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RESEARCH ARTICLE

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The impact of telehealth cost-sharing on healthcare utilization: Evidence from high-deductible health plans

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Abstract

Objective: Evaluate whether cost-sharing decreases led high-deductible health plans (HDHP) enrollees to increase their use of healthcare.

Data Sources, Study Setting: National sample of chronically-ill patients age 18–64 from 2018 to 2020 ($n = 1,318,178$).

Study Design: Difference-in-differences analyses using entropy-balancing weights were used to evaluate the effect of a policy shift to \$0 cost-sharing for telehealth on utilization for HDHP compared with non-HDHP enrollees. Due to this shock, HDHP enrollees experienced substantial declines in cost-sharing for telehealth, while non-HDHP enrollees experienced small declines. Event study models were also used to evaluate changes over time.

Data Collection/Extraction Methods: Outcomes included use of any outpatient care; use of \$0 telehealth; use of \$0 telehealth as a proportion of all outpatient care; and use of any telehealth. To test whether any differences were due to preferences for care modality versus cost-sharing, we further evaluated use of non-\$0 telehealth as a placebo test.

Principal Findings: There was no difference in change in overall outpatient visits ($p = 0.84$), with chronicall-ill HDHP enrollees using less care both before and after the policy shift. However, compared with non-HDHP enrollees, HDHP enrollees increased their use of \$0 telehealth by 0.08 visits over a 9-month period, a 27% increase (95% CI 0.07–0.09, $p < 0.001$) and shifted 1.2 percentage points more of their care to \$0 telehealth, a 15% increase ($ß = 0.01$, 95% CI 0.01, 0.01, $p < 0.001$). However, HDHP enrollees had lower uptake of non-\$0 telehealth than non-HDHP enrollees ($ß = -0.01$, 95%CI -0.02, 0.00, $p = 0.04$).

Conclusions: Recent-but-expiring federal legislation exempts telehealth from HDHP deductibles for care provided in 2023 and 2024. Our results indicate that extending the protections provided by this legislation could help reduce the gap in access to care for chronically-ill persons enrolled in HDHPs.

KEYWORDS
cost-sharing, high-deductible health plans, telehealth

What is known on this topic

- Evidence indicates that as patient cost-sharing increases, patients reduce their use of both high-value and low-value healthcare.
- High-deductible health plans impose high cost-sharing on patients and are an increasingly-prevalent form of health insurance.
- This may be especially problematic for persons with chronic illness, who require access to regular medical care. More than 60% of Americans have one or more chronic illness.

What this study adds

- Using quasi-experimental techniques, we study the effect on care utilization when patient cost-sharing *decreases*, for a chronically ill cohort of patients.
- We find that in response to a policy shift, enrollees with large declines in cost-sharing increased use of services more so than enrollees who had small declines in cost-sharing.
- Results have implications for recent federal legislation and indicate that making permanent the telehealth cost-sharing exemption from HDHP plans can increase receipt of outpatient care for chronically-ill enrollees.

1 | INTRODUCTION

High-deductible health plans (HDHPs) are a common insurance mechanism, enrolling approximately 45% of privately-insured persons, defined as those covered by employer-sponsored insurance or through the Affordable Care Act marketplaces.[1] Persons enrolled in HDHPs experience, by design, high cost-sharing for medical care, including physician office visits, medications, laboratory draws, and other routine medical care. A host of quasi-experimental evidence indicates that HDHP enrollment causes a reduction in healthcare utilization.[2–4] These reductions in care utilization due to high cost-sharing are typically indiscriminate; persons reduce their use of both high-value and low-value services.[5–10] Such care reductions could lead to unmet need and poor outcomes for people with high healthcare needs, such as chronically-ill persons; reducing cost-sharing for care could therefore help connect chronically-ill HDHP enrollees to necessary medical care. While a large body of work has examined the relationship between increased patient cost-sharing and use of care, fewer studies have evaluated the effect of the opposite. Here, we study the impact of a decrease in cost-sharing to ascertain its impact on care utilization.

