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Access to Virtual Care in Behavioral Health:

A Social Determinant of Health

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Abstract

Objective: In the wake of COVID-19, the use of virtual modalities to provide healthcare has increased significantly. While virtual care services, particularly for behavioral health encounters, have become commonplace in many healthcare systems, there is limited data describing to what extent access to virtual care is affected by social determinants of health. The present study aims to characterize the utilization of virtual (video, phone) and non-virtual (in—person office visits) behavioral health care encounters among differing socioeconomic and demographic populations in two campuses served by a tertiary care center in Delaware to identify trends and potential barriers to these services. **Methods**: A dataset of 19500 behavioral health visits among 3420 patients in the Christiana-Care health network at sites in Newark, DE and Wilmington, DE was analyzed using Kruskal-Wallis test results for continuous variables and chi-squared tests for categorical variables. **Results**: Patients utilizing virtual (video, phone) visits tended to be younger and have a lighter burden of economic inequality than patients seen in-person. Metrics such as access to a computer, internet connection, and median income were directly correlated with increased use of virtual modalities. **Conclusion**: The findings indicate that access to and utilization of virtual care may be a social determinant of health. Future research should assess access to telehealth and its impact on health outcomes.

Introduction

The COVID-19 pandemic has had profound and lasting changes on the provision of healthcare worldwide. In the US, virtual care has seen tremendous growth,[1] where telehealth visits (0.32 visit per person) accounted for 23.6% of all interactions in 2020 compared with 0.3% of contacts in 2019.[2] Furthermore, behavioral health encounters were far more likely than medical contacts to take place virtually (46.1% vs 22.1%) in 2022.[2] In the aftermath of COVID-19, telehealth has established itself as a powerful tool to expand access to care in the current era.

Despite its utility, there are concerns that as health systems increasingly focus on technically advanced modalities such as virtual care, they may enhance disparities in access to and outcomes of care.[3,4] In the setting of this new healthcare paradigm, there is a need to further characterize

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both users and nonusers of virtual care and the barriers they face. Relationships among race, income inequality and social resources are complex and have been implicated in predicting negative health outcomes, which became particularly apparent during the pandemic. Tan et al demonstrated that income inequality within US counties was associated with more cases and deaths due to COVID-19 in the summer months of 2020.[5] Currently there is limited research regarding how social determinants of health impact access to virtual care. With proper implementation, virtual care may enable providers to improve overall health through identification and provision of care to at-risk populations and underserved geographical areas.

The present study aims to characterize users and non-users of virtual care among behavioral health patients of one of Delaware's largest health systems and to thus provide insights into trends of virtual care use among patients of differing socioeconomic and demographic backgrounds, with the goal of identifying potential barriers to access to virtual care. We conducted a retrospective cohort study to analyze users of virtual and in-person care at behavioral health outpatient clinics at the ChristianaCare health network from January 2020 to September 2021. Patient visits were analyzed temporally, and grouped based on visit type (office, phone, or video), demographics, geographical location, and diagnoses.

Methods

Institutional review board approval from Christiana Care was granted for this study. We extracted behavioral health visit subtypes and demographic information from the electronic health records data warehouse for patients seen for outpatient behavioral health visits at Wilmington and Newark campuses of ChristianaCare, a tertiary care center in Delaware, during January 2020 through September 2021. A limited data set as per institutional review board definition was used. Informed consent was waived by the Christiana Care institutional review board in accordance with the Office for Human Research Protections regulations 45 CFR 46.116(d). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines relevant to our study were followed.

All patient visits occurred in outpatient behavioral health offices in the ChristianaCare Health System between January 1, 2020, and September 30, 2021. Visit data were collected via an electronic health records data warehouse maintained by ChristianaCare. Additionally, data from the 2018 United States Census Bureau Community Survey were merged with these data to provide demographic information, with census tract of residence used as a unifying datapoint.

Data were grouped by service location between Wilmington and Newark campuses within the ChristianaCare network. The Wilmington campus serves a primarily urban population within Delaware's most populous city, while the Newark campus, in a suburban area of Delaware, serves more suburban residents. Encounters were subdivided by visit type: office, phone, or video. These subdivisions were analyzed by Kruskal-Wallis test results for continuous variables and chi-squared tests for categorical variables to determine statistically significant differences between means of various datapoints, including unemployment rate, access to broadband internet connection, percentage of individuals with a vehicle, primary payor, gender, and median household income by census tract.

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Results

19500 visits were analyzed from 3420 patients (table 1). 7846 visits occurred in Wilmington, DE among 1569 patients, and 11654 visits occurred in Newark, DE among 1851 patients. The average age of all participants was 42(±19.2) years old. 85.7% of participants were under the age of 65, and 14.3% were age 65 and above. 47.9% of participants had commercial insurance, 25.6% were insured by Medicaid, 25.8% were insured by Medicare, and 0.7% had self-pay insurance. 64.8% of patients were classified as female per the EMR, and 35.2% of patients were classified as male.

Table 1. Unique Patient Demographics

Location	**Newark** N(%)	**Wilmington** N(%)	**Total** N(%)
Count	1851	1569	3420
Average Age*	44.316 (18.235)	39.393 (20.007)	42.058 (19.222)
Number of Visits*	6.404 (5.970)	4.873 (5.514)	5.702 (5.815)
Male	634 (34.3%)	571 (36.4%)	1205 (35.2%)
Female	1217 (65.7%)	998 (63.6%)	2215 (64.8%)
Race: White	1388 (75.0%)	947 (60.4%)	2335 (68.3%)
Race: Black	346 (18.7%)	493 (31.4%)	839 (24.5%)
Race: Other	86 (4.6%)	79 (5.0%)	165 (4.8%)
Age below 65	1547 (83.6%)	1384 (88.2%)	2931 (85.7%)
Age 65 and Above	304 (16.4%)	185 (11.8%)	489 (14.3%)
Commercial Insurance	983 (53.1%)	654 (41.7%)	1637 (47.9%)
Medicaid	347 (18.7%)	530 (33.8%)	877 (25.6%)
Medicare	512 (27.7%)	369 (23.5%)	881 (25.8%)
Self-Pay	9 (0.5%)	16 (1.0%)	25 (0.7%)

*Mean (standard deviation)

The Wilmington and Newark campuses had comparable proportions of office visits during the study period, however in Newark phone and video visit percentages were similar (33.7%, 39.3%) as compared with less than half as many phone visits compared to video visits (19.3%, 51.8%) in Wilmington (table 2). The most common visit type among all male participants was video (44.0%), followed by office (31.6%) and phone (24.4%), whereas among females the most common visit type was video (44.5%) followed by phone (29.7%) and office (25.7%). A greater proportion of video and phone visit users tended to have computers, internet connection, higher income, and own a vehicle compared with office users. GINI coefficient, which is an international measure of wealth and income inequality, was lower in video and phone users than in office visit users.

Table 2. Patient Visits With Census Tract Characteristics

Visit Type	**Office**	**Phone**	**Video**	**Total** **
Count	5412	5441	8647	19500
Newark N(%)	3151 (27.0%)*	3923 (33.7%)*	4580 (39.3%)*	11654 (59.8%)
Wilmington N(%)	2261 (28.8%)*	1518 (19.3%)*	4067 (51.8%)*	7846 (40.2%)

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Female N(%)	3273 (25.7%)*	3794 (29.7%)*	5670 (44.5%)*	12737 (65.3%)
Male N(%)	2139 (31.6%)*	1647 (24.4%)*	2977 (44.0%)*	6763 (34.7%)
Age below 65 N(%)	4442 (26.6%)*	4337 (26.0%)*	7892 (47.3%)*	16671 (85.5%)
Age 65 and Above N(%)	970 (34.3%)*	1104 (39.0%)*	755 (26.7%)*	2829 (14.5%)
Commercial Insurance N(%)	2147 (23.5%)*	2045 (22.4%)*	4928 (54.0%)*	9120 (46.8%)
Medicaid N(%)	1376 (29.1%)*	1278 (27.0%)*	2080 (43.9%)*	4734 (24.3%)
Medicare N(%)	1853 (33.3%)*	2104 (37.8%)*	1607 (28.9%)*	5564 (28.5%)
Self-pay N(%)	36 (43.9%)*	14 (17.1%)*	32 (39.0%)*	82 (0.4%)
Percent with Computer mean (sd)	89.866 (7.875)**	90.287 (7.494)**	91.352 (6.232)**	90.643 (7.107)
Percent with Internet Connection mean (sd)	82.367 (11.785)**	83.163 (10.959)**	84.459 (9.408)**	83.518 (10.585)
Percent Unemployment mean (sd)	6.686 (3.764) **	6.568 (3.473)**	6.140 (3.103)**	6.411 (3.409)
Percent with No Vehicle mean (sd)	7.757 (9.947) **	6.986 (8.825)**	6.068 (7.364)**	6.792 (8.585)
Average Median Income (thousands) mean (sd)	69.693 (25.907)**	69.865 (24.595)**	74.334 (25.202)**	71.801 (25.332)
GINI mean (sd)	0.421 (0.062)**	0.416 (0.060)**	0.411 (0.056)**	0.415 (0.059)

* Row statistics ** column statistics

Visits were divided into Wilmington and Newark campuses and sub-divided into office, phone, and video types (table 3). On average, outpatient behavioral health clients served by the Wilmington outpatient clinic had less computer ownership, less access to an internet connection, greater unemployment, fewer vehicles, lower income, and a higher GINI coefficient compared to patients served by the Newark campus. In Wilmington, video visit users on average had less unemployment, more vehicles, greater income, and a lower GINI coefficient than office visit users. These differences are less apparent in Newark residents, who have a similar GINI coefficient across all visit modalities and less variance among other census points.

Table 3. Patient Visits with Census Tract Characteristics Split by Location

	Wilmington Mean (sd)				**Newark** Mean (sd)			
Visit type	**Office (N=2261)**	**Phone (N=1518)**	**Video (N=4067)**	**Total**	**Office (N=3151)**	**Phone (N=3923)**	**Video (N=4580)**	**Total**
Count	2261	1518	4067	7846	3151	3923	4580	11654

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Percent with Computer	86.580* (9.398)	86.278 (9.611)	90.127 (6.776)	88.4 (8.4)	92.220 (5.469)	91.831 (5.802)	92.438 (5.484)	92.2 (5.6)
Percent with Internet Connection	77.148 (14.038)	76.685 (14.071)	82.196 (10.254)	79.7 (12.5)	86.107 (7.982)	85.657 (8.231)	86.463 (8.077)	86.1 (8.1)
Percent Unemployment	7.537 (4.518)	7.497 (4.562)	6.301 (3.413)	6.9 (4.0)	6.075 (2.968)	6.211 (2.871)	5.998 (2.792)	6.1 (2.9)
Percent with No Vehicle	12.098 (12.700)	12.222 (12.462)	7.618 (8.873)	9.8 (11.1)	4.647 (5.579)	4.970 (5.787)	4.695 (5.340)	4.8 (5.6)
Average Median Income (thousands)	62.861 (27.271)	62.259 (26.673)	71.256 (24.980)	67.1 (26.3)	74.588 (23.706)	72.793 (23.091)	77.059 (25.086)	75.0 (24.1)
GINI	0.444 (0.068)	0.444 (0.069)	0.419 (0.059)	0.431 (0.065)	0.404 (0.052)	0.405 (0.052)	0.405 (0.053)	0.405 (0.053)

* All P values <0.001 except for Newark GINI and Newark percent with no vehicle

A temporal trend (figure 1) of visits by type reveals a sharp increase in phone visits in early 2020, followed by a gradual replacement by video visits and a return of office visits during and in the latter half of 2021. When split by location, Wilmington clinical sites (figure 2) maintained a majority of video visits through 2021, whereas Newark sites returned to predominantly office visits by September 2021 (figure 3). Visit types subdivided among individuals age 65 and older (figure 4) shows a preference for phone visits in early 2020 and in-person visits in late 2021. The census tract characteristics of this sub-group were also summarized (table 4).

Figure 1. Visits Over Time, by Type

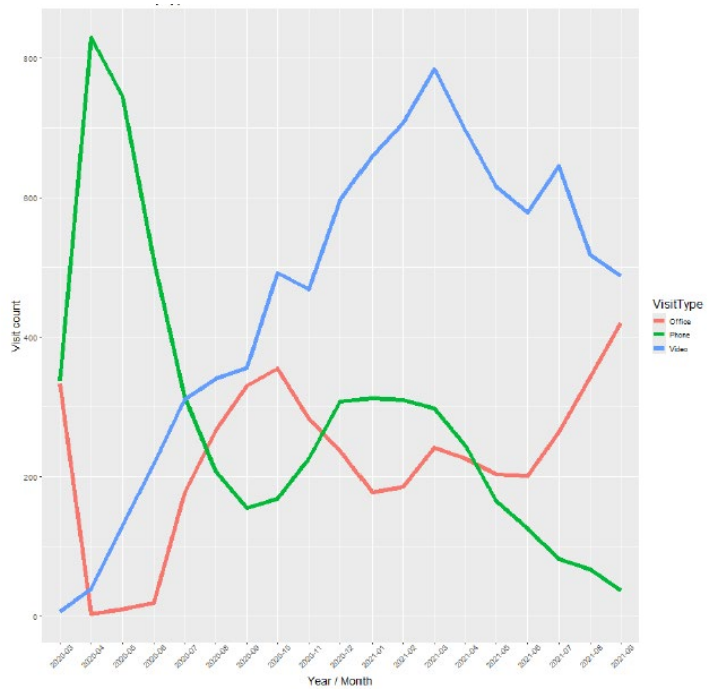

Figure 2. Wilmington, Visits Over Time by Type

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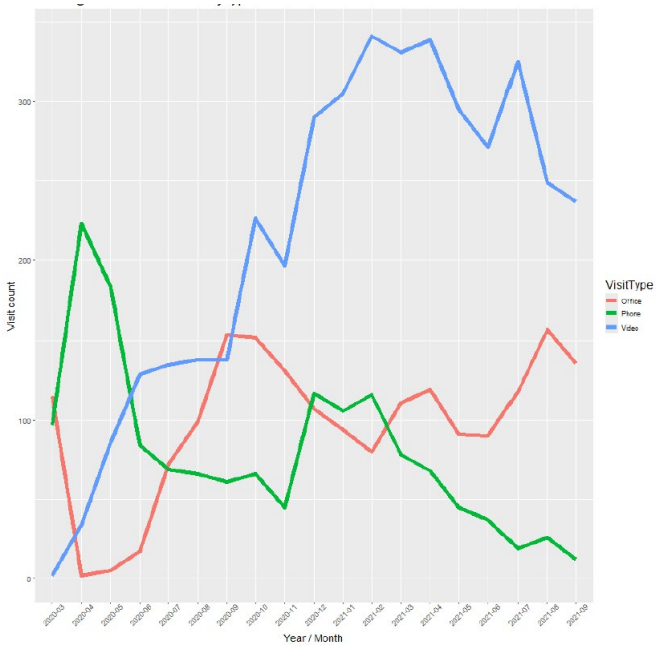

Figure 3. Newark, Visits Over Time by Type

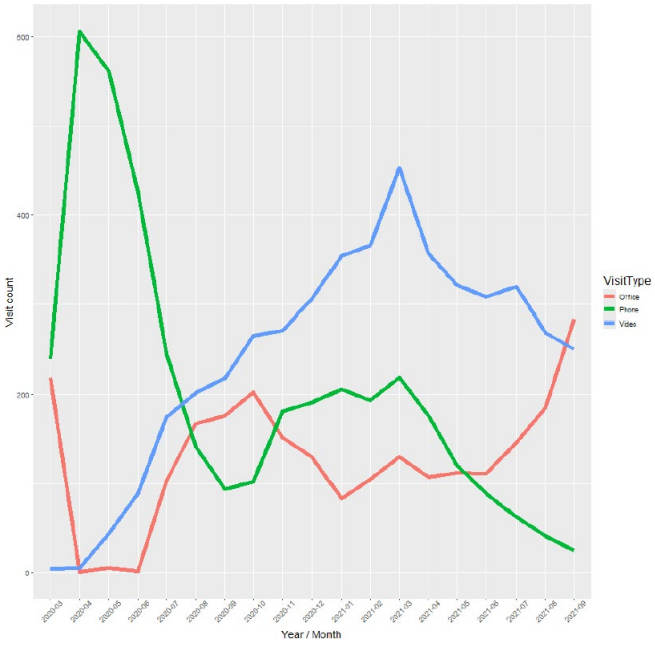

Figure 4. Age 65+ Visits Over Time by Type

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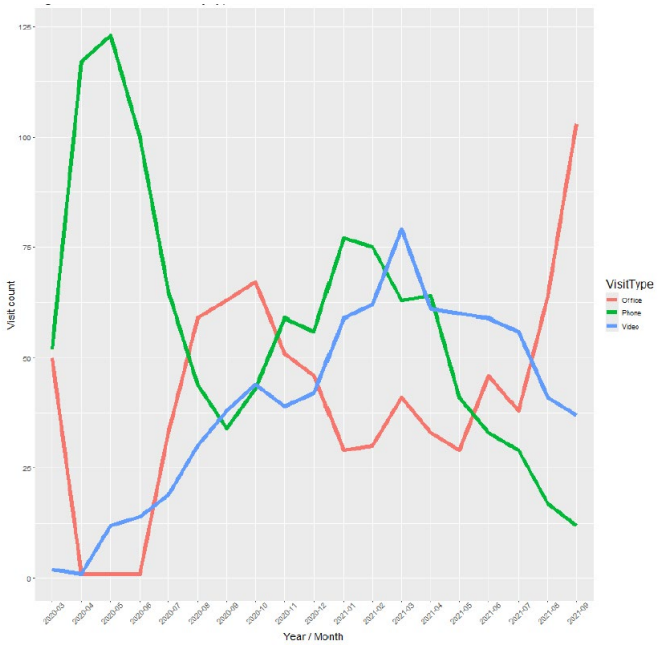

Table 4. Census Data for Patients 65 and Older

Visits	Mean (sd)
N	2829
GINI	0.418 (0.063)
Average median income (thousands)	73.0 (25.4)
Percent with computer	91.0 (7.1)
Percent with internet connection	84.7 (10.2)
Percent with no vehicle	6.41 (8.0)

Discussion

As evidenced by its higher GINI coefficient, lower median income, and greater unemployment, the region of Wilmington, DE has higher measurements of inequality than Newark, DE. These differences in socioeconomic status are also correlated with distinct patterns in the usage of virtual versus in-person healthcare encounters between the two regions. In Newark, an area with a lower burden of socioeconomic challenges, differences among groups of video, phone, and office users were of lesser magnitude than in Wilmington. In Wilmington, users of in-person office visits tended to face greater barriers to health such as a lower median income, less access to a vehicle, and greater unemployment than video users. In addition, these users reported less computer availability and less broadband internet access. Differences among video, phone, and office users via measures of income inequality were significant for the overall cohort and this was primarily driven by Wilmington as opposed to Newark.

In terms of overall usage, however, Wilmington patients used video visits to a far greater extent than Newark residents. It appears that in Wilmington, an area with greater economic diversity, more affluent residents tended towards video visits while others opted for phone or office visits. This trend was less pronounced in Newark, a location with less variance in measurements of inequality such as the GINI coefficient. Rates of video visits were higher among patients with commercial insurance and lower in those with Medicaid. These trends suggest multiple barriers

to providing virtual care to differing populations depending on their socioeconomic status, with individuals of lower socioeconomic status tending to opt for in-person encounters.

On temporal analysis the rates of video use by Wilmington patients remained the most popular visit type through September 2021, while in Newark office visit rates increased and eventually overtook other visit modalities in 2021. Among patients aged 65 and older, in-person visits became the most popular option in 2021 once quarantine measures from COVID-19 subsided. This supports the finding that video visit usage rates were proportionally lowest among patients with Medicare. The Newark sample also had a higher proportion of patients 65 and older, suggesting that the trend in Newark towards in-person visits may have been attributable to this population. Census data for the 65 and older cohort did not demonstrate relative socioeconomic inequality or access to virtual care compared with the overall cohort, suggesting that this trend toward in-person visits was likely due to a generational and cultural preference for in-person care among older individuals. This preference may represent a barrier to virtual care in older patients for whom virtual visits may be optimal, for example due to limited mobility or heightened risk of infection due to other health conditions. Approximately two-thirds of the study cohort were female, and approximately one third were male. This result is reflective of established literature demonstrating gender differences in utilization of healthcare services in the United States.[6]

Public Health Implications

In conclusion, these findings uncovered significant variations in usage of virtual and non-virtual visits among individuals with respect to age, gender, location, and economic conditions. Patients from groups that experience greater income inequality, higher unemployment, and greater housing insecurity are disproportionately infrequent users of virtual care modalities. Thus, these metrics can be interpreted as potential barriers to equitable access and utilization of virtual care in vulnerable populations. Future studies should examine this trend's impact on health outcomes to determine whether access to virtual care is itself a social determinant of health.

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