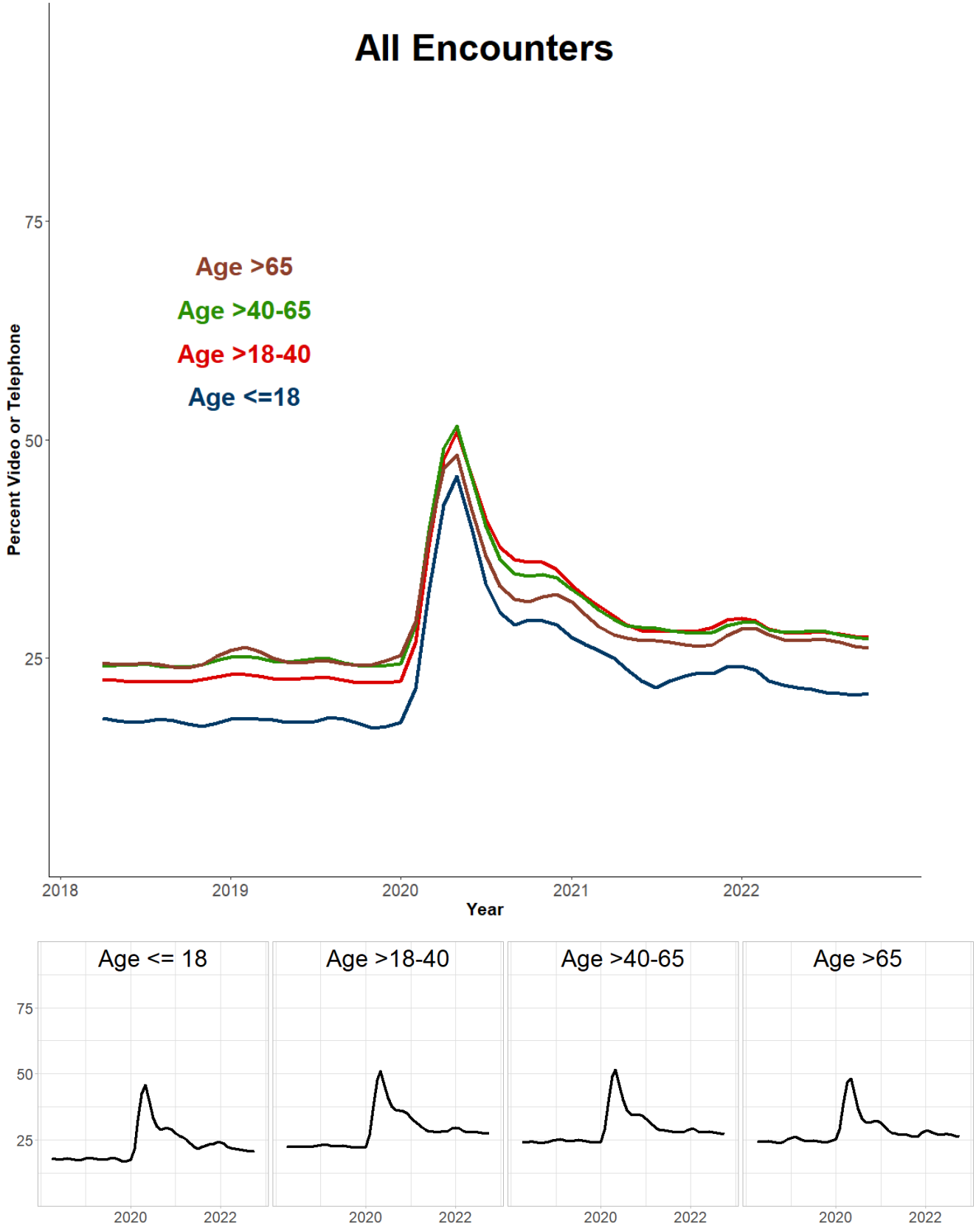
The use of telehealth for prenatal care was minimal. Nearly all of the prenatal care encounters were in-person from 2018-2022 and results were consistent with 4-5 encounters per pregnancy across racial groups (Figures 18 and 19).

Table 1. Patient characteristics

Variable	Count	(%)
Total	1,851,709	NA
Age <=18 years	330,760	18%
Age 19-40 years	381,347	21%
Age 41-65 years	642,335	35%
Age 66-75 years	282,243	15%
Age >75 years	208,581	11%
Gender - Female	1,056,430	57%
Gender - Male	795,047	43%
Race	NA	NA
American Indian or Alaska Native	18,517	1%
Asian	79,986	4%
Black or African American	134,842	7%
Native Hawaiian or Other Pacific Islander	2,670	<1%
White	1,548,461	84%
Ethnicity - Hispanic or Latino	67,226	4%
Ethnicity - Not Hispanic or Latino	1,657,833	90%
Neighborhood Urban	1,210,968	65%
Neighborhood Exurban	177,852	10%
Neighborhood Small Town	135,002	7%
Neighborhood Rural	300,868	16%
SVI 1 (low vulnerability)	534,057	29%
Neighborhood SVI 2	458,428	25%
Neighborhood SVI 3	428,733	23%
SVI 4 (high vulnerability)	403,387	22%
Conditions of Interest - Diabetes	236,921	13%
Conditions of Interest - Depression	491,756	27%
Conditions of Interest - Asthma	241,561	13%
Medicaid Coverage	358,291	19%

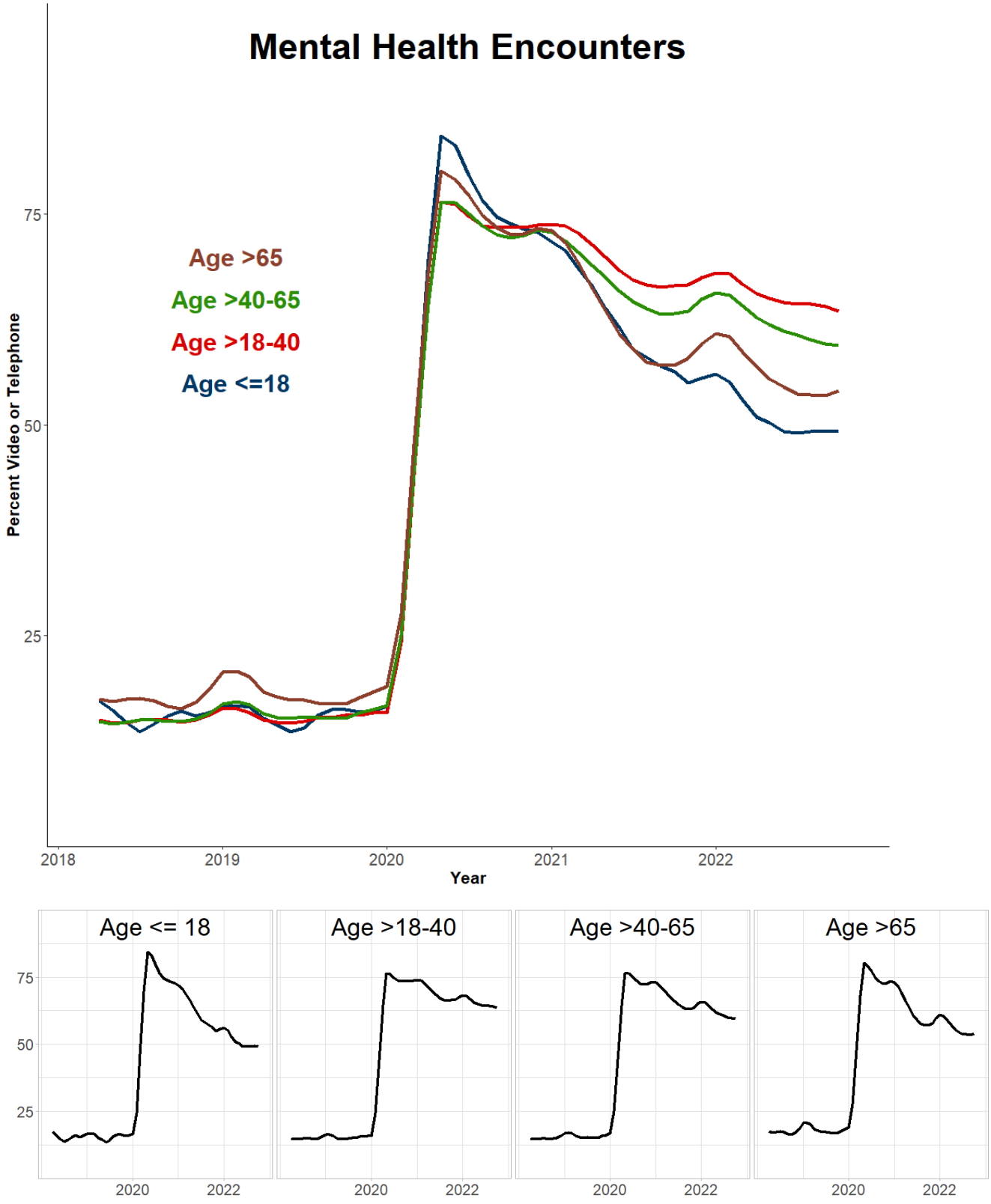
Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study.
Notes: Missing data included 6,443 (0.3%) for age, 74 for gender (<1%), 67,233 (4%) for race, 126,650 (7%) for ethnicity, 27,055 (1%) for neighborhood characteristics. SVI, Social Vulnerability Index.

Figure 1. Telehealth use over time as a percent of all outpatient encounters by age



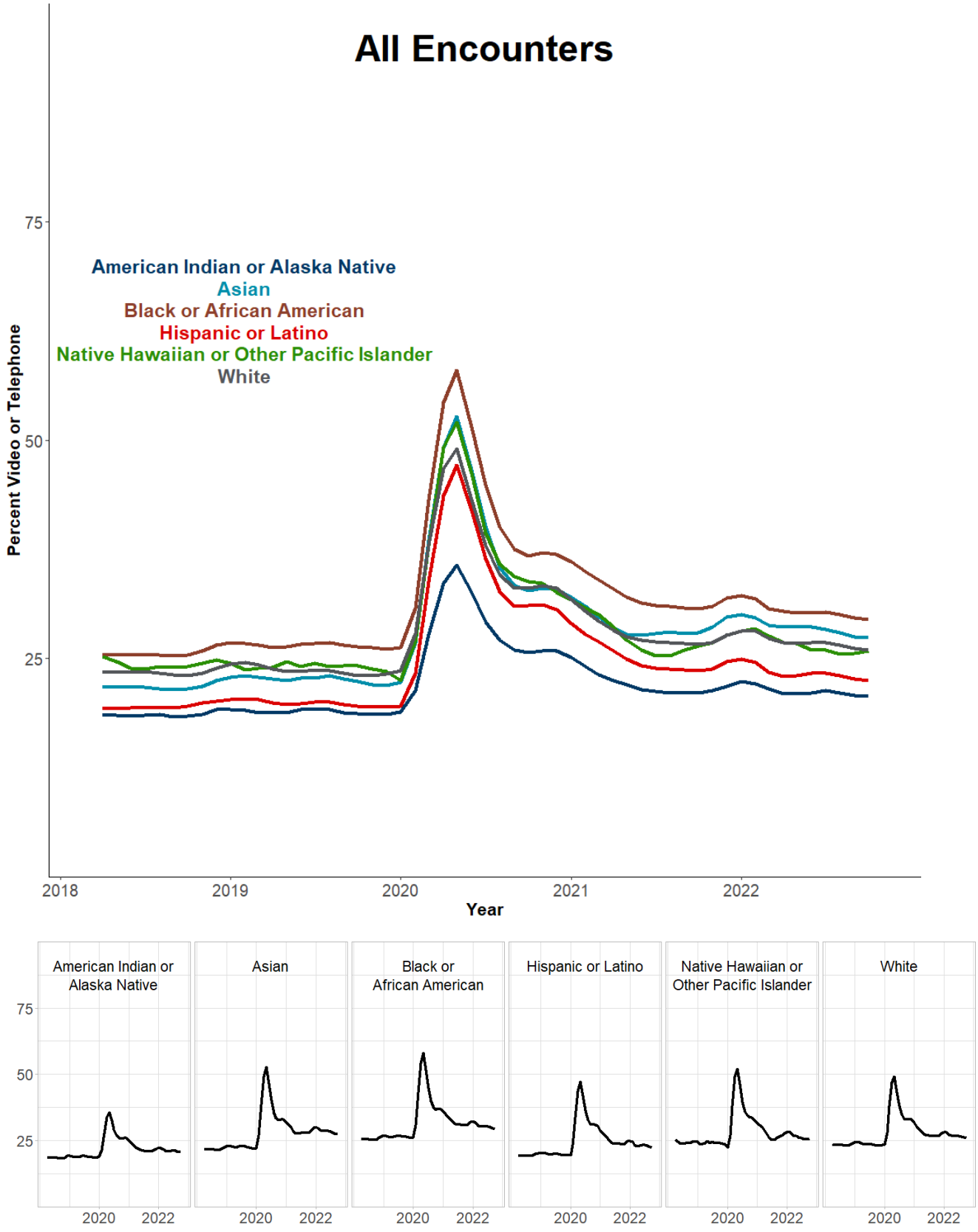
Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study

Figure 2. Telehealth use for mental health as a percent of all outpatient mental health encounters by age



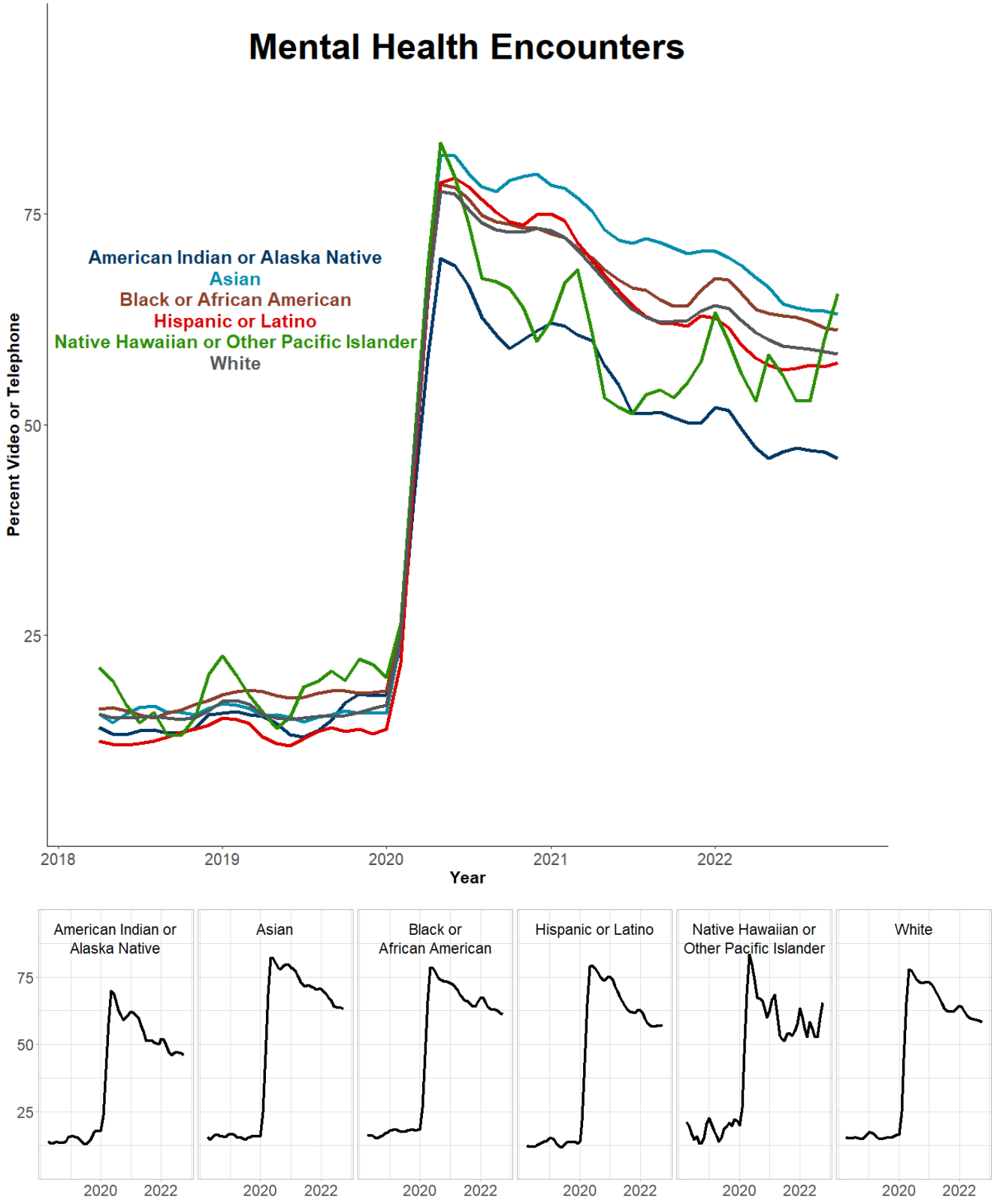
Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study

Figure 3. Telehealth use over time as a percent of all outpatient encounters by race/ethnicity



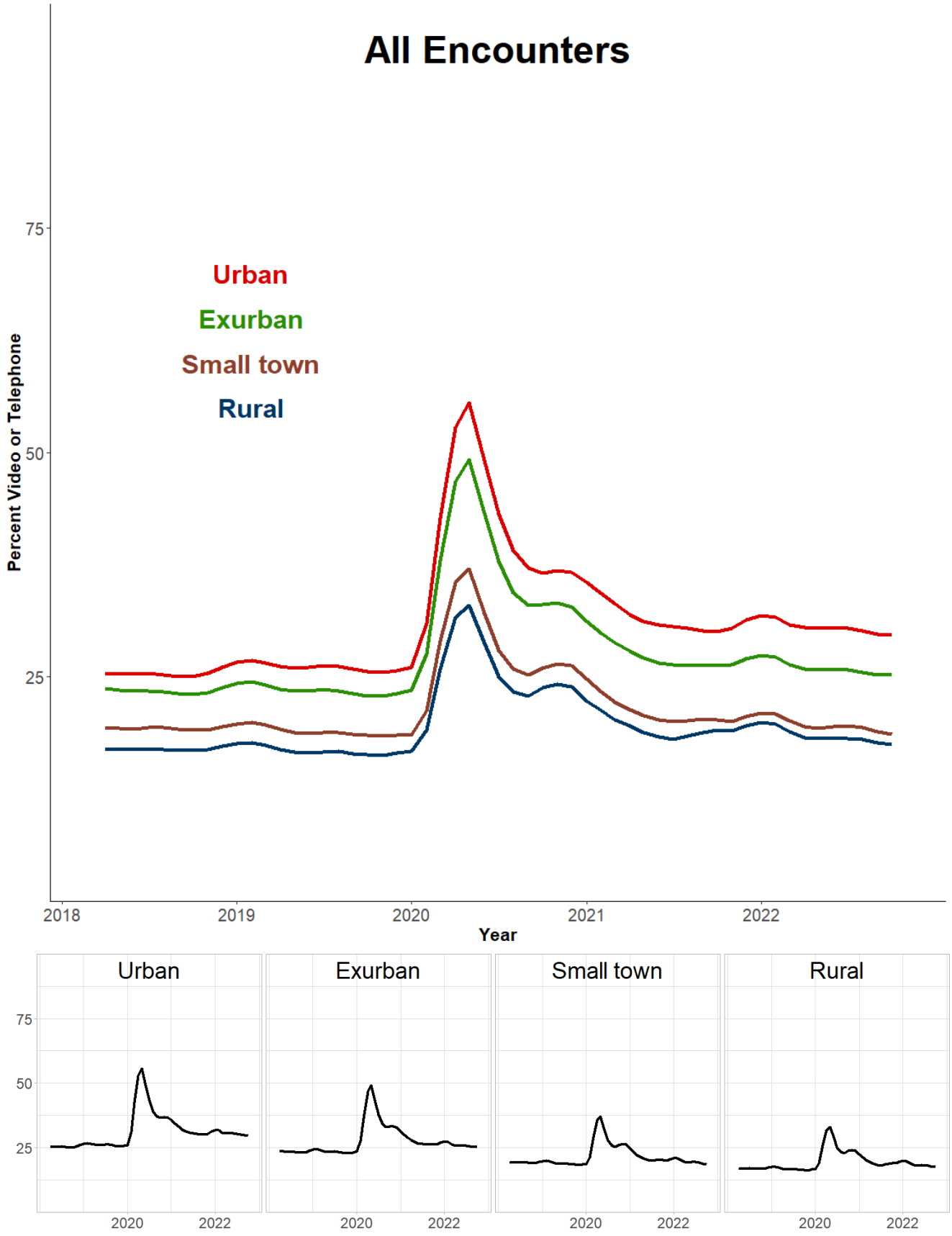
Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study

Figure 4. Telehealth use for mental health as a percent of all outpatient mental health encounters by race/ethnicity



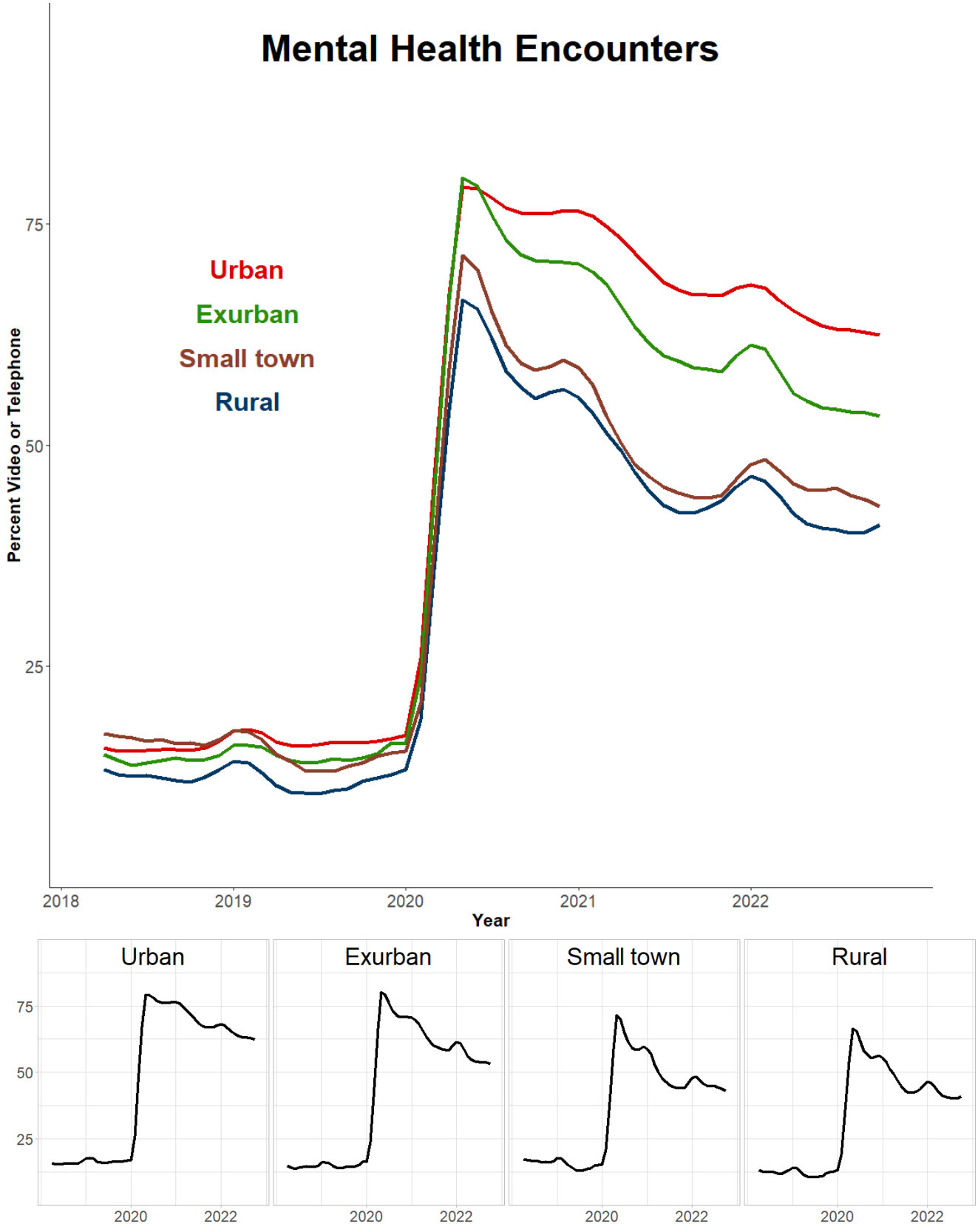
Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study

Figure 5. Telehealth use over time as a percent of all outpatient encounters by rurality



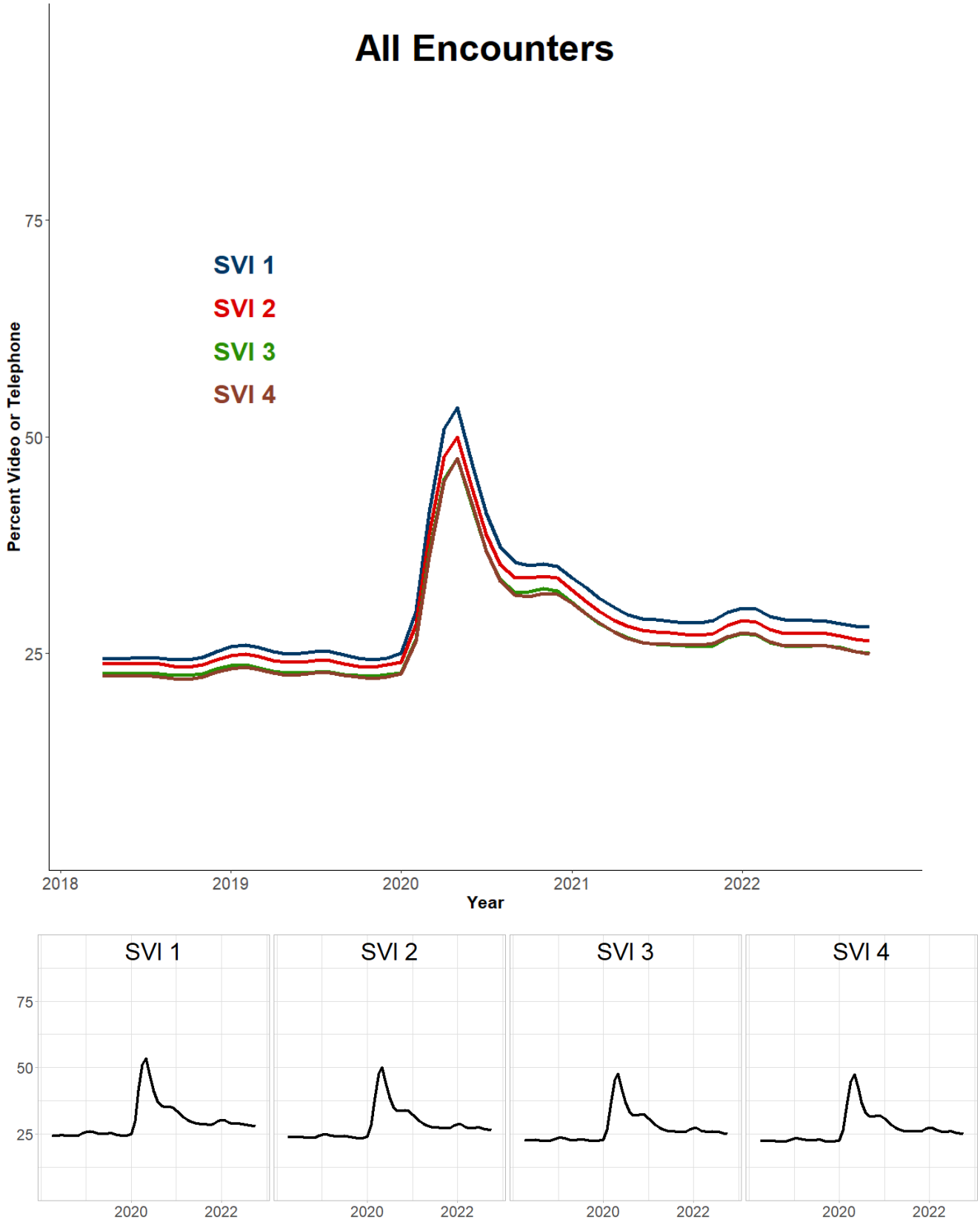
Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study

Figure 6. Telehealth use for mental health as a percent of all outpatient mental health encounters by rurality



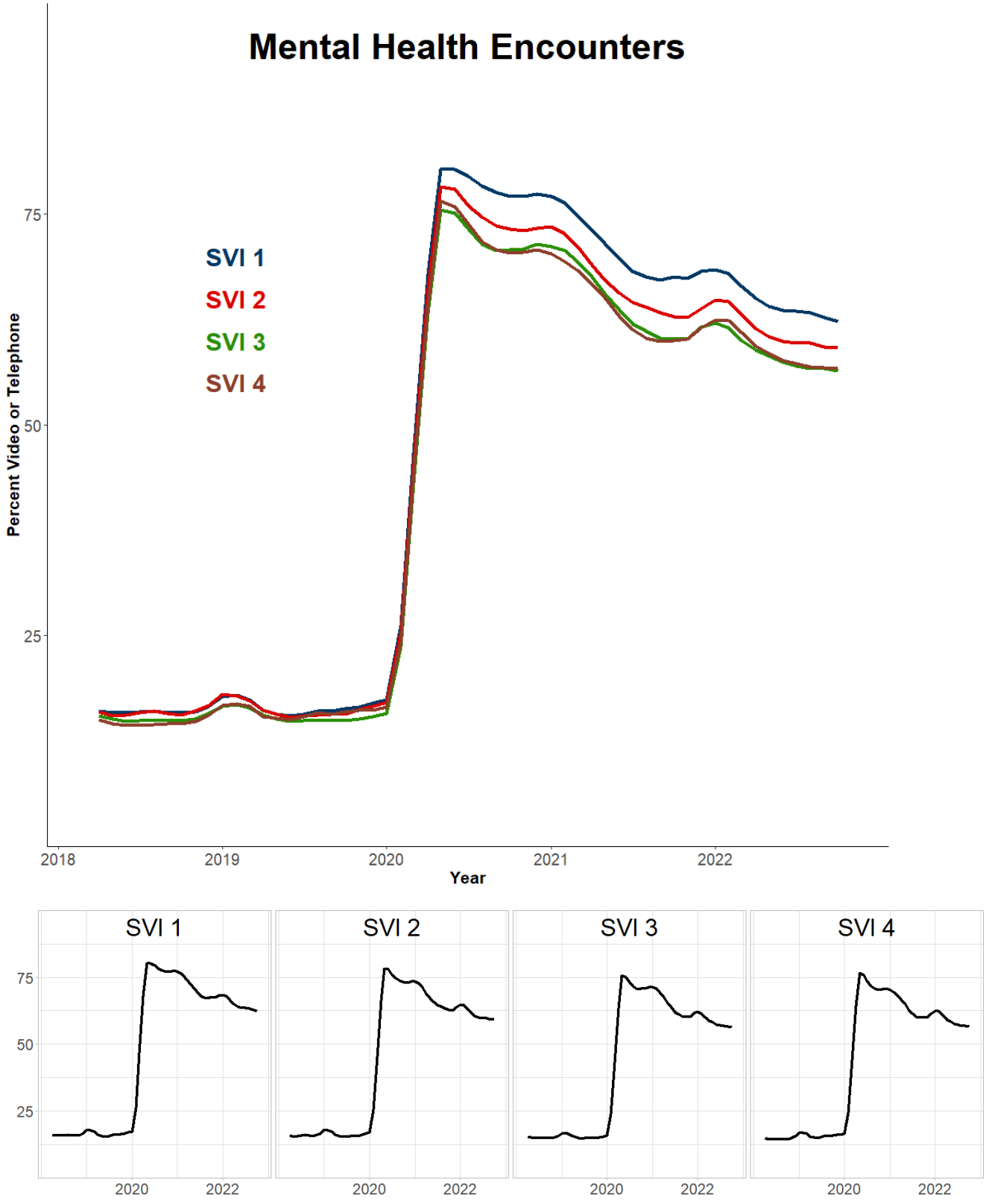
Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study

Figure 7. Telehealth use over time as a percent of all outpatient encounters by Social Vulnerability Index (SVI)



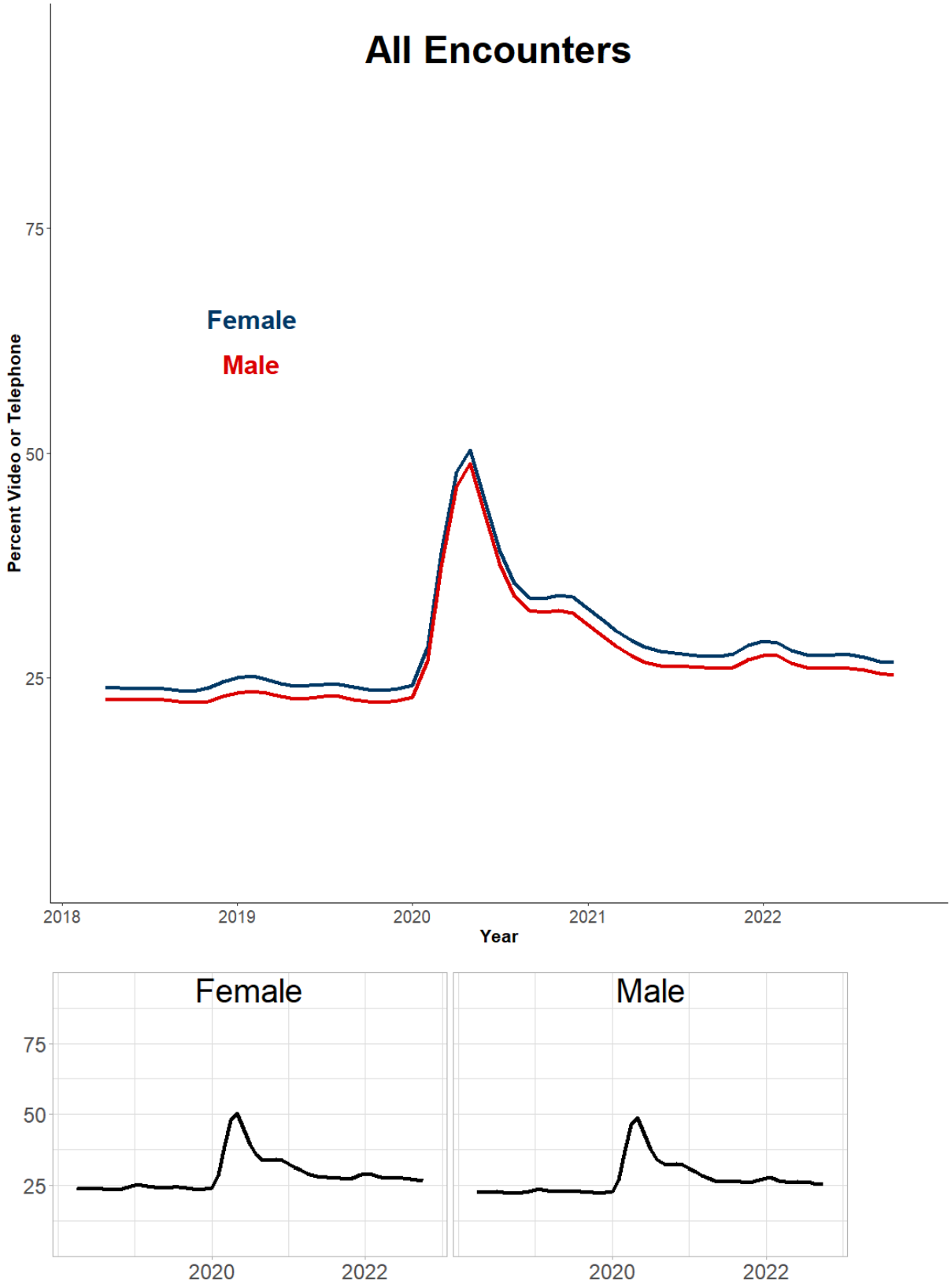
Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study

Figure 8. Telehealth use for mental health as a percent of all outpatient mental health encounters by Social Vulnerability Index (SVI)



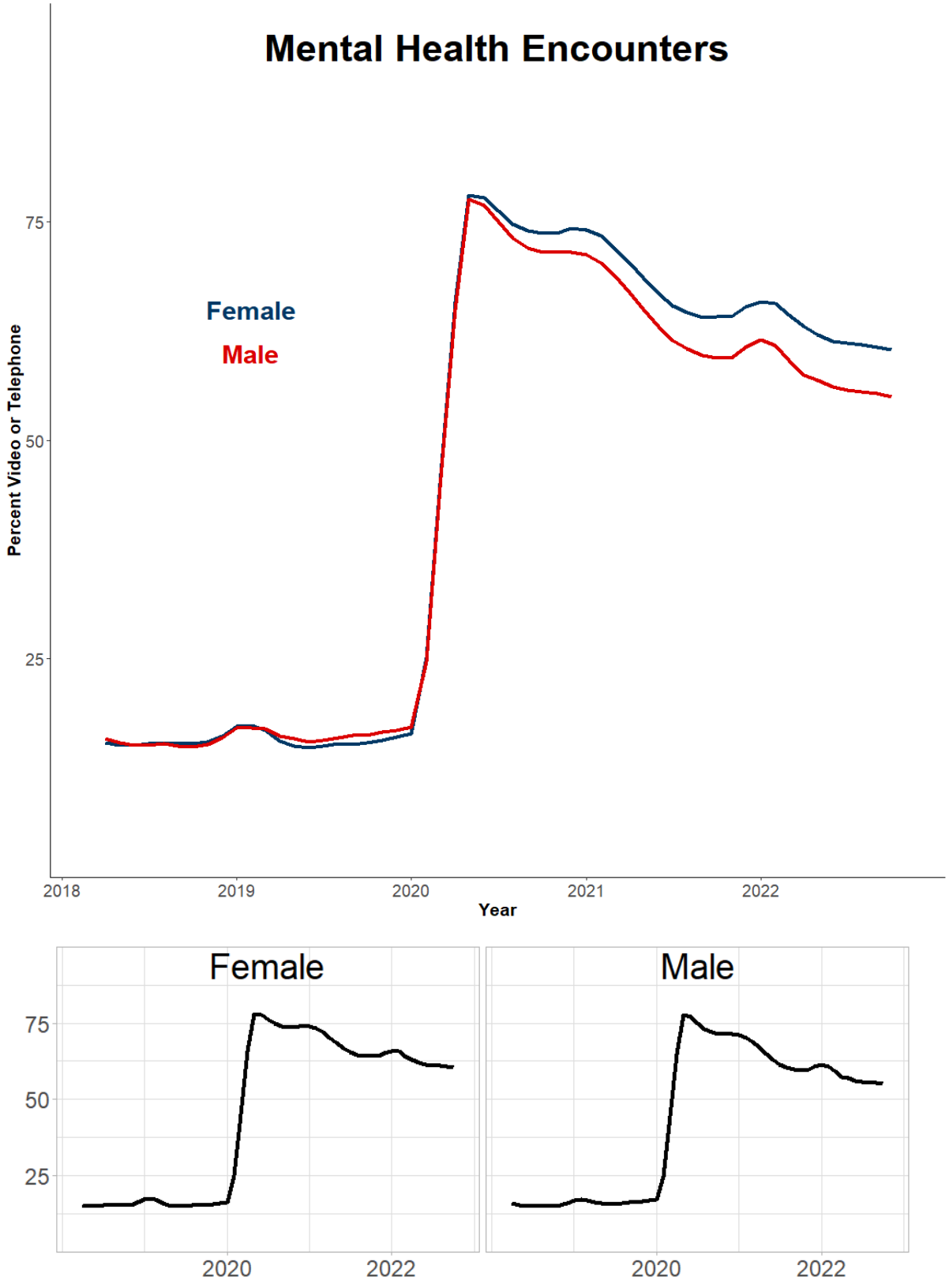
Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study

Figure 9. Telehealth use over time as a percent of all outpatient encounters by sex



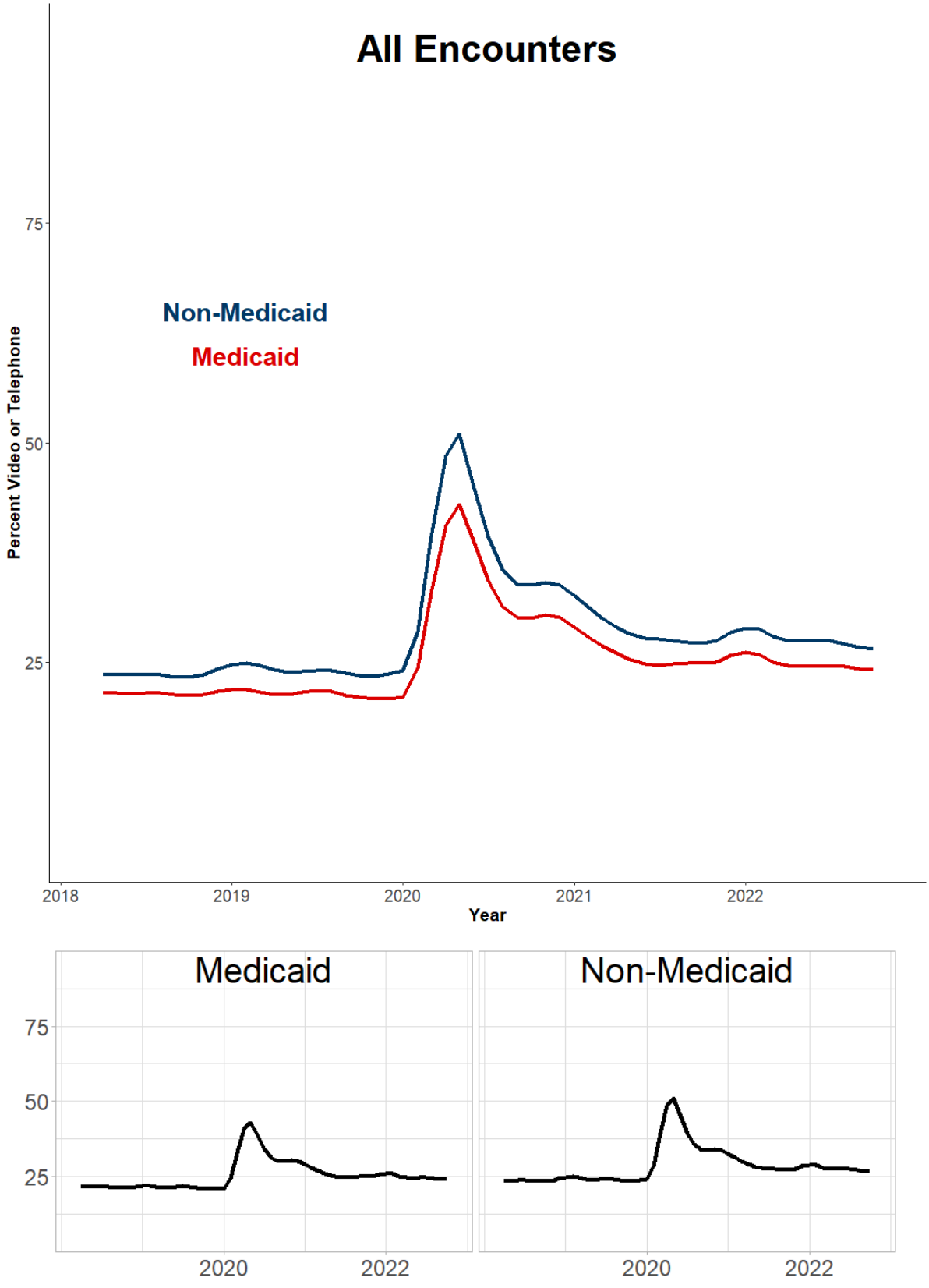
Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study

Figure 10. Telehealth use for mental health as a percent of all outpatient mental health encounters by sex



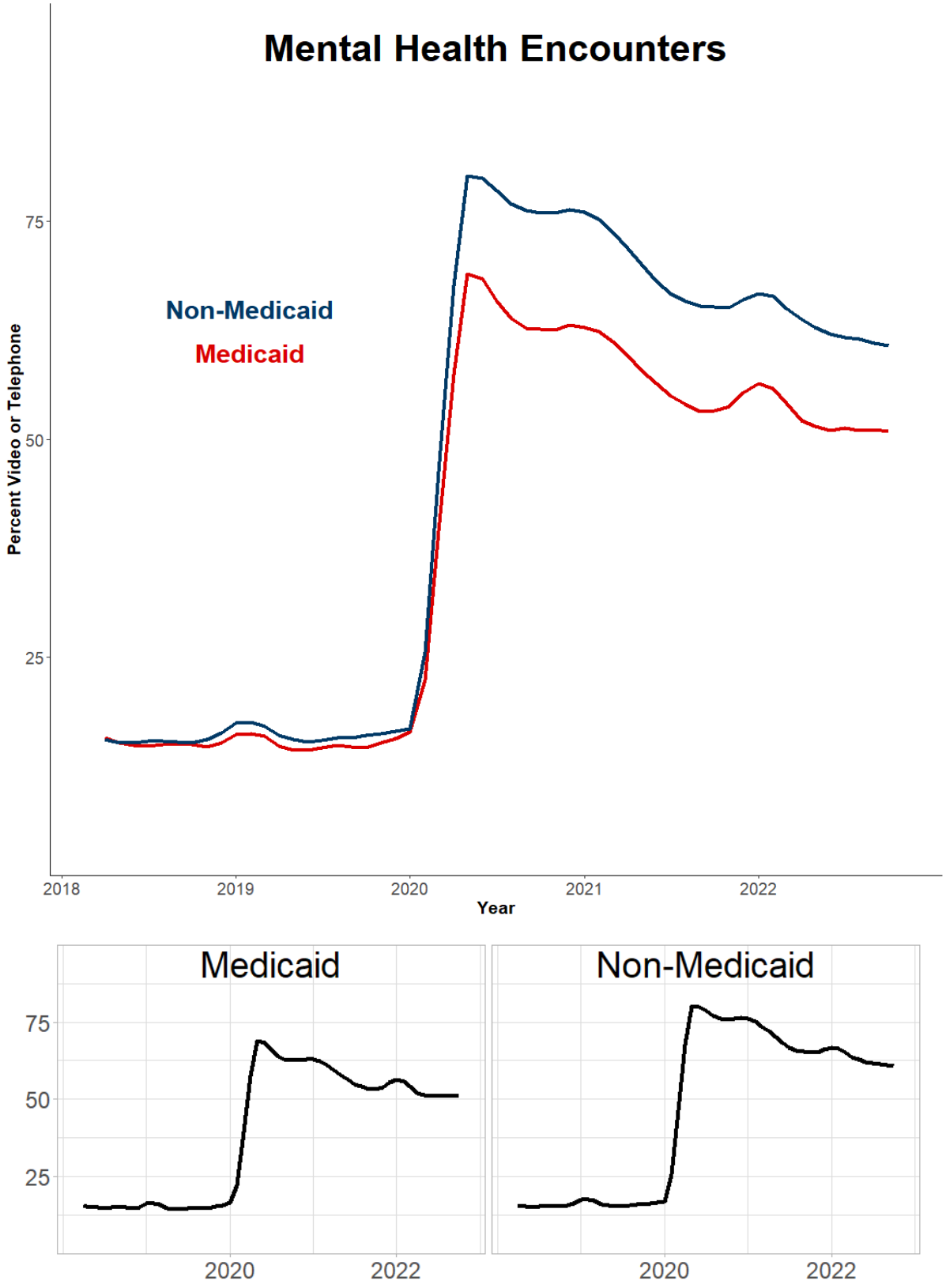
Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study

Figure 11. Telehealth use over time as a percent of all outpatient encounters by Medicaid status



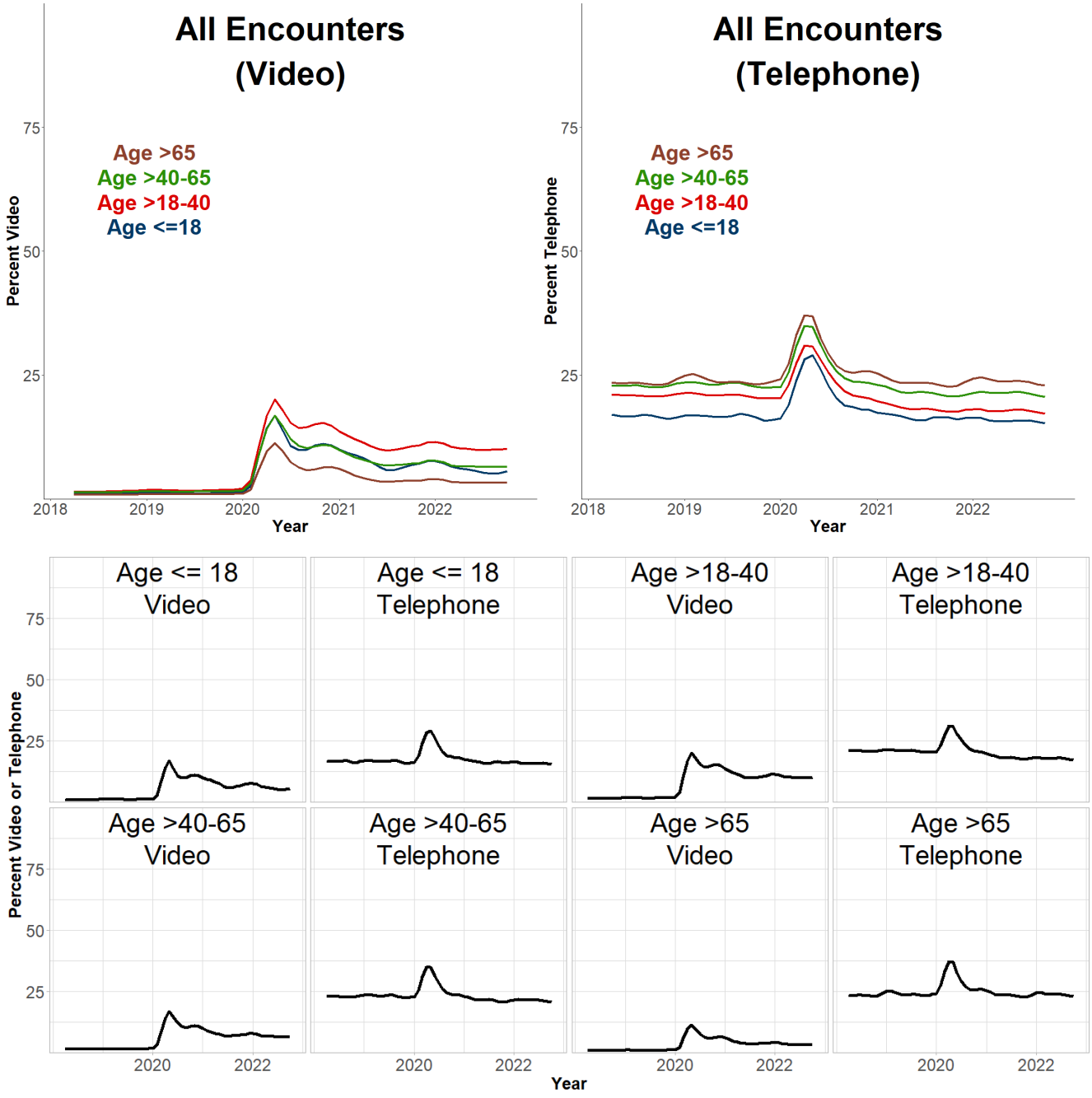
Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study

Figure 12. Telehealth use for mental health as a percent of all outpatient mental health encounters by Medicaid status



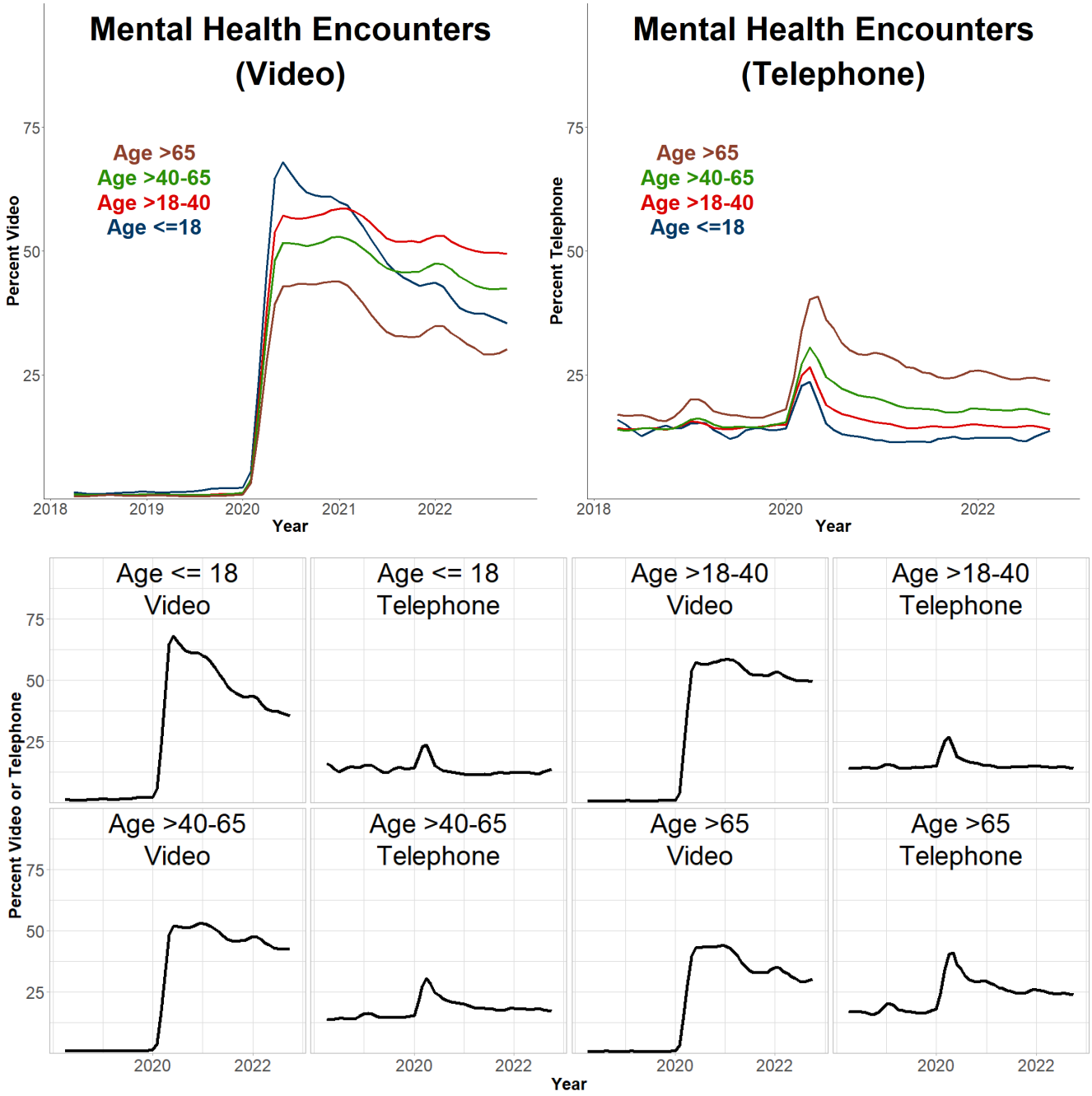
Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study

Figure 13. Video and telephone use over time as a percent of all outpatient encounters by age



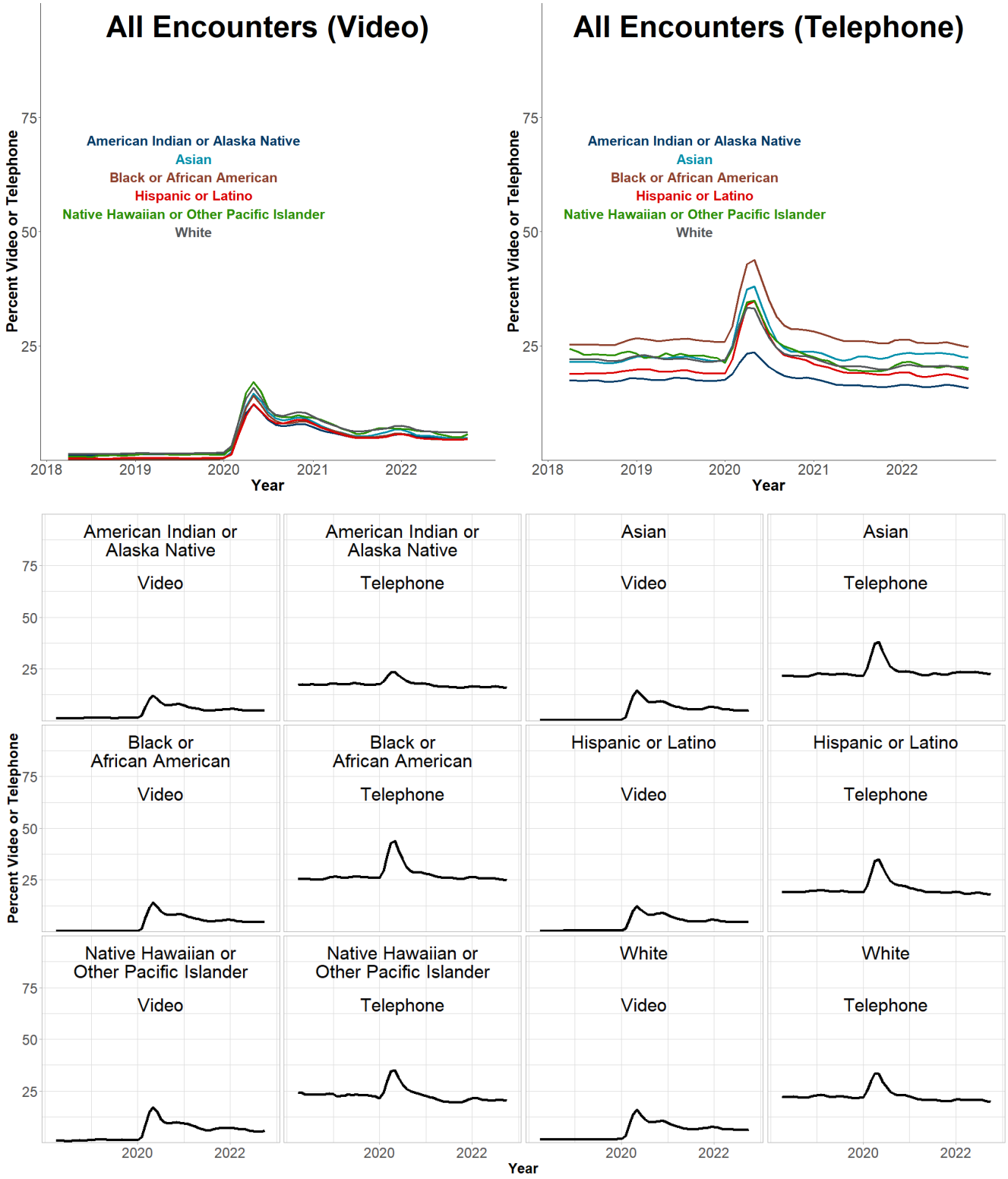
Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study

Figure 14. Video and telephone encounters for mental health as a percent of all outpatient mental health encounters by age



Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study

Figure 15. Video and telephone use over time as a percent of all outpatient encounters by race/ethnicity

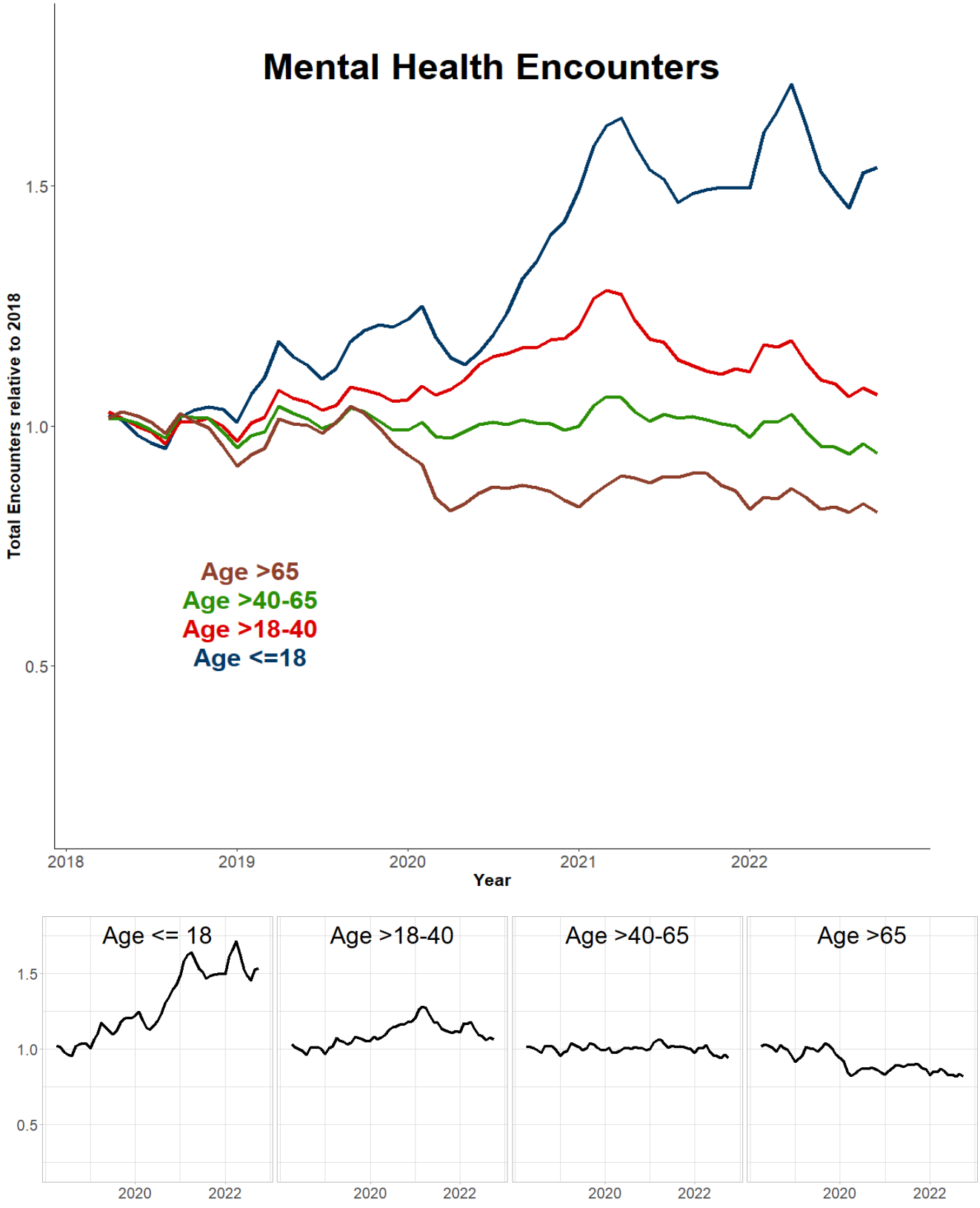


Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study

Figure 16. All outpatient encounters over time as a percent of all outpatient encounters in 2018 by age

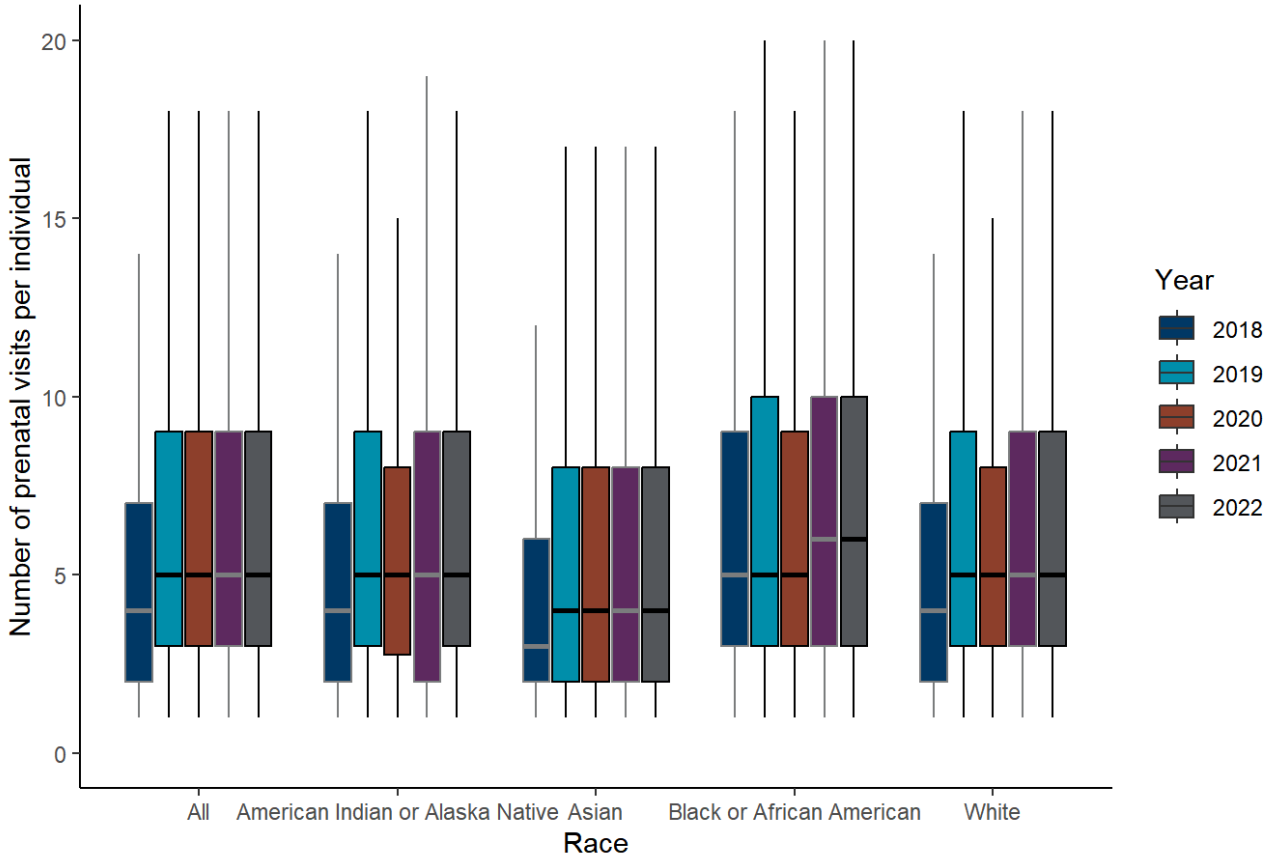
Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study

Figure 17. Mental health encounters over time as a percent of mental health encounters in 2018 by age



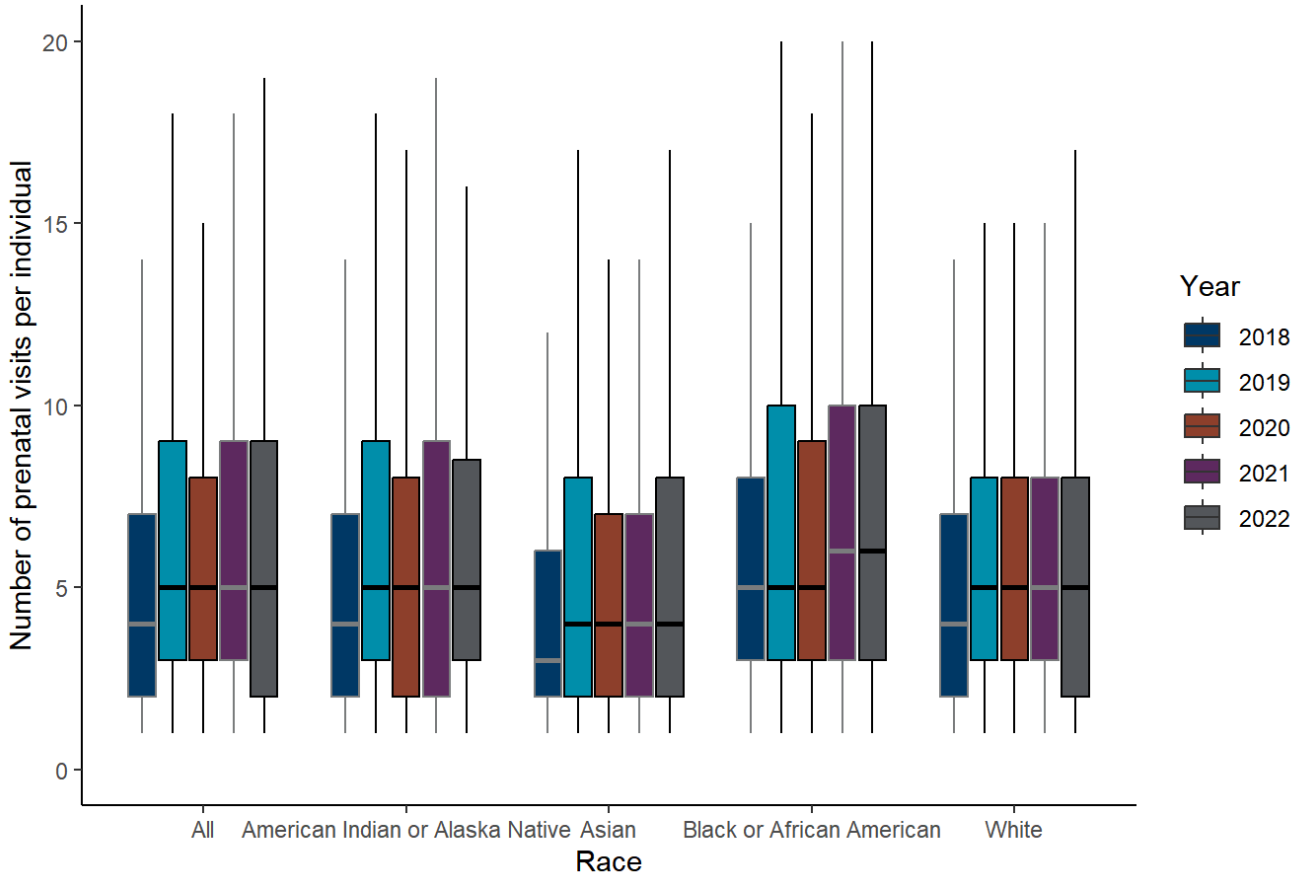
Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study

Figure 18. Prenatal encounters per delivery by race and year (in-person plus telehealth)



Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study

Figure 19. In-person prenatal encounters per delivery by race and year (in-person only)



Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study

How has the expansion of telehealth impacted quality of care, and to what extent does this differ by modality?

Table 2. Evaluation of the association of high versus low telehealth use by provider on processes of care and outcomes for patients with depression

Diagnosis/Measure	High-Pre	%/rate	High-Post	%/rate	Low-Pre	%/rate	Low-Post	%/rate	Diff in Diff (95% CI)
Depression (N)	197,489	NA	225,817	NA	61,879	NA	84,315	NA	NA
PHQ-9 Assessment	149,479	76%	152,096	67%	37,009	60%	50,331	60%	-4.3% (-7%, -1.6%)
PHQ-9 Levels	5.2	NA	5.4	NA	6.3	NA	6.3	NA	-0.03 (-0.4, 0.3)
ED/hospitalization (Mental Health)	16,266	8%	17,588	8%	5,195	8%	6,765	8%	0% (-1.5%, 1.4%)

Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study.

Notes: Confidence intervals (CI) for difference-in-difference results that include 0 indicate no difference in the change in outcomes with high telehealth vs low telehealth use with telehealth use including both video and telephone encounters. Pre-period outcomes = 2019; Post-expansion outcomes = 2022; ED = emergency department; High telehealth use defined by provider telehealth use above median in 2021.

Table 2 shows the distribution of patients across high and low telehealth use providers (defined by telehealth use in 2021) and in the pre-pandemic (2019) and post-expansion (2022) periods. Across these groups, a PHQ-9 assessment was completed in 60-76% of patients with an average PHQ-9 level ranging from 5.2 to 6.3. The decrease in the rate of PHQ-9 assessment from 2019 to 2022 was greater for patients seen by high telehealth use providers compared to patients seen by low telehealth use providers (-4.3% (95% confidence interval (CI): -7.0% to -1.6%)). PHQ-9 levels were lower in patients seen by low telehealth use providers than patients seen by low telehealth use providers but the difference was not significant (-0.03 (95% CI -0.4 to 0.3)). Additionally, there was no difference in the percent of patients with an ED encounter/hospitalization for mental health between patients seen by low or high telehealth use providers.

Table 3. Evaluation of the association of high versus low telehealth use by provider on processes of care and outcomes for patients with diabetes

Diagnosis/Measure	High-Pre	%/rate	High-Post	%/rate	Low-Pre	%/rate	Low-Post	%/rate	Diff in Diff (95% CI)
Diabetes (N)	110,687	NA	128,607	NA	32,500	NA	42,274	NA	NA
A1C (Measured)	99,274	90%	106,004	82%	26,996	83%	31,885	75%	0.4% (-2.2%, 3%)
A1C (Level)	7.2	NA	7.1	NA	7.1	NA	7.1	NA	-0.003 (-0.1, 0.09)
UACR (Measured)	58,933	53%	64,330	50%	15,028	46%	17,678	42%	-2.1% (-5.8%, 1.6%)
UACR (Level)	106	NA	116	NA	117	NA	127	NA	NA
BP Controlled	83,004	77%	84,923	73%	23,091	75%	27,172	72%	-0.9% (-3.3%, 1.6%)
SBP (Measured)	108,345	98%	116,611	91%	30,659	94%	37,657	89%	-0.6% (-3.7%, 2.5%)
SBP (Level)	130	NA	131	NA	130	NA	131	NA	0.2 (-0.8, 1)
ED/hospitalization (Diabetes)	18,791	17%	19,105	15%	5,377	17%	7,278	17%	-0.9% (-3%, 1.1%)

Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study.

Notes: Confidence intervals (CI) for difference-in-difference results all include 0 indicating no difference in outcome with high telehealth vs low telehealth use with telehealth use including both video and telephone encounters. Pre = 2019; Post = 2022; SBP = systolic blood pressure; ED = emergency department; UACR = urine albumin to creatinine ratio; High telehealth use defined by provider telehealth use above median in 2021.

Among patients with type 2 diabetes across the high and low telehealth groups in 2019 and 2022, an A1c was measured in 75-90%, a urine albumin to creatinine ratio was measured in 42-53%, and systolic blood pressure was measured in 89-98% (Table 3). There was no difference in any process or outcome measure between patients seen by low or high telehealth use providers.

Table 4. Evaluation of the association of high versus low telehealth use by provider on processes of care and outcomes for patients with asthma

Diagnosis/Measure	High-Pre	%/rate	High-Post	%/rate	Low-Pre	%/rate	Low-Post	%/rate	Diff in Diff (95% CI)
Asthma (N)	105,724	NA	107,975	NA	38,969	NA	47,311	NA	NA
Asthma Survey Completed	43,167	41%	34,973	32%	17,016	44%	19,195	41%	-2.2% (-8.3%, 3.9%)
Asthma Controlled	33,400	77%	26,461	76%	13,395	79%	14,826	77%	0.5% (-2.5%, 3.6%)
ED/hospitalization (Asthma/COPD)	10,236	10%	8,417	8%	3,395	9%	3,408	7%	-0.2% (-1.5%, 1.1%)

Source: 2016 - 2023 MN EHR Consortium Data for the Minnesota Telehealth Study.
Notes: Confidence intervals (CI) for difference-in-difference results all include 0 indicating no difference in outcome with high telehealth vs low telehealth use with telehealth use including both video and telephone encounters. Pre = 2019; Post = 2022; ED = emergency department; COPD = chronic obstructive pulmonary disease; High telehealth use defined by provider telehealth use above median in 2021.

Among patients with asthma, 32-44% had an asthma control survey and of those surveyed, the asthma control rate was 76-79% (Table 4). There was no difference in the proportion of patients with asthma surveyed, the asthma control rate, or the percent of patients with asthma with an ED encounter/hospitalization for asthma or COPD between patients seen by low or high telehealth use providers.

Results of the difference-in-difference analyses were similar when telehealth use was defined using only telephone encounters and when high and low telehealth use was defined by high and low tertiles.

Highlights and important summary data points

How has outpatient use of telehealth changed, and have these changes differed for specific groups of Minnesotans?

- Telehealth use peaked early in the public health emergency and reduced after that, but continues to be used more than the pre-pandemic levels. Though there continues to be an increase in the quantity of care that is delivered via telehealth for non-mental health-related encounters, patterns in which subgroups of patients utilize telehealth remain similar to pre-pandemic patterns.
    - Black or African American Minnesotans had the highest rate of telehealth use, and American Indian/Alaska Native Minnesotans had the lowest rate of telehealth use.
    - Children ages 18 years and younger had the lowest rate of telehealth use.
    - Consistent with other studies, people living in urban and exurban neighborhoods had higher rates of telehealth use than those living in small towns and rural neighborhoods.[16]
    - There was little observed difference in utilization patterns among SVI (social vulnerability index) groups and between those people with and without Medicaid coverage.
- Trends in the use of telehealth for mental health changed dramatically in the post-expansion period. There was a substantial increase in telehealth use for mental health that continues in the post-expansion period, and patterns of which subgroups are utilizing this service differ in the post-expansion period when compared to pre-pandemic.
    - All age groups had a substantial increase in their utilization of mental health services via telehealth; however, patterns in use changed from pre-pandemic to the post-expansion period. In the pre-pandemic period, adults aged 65 and older utilized telehealth for mental healthcare the most, and in the post-expansion period, working-age adults (ages 18-65) were the highest utilizers of telehealth for mental health.
    - In the pre-pandemic period, there was low variability in use of telehealth for mental health among people representing different racial/ethnic backgrounds. This changed in the post-expansion period, with higher utilization of telehealth among Asian, Black or African American, White, and Hispanic or Latino Minnesotans. Patients identifying as

American Indian or Alaskan Native utilized telehealth for mental healthcare less than other racial or ethnic groups.

- When examining trends in telehealth utilization for mental healthcare according to social vulnerability groupings, those patients living in less vulnerable areas tended to use telehealth more than those patients living in more vulnerable areas, although differences were not large. Notably, increases in use were sustained across all SVI groupings.
- There was an observed difference in utilization based on health plan in that non-Medicaid enrollees were more likely to leverage telehealth for mental healthcare post-expansion than their Medicaid counterparts. Again, there was increased utilization for both groups.

What is the prevalence of audio-only (telephone) and audio-visual (video) telehealth, and how were these two modalities used by different subgroups?

- Telehealth, for the purpose of this analysis, consisted of both telephone and video encounters. It was clear that, unlike video, telephone encounters were used frequently by providers to communicate with patients prior to the telehealth expansion. It is difficult to ascertain from EHR data which of these telephone encounters were billable and scheduled encounters versus impromptu phone calls where brief clinical guidance or consultation was provided to patients. We observed less increase in telephone utilization in the post-expansion period compared with utilization of video encounters overall.
    - We observed that people aged 65 and older utilized telephone encounters more than other age groups. This is contrasted against their relatively low utilization of video encounters compared with other age groups. This comparison becomes more pronounced when looking at only mental health encounters for those aged 65 years and older in that they seem to be more reliant on telephone as a means to accessing mental healthcare via telehealth. Further evaluation is needed to determine whether this finding is related to greater comorbidities or healthcare need among the elderly.
    - While there appeared to be tighter clustering of video utilization among racial and ethnic groups, the same is not true for telephone encounters. It appears that Black or

African American Minnesotans and Asian Minnesotans are more likely to utilize telephone versus video when compared to other racial groups.

- Utilization patterns for telephone did not change substantially across racial/ethnic groups and age groups when comparing pre- and post-expansion periods.

How has the expansion of telehealth impacted quality of care, and to what extent does this differ by modality?

- This analysis used a difference-in-difference methodology that allowed comparison of quality measures between patients receiving care from high telehealth versus low telehealth use providers. This analysis showed that patients who saw providers with higher utilization of telehealth in 2021 did not have differential changes in quality of care for three conditions (type 2 diabetes, depression, and asthma) compared with those who saw providers with lower utilization of telehealth in 2021. The one exception was that, among those with depression, the decrease in the rate of PHQ-9 assessment from 2019 to 2022 was greater for patients seen by high telehealth use providers compared to patients seen by low telehealth use providers.

Limitations to the data and evaluation plan

- **Limits of EHR data:** Electronic health records contain timely and complete data of healthcare encounters, diagnoses, and demographic information. However, it is secondary data collected for the purposes of documenting the clinical encounter, so it does not include firsthand accounts from patients or providers. Our data allow us to draw conclusions about the types of care that were delivered, but we cannot draw conclusions about why providers or patients opt for telehealth vs. in-person care, or video vs. telephone telehealth. In order for providers to include notes from an interaction with a patient in the EHR, they must generate an encounter. This study did not investigate the billing codes associated with telehealth encounters. While we can establish the presence of a clinical encounter conducted via telephone or video telehealth for the purposes of a provider contacting a patient, we cannot distinguish whether that encounter was billed. A database like the Minnesota All Payer Claims Database (MN APCD) may provide a clearer picture of which encounters were billable under

billing rules of the timeframe of interest. Attribution of patients to primary care providers is based on encounter data and may not reflect the responsible primary care provider in all instances.

- **Limits of MNEHRC**: Only patients who receive care in one of the 8 participating large, Minnesota health systems are included in these analyses. Patients from these health systems may exhibit systematic differences from those who were not included such as demographics (age, race, neighborhood factors, and presence of health conditions), personal access to technology, and access to telehealth from their care providers. There is also a substantial portion of patients that receive in-person and virtual mental healthcare from private providers which are not included in our sample. We also assigned patients to only one health system where they received most of their care; we did not capture ED encounters and hospitalizations that occurred at a health system outside of the one to which patients were assigned.
- **Limits of analysis plan**: In our analysis of quality of care during the expansion of telehealth, we chose to assign patients to providers only if those patients had an encounter in the periods before and after expansion. It is possible that this requirement excluded those who do not have regular access to care (e.g., people with frequent lapses in insurance, people with unstable housing) and those who are generally healthy and do not regularly access healthcare services. Similarly, our analysis of prenatal care focuses specifically on the first identified pregnancy and not subsequent pregnancies. People who have multiple pregnancies in a short amount of time may be more likely to experience complications, so our data may not reflect the most complex pregnancies. In addition, patients were attributed to the provider they see the most and not necessarily to the specialist who they see for a particular condition (e.g., mental healthcare provider for depression, endocrinologist for diabetes) so more exploration is needed to understand the full impact of telehealth on quality of care.

Key takeaways that may inform telehealth policy in Minnesota

- Use of telehealth for mental health encounters increased substantially from the pre-pandemic period. Though our data are insufficient to determine if that is due to increased access,

increased need, or patient preference, it is clear that there continues to be high utilization of telehealth for mental health encounters.

- The change in quality of care from 2019 to 2022 from providers with higher telehealth use was similar to providers with lower telehealth use for patients with depression, diabetes, and asthma. If the State of Minnesota continues to support telehealth utilization in patterns similar to that of regulations put in place during the public health emergency, these results do not indicate that quality of care will be negatively impacted.
- The data presented here include a mix of billable encounters and communications between providers and patients that are not or cannot be billed. Telephone encounters made up an average of 20% of all encounters in both the pre-pandemic and post-expansion periods, indicating the important role telephone encounters play in the patient/provider relationship. Though we cannot estimate the percent of these calls that are unbilled, the sheer quantity of them indicates a high amount of uncompensated care that occurs over the phone, which is consistent with other research into the challenges of providing and financing high quality care.[17-19]
- Many of the same groups of Minnesotans who were utilizing telehealth prior to the pandemic are still utilizing it at higher rates now. Further research is needed to identify preferences, facilitators, and barriers to telehealth use across diverse populations.
- Patients aged 65 years and older and those in rural communities seem to utilize video encounters less than their younger, more urban counterparts. Careful attention should be paid to the role of digital literacy and digital access as these modalities of care delivery become more prominent and ubiquitous.

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