We evaluate the effect of a policy shock that occurred in early 2020 – the shift to $0 cost-sharing for telehealth visits – and its impact on use of outpatient care. During March 2020, the majority of U.S. insurers began to offer $0 cost-sharing for telehealth services. We evaluate whether persons in HDHPs were more likely to increase their use of outpatient care, and telehealth in particular, relative to persons enrolled in non-HDHPs, as a result of this policy change. A key advantage of our approach is that it relies on a shock that could not be anticipated; the unexpected nature of the COVID-19 pandemic and the policy changes that accompanied it protect this analysis from the risk of anticipatory stockpiling of care and physician visits that might otherwise cause bias.[4,11] The policy change affected both persons enrolled in HDHP and non-HDHPs (though quite differently), as explicated in the next section. Our findings have implications for federal legislation, as the passage of the soon-expiring Consolidated Appropriations Act of 2023 allowed HDHPs to offer first-dollar coverage for telehealth without participants losing their eligibility to contribute to a health savings account (HSA).

2 | METHODS

Our cohort consisted of persons aged 18–64 with employer-sponsored insurance, studied using national MarketScan commercial claims data from 2018 to 2020. Data from 2018 were used to identify the cohort of patients with chronic conditions; data from 2019 and 2020 entered in to the statistical models. The use of a chronically-ill cohort was informed by two factors: (1) persons with chronic illness are more likely to require contact with the health system and health insurance than the general population and are therefore more likely to be aware of changes in insurance policy; and (2) the cost-sharing implications of HDHPs have greater health consequences for a chronically-ill population.[12–14] We studied persons with the most common chronic illnesses in the United States: hypertension, diabetes, major depressive disorder, asthma, coronary artery disease, heart failure, chronic obstructive pulmonary disease, or osteoporosis.[15] We study the following outcomes: (1) number of outpatient visits (in-person or telehealth); (2) number of $0 telehealth visits; (3) $0 telehealth visits as a proportion of overall outpatient visits; (4) use of non $0 telehealth; and (5) use of any telehealth. The former two outcomes allow one to ascertain whether such care utilization increased or decreased; the third indicates the extent to which patients shifted their care from in-person care to $0 telehealth. The fourth is used as a placebo test to assess whether any shift in telehealth is due to a preference of that care modality or due to reductions in cost-sharing and the fifth serves to ascertain preference for the telehealth care modality as a whole. Using 2019 IRS definitions, we considered individuals to be enrolled in a HDHP if they were enrolled in an individual plan with a deductible of $1350 or greater or enrolled in a family plan with a deductible of $2700 or greater.[16] To be included in the cohort, patients needed to be continuously enrolled in their health plan (HDHP or non-HDHP) in both 2019 and 2020. Telehealth was identified using Current Procedural Terminology (CPT)/Healthcare Common Procedure Coding System (HCPCS) codes. Claims were rolled up to the visit level by date; we analyzed data at the person-year or person-month level (depending on the statistical model). We considered a patient to have an outpatient telehealth encounter if the claim contained a telehealth outpatient CPT/HCPCS code (99,441–99,443, 98,966–98,968), or an outpatient visit code (90,785, 90,791, 90,792, 90,832–90,834, 90,836–90,840, 90,845, 90,847, 90,853, 90,863, 90,875, 99,202–99,205, 99,211–99,215, 99,242–99,244, 99,245, 99,366, 99,381–99,387, 99,391, 99,392–99,397, 99,401, 99,402–99,404, 99,406, 99,407–99,409, 99,483) with either a telehealth CPT/HCPCS telehealth modifier (GT or 95) or Place of Service (POS) telehealth code (02).[17]

Our main identification strategy uses difference-in-differences modeling, which adjusts for all time-invariant differences that may exist between the HDHP and non-HDHP groups. We combined this approach with entropy-balancing weights, making the approach doubly robust (discussed more below). The "post" period for the difference-in-differences models was April to December 2020, as $0 telehealth was largely enacted during March 2020. April to December 2019 was considered the "pre" period to match the months in the post-period and ensure that seasonal variations in outpatient utilization were not driving any detected differences. Our treatment group consisted of persons enrolled in a HDHP in both 2019 and 2020; our control group consisted of persons enrolled in a non-HDHP in both 2019 and 2020. Both groups were affected by the same policy shock of the switch to $0 cost-sharing for telehealth; however, this shock resulted in a different *reduction* in cost-sharing for each group. HDHP enrollees, who are responsible for 100% cost-sharing for most services, including disease management, until a high deductible is met, would be expected to experience a larger decline in telehealth cost-sharing due to this policy change. We tested this using difference-in-differences models evaluating average out-of-pocket costs for evaluation and management (E&M) visits HDHP and non-HDHP patients in April 2020 (the first full month after the policy change took effect) versus April 2019, using the same covariates as the main models.

A key assumption of our empirical strategy is that any shock to healthcare utilization during the time frame of interest was common between HDHP and non-HDHP enrollees. This assumption could be violated if the COVID-19 pandemic affected healthcare use differently for HDHP and non-HDHP groups. For example, if HDHP enrollees were healthier than non-HDHP enrollees they may had been better able to forgo in-person care and switch to telehealth. We addressed this issue in several ways. First, we adjusted for covariates that were anticipated to influence the trend in healthcare use differentially after the pandemic started, such as geography and vulnerability to COVID-19 illness.[18,19] To capture this, we interacted the following variables with time and included them as covariates: diabetes, obesity, cancer, heart disease, osteoporosis, mental health, and respiratory illness; geographic region; sex; and age group. All variables were assessed using baseline (2018) data. This adjustment helps control for the issue that, compared with non-HDHP enrollees, HDHP enrollees might be healthier, younger, or live in regions less affected by COVID-19 by allowing for separate counterfactual time trends by age group, disease type, and region. These covariates are unrelated to the intervention, allowing us to include them in the model while still estimating the average treatment effect on the treated (ATT).[20] Second, we incorporate entropy-balancing weights that are a function of baseline disease type, age group, sex, region and enrollment in an individual versus family insurance plan, and also interact these characteristics with time.[21] As a statistical technique, entropy balancing has been shown to outperform propensity scores estimated via generalized boosted models or logistic regression with respect to both bias and variance.[22] Entropy balancing produces weights that equalize the weighted means of potential confounders between the control and treated samples. At the same time, the approach minimizes the variation (as measured by sample entropy) of the weights among all weights that produce the desired balance.[21] Relative to propensity score weighting, entropy-balancing guarantees desired levels of balance, which cannot always be achieved with other weighting or matching approaches.[21,23] In our model, entropy balancing was used to select weights for each non-HDHP observation so that the proportion of people with key characteristics for whom the pandemic may have differential effects were identical to that of the HDHP group in the pre-period.[21] As this use of entropy balancing is an alternative way of adjusting for potentially uncommon shocks that are driven by imbalance in these characteristics, adding these weights to our main model makes it doubly robust. Finally, we also ran our main models separately for each chronic condition subtype, which ensures that all individuals included in the regression have the respective condition and that differential distributions of illness across HDHP and non-HDHP groups are not driving model results.

We first employed traditional two-period (person-year) difference-in-differences models including entropy-balancing weights. Analyses were conducted using ordinary least squares regression with standard errors clustered by patient.[24] Quantile-quantile plots showed non-normal residuals with strong right-skew. Nonetheless, because of the large sample size and large number of clusters in the data, statistical inference is robust to violations of normality.[25] We then

TABLE 1 Cohort characteristics.

	Pre-Entropy balancing				Post-Entropy balancing		
	Total N	Non-HDHP	HDHP	*p*-value	Non-HDHP	HDHP	*p*-value
Total	1,318,178	71.00	29.00		50.00	50.00	
18–34	166,796	12.05	14.12	<0.0001	14.10	14.12	0.831
35–44	215,136	15.79	17.62		17.56	17.62	
45–54	410,958	30.77	32.17		32.18	32.17	
55–64	525,288	41.38	36.09		36.17	36.09	
Male	630,386	46.57	50.88	<0.0001	50.87	50.88	0.894
Female	687,792	53.43	49.12		49.13	49.12	
Northeast	175,065	12.24	15.83	<0.0001	15.82	15.83	0.994
North Central	298,969	20.65	27.64		27.62	27.64	
South	702,622	58.03	41.74		41.79	41.74	
West	141,064	9.05	14.76		14.74	14.76	
Unknown	458	0.04	0.03		0.03	0.03	
Individual	403,520	33.40	23.79	<0.0001	23.83	23.79	0.655
Family	914,658	66.60	76.21		76.17	76.21	
Respiratory illness	216,552	16.24	16.88	<0.0001	16.88	16.88	0.982
Heart disease	139,754	10.93	9.80	<0.0001	9.80	9.80	0.954
Cancer	68,621	5.34	4.87	<0.0001	4.87	4.87	0.976
Obesity	274,513	21.75	18.56	<0.0001	18.58	18.56	0.894
Diabetes	312,396	24.48	21.79	<0.0001	21.80	21.79	0.917
Osteoporosis	55,267	4.03	4.59	<0.0001	4.59	4.59	0.978
Major depressive disorder	111,253	8.44	8.44	0.925	8.44	8.44	0.996

employed event study models, also including entropy-balancing weights. These models used monthly data (i.e., person-month), with a reference period of December 2019. Event study models were also conducted using ordinary least squares regression with clustering at the patient level and included the same covariates as the difference-in-differences models and the same entropy-balancing weights. For these models, we interacted characteristics that could modify the effect of the pandemic with month (as opposed interacting with the *post* variable in the two-period difference-in-differences models). These interaction terms adjust for any differential care seeking that occurred by disease type as the pandemic progressed throughout 2020. For example, if asthmatic patients were more likely to reduce in-person outpatient care in the first months of the pandemic, while diabetic patients were more likely to reduce in-person outpatient care in the second few months of the pandemic,[18,19] this bias would be addressed through the inclusion of disease-by-month interaction terms.

While insurers were allowed to exempt telehealth from deductibles and cost-sharing during the COVID-19 public health emergency, not all did so. In the post-period, 58.8% of telehealth visits for HDHP enrollees had $0 cost-sharing and 54.8% of telehealth visits for non-HDHP enrollees had $0 cost-sharing. We leveraged this variation to evaluate whether HDHP enrollees had differential increase in use of telehealth when that telehealth had $0 versus non$0 cost-sharing. This allowed us to ascertain whether any response was due to the change in cost-sharing or the change in visit modality (telehealth).

We also investigate sex-based disparities in responses to changes in cost-sharing. Given income and wealth differentials experienced by females versus males,[26] resulting in females having lower disposable income available for cost-sharing, we estimated sex-based heterogeneity in treatment effect by employing a triple difference. This allows us to ascertain whether within insurance plan type, males and females responded differently to this policy change.

Data cleaning was conducted using SAS, v9.4; statistical models were run using Stata, v16. All analyses, with the exception of conducting disease-specific analyses, were pre-specified. This study was approved by the RAND Institutional Review Board.

3 | RESULTS

Our cohort consisted of 1,318,178 adults with chronic illness, of whom 29.9% were enrolled in a HDHP and 70.0% were enrolled in a non-HDHP (Table 1). Prior to entropy balancing, cohort members enrolled in HDHPs were more likely to be male and be in a family insurance plan; they were less likely to have heart disease, cancer, obesity or diabetes, and were more likely to have asthma and osteoporosis ($p < 0.0001$ for all). After conducting entropy-balancing weighting, groups exhibited nearly identical baseline characteristics

FIGURE 1 Telehealth as a proportion of outpatient care (unadjusted). Height of bars represents all care, with blue bars indicating outpatient care, green bars representing $0 telehealth, and orange bars indicating non$0 telehealth.

with no significant differences (Table 1). After entropy-balancing weighting, the effective sample size was 1,181,710, with all 382,275 observations in the HDHP remaining.

Unadjusted care trajectories were similar across groups in both the pre- and the post-period, with HDHP enrollees consistently using less overall outpatient care (Figure A1). Both HDHP and non-HDHP patients experienced a decline in average utilization from 2019 to 2020, driven mainly by large drops in utilization during April and May of 2020 (Figure 1). On a per member per month (PMPM) basis, HDHP enrollees had an average of 0.57 visits PMPM in the pre-period and 0.54 visits PMPM in the post-period while non-HDHP enrollees had an average of 0.60 visits PMPM in the pre-period and 0.57 visits PMPM in the post-period. Extending these analyses to a truncated year basis (April–December), in the pre-period, HDHP enrollees had an average of 5.1 outpatient visits per truncated year and non-HDHP enrollees had an average of 5.5 total outpatient visits per truncated year. While care rebounded at the end of the year in the post-period, the rebound was not sufficient to offset the early drops in care. In the post-period, HDHP enrollees had an average of 4.9 outpatient visits per truncated year while non-HDHP enrollees had an average of 5.2 visits per truncated year. Between April 2019 and April 2020, HDHP enrollees experienced a 123% larger decline in OOP costs relative to non-HDHP enrollees (see Table A1).

There was very little telehealth use in the pre-period in either group, with an average of 0.001 visits PMPM in both HDHP and non-HDHP enrollees. This increased in the post-period, with HDHP enrollees having 0.14 telehealth visits PMPM and non-HDHP enrollees

TABLE 2 Results from difference-in-differences models using entropy-balanced weights[a].

Outcome	(1) Any visit	(2) \$0 Telehealth	(3) \$0 Telehealth share of all visits	(4) Non\$0 Telehealth	(5) Any Telehealth
HDHP	−0.22***	0.00**	0.00***	0.00***	0.00***
	(−0.24, −0.19)	(0.00, 0.00)	(0.00, 0.00)	(0.00, 0.00)	(0.00, 0.00)
Post	−0.01	0.30***	0.08***	0.32***	0.62***
	(−0.05, 0.03)	(0.28, 0.33)	(0.08, 0.08)	(0.30, 0.34)	(0.59, 0.65)
HDHP * post	−0.01	0.08***	0.01***	−0.01**	0.07***
	(−0.04, 0.01)	(0.07, 0.09)	(0.01, 0.01)	(−0.02, −0.00)	(0.05, 0.08)

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.
[a]The top row contains the beta-coefficient, the bottom row contains 95% Confidence Intervals. Positive values indicate HDHP enrollees had a greater increase in use of that service from 2019 to 2020 compared with non-HDHP enrollees. Full model results can be found in the Appendix, Table A2.

having 0.12 telehealth visits PMPM (here, telehealth represents both \$0 and non\$0 telehealth). On a truncated year basis, in the post-period this corresponded to 1.25 visits per member per truncated year for HDHP enrollees and 1.11 visits per member per truncated year for non-HDHP enrollees.

Results from difference-in-differences models indicate there was no significant difference in change in use of overall outpatient care between HDHP and non-HDHP enrollees from 2019 to 2020 ($p = 0.19$; Table 2, model 1). However, HDHP enrollees increased their use of \$0 telehealth more than non-HDHP enrollees, with an average increase of 0.08 more \$0 telehealth visits per truncated year (April–December) (95% CI 0.07–0.09 $p < 0.0001$; 27% increase). As a result, \$0 telehealth accounted for a greater share of total outpatient care utilization for HDHP enrollees compared with non-HDHP enrollees in the post-period; HDHP enrollees increased the share of all outpatient care that was telehealth by 1.2 percentage points more than non-HDHP enrollees from (95% CI 1.1–1.2%, $p < 0.0001$; 15% increase).

In further analyses evaluating whether the larger uptake of telehealth in HDHP enrollees was due to \$0 cost-sharing or the shift to the telehealth modality, results indicate that HDHP enrollees had *lower* uptake of non\$0 telehealth from 2019 to 2020 than did non-HDHP enrollees (ß $= -0.01$, 95%CI -0.02, 0.00, $p = 0.04$). Thus, HDHP enrollees had greater uptake in use of \$0 telehealth and lower uptake of non\$0 telehealth (Table 2, column 4). The proportion of telehealth visits that had cost-sharing was similar in each group, with (58.8%) of telehealth visits for HDHP enrollees having \$0 cost-sharing and (54.8%) of telehealth visits for non-HDHP enrollees having \$0 cost-sharing; this suggests that each group had roughly similar exposure to \$0 telehealth and non\$0 telehealth and therefore roughly similar opportunity to shift to \$0 telehealth.

Results from event study models indicate that compared with non-HDHP enrollees, HDHP enrollees had greater increases in their use of \$0 telehealth in all months following the policy change (using a Dec 2019 reference period), with the exception of July 2020 (Figure 3). Telehealth as a proportion of outpatient care increased more for HDHP enrollees than for non-HDHP enrollees immediately after the policy change. This waned over time, but remained statistically higher for HDHP enrollees through December 2020. There was not a meaningful shift back to in-person care at the end of the calendar year, when patients' deductibles were more likely to be met and cost-sharing for in-person care decreased. The difference in use of non-\$0 telehealth between HDHP and non-HDHP enrollees was close to zero in most months. Compared with Dec 2019, outpatient care as a whole (telehealth or in-person) care from April to December 2020 remained more depressed for HDHP enrollees than it did for non-HDHP enrollees.

3.1 | Disease-specific results

Figure 2 shows that the results we report above are mostly consistent when we subset on each disease type individually. Results from disease-specific difference-in-difference models indicate that, within each condition studied, HDHP enrollees had greater increase in use of \$0 telehealth than non-HDHP enrollees.

3.2 | Sex-based differences

Lastly, results from triple difference models evaluating sex-based differences in use of care indicate that within HDHP plans, females were significantly more likely to use any telehealth relative to males (ß $= 0.05$, CI 0.02, 0.08, $p < 0.001$), a difference driven almost entirely by their larger uptake of \$0 telehealth (ß $= 0.05$, CI 0.02, 0.07, $p < 0.001$) (Table A3).

4 | DISCUSSION

HDHPs are a form of consumer-directed healthcare, which is predicated on the assumption that patients will respond in economically rational ways to changes in cost-sharing. Existing quasi-experimental evidence indicates patients in HDHPs respond to increases in cost-sharing by reducing their utilization of care. Our study examines the opposite direction of effect – the impact of decreases in cost-sharing on utilization of HDHP enrollees. Our results show that HDHP enrollees with chronic conditions responded to a sudden decrease in (selective) cost-sharing for telehealth by increasing their use of \$0 telehealth

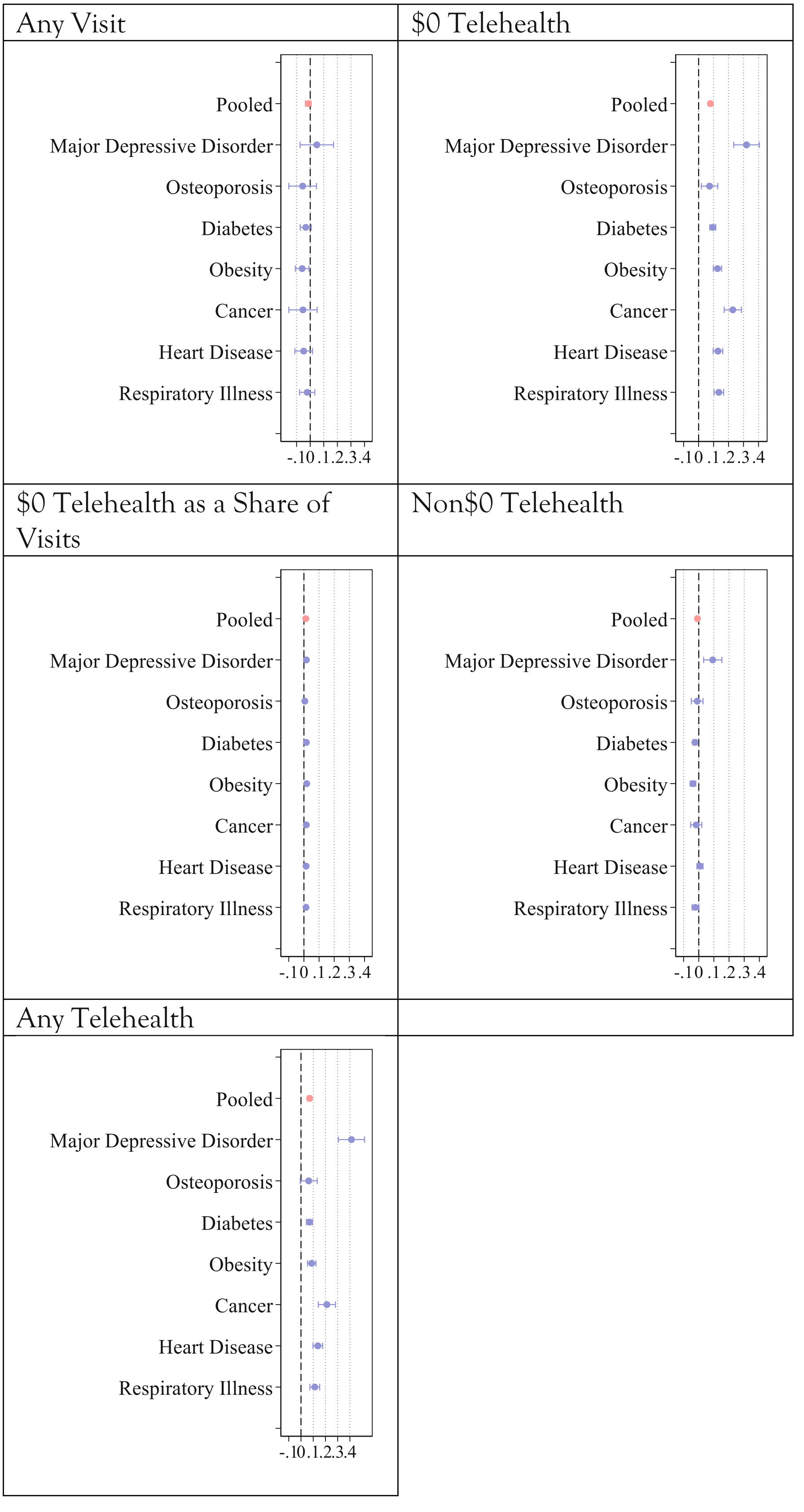

FIGURE 2 Condition-specific forest plots (adjusted). Dots represent point estimates from difference-in-differences models run using condition-specific entropy balancing weights, bars represent 95% Confidence Intervals. Positive values indicate high-deductible health plan (HDHP) patients had greater increase in the use of the outcome of interest compared with non-HDHP patients from 2019 to 2020.

services more so than enrollees in non-HDHPs. This occurred irrespective of disease type. That HDHP enrollees had lower use of non$0 telehealth compared with non-HDHP enrollees provides support for the argument that the mechanism for their relative increase in $0 telehealth utilization was due to the larger decline in cost-sharing rather than a stronger preference for the telehealth modality.

While there were no differences between HDHP and non-HDHP enrollees in the change in the amount of total outpatient care received

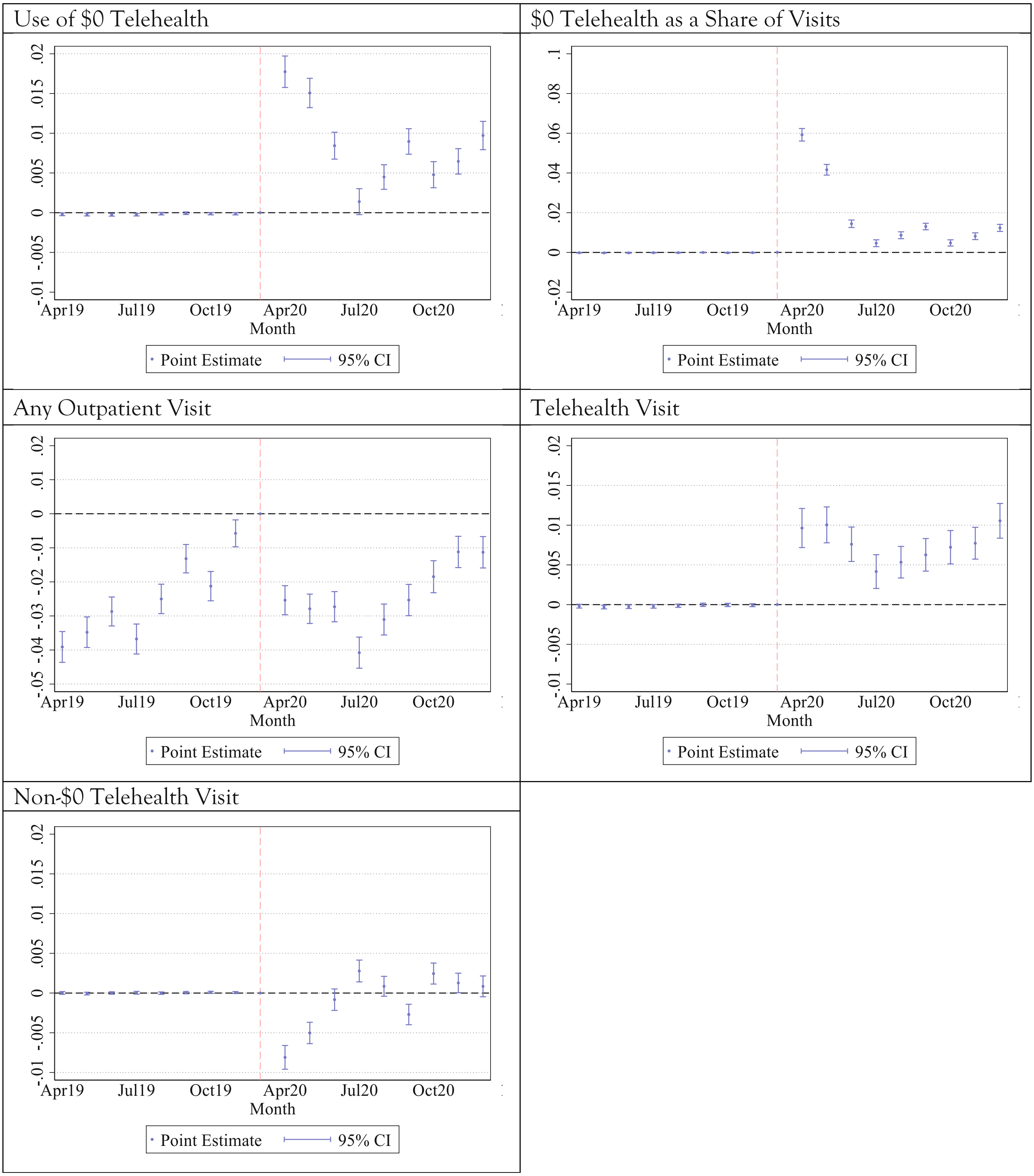

FIGURE 3 Event study figures (adjusted). Estimates incorporate entropy balancing weights. Positive values indicate a greater uptake in the use of the relevant service from December 2019 to the specific time period for persons enrolled in HDHP plans versus non-HDHP plans. *Y*-axis indicates change in number of visits relative to a December 2019 reference period.

between the pre- and post-periods, telehealth visits – especially $0 telehealth visits – came to comprise a greater share of outpatient visits for HDHP enrollees versus non-HDHP enrollees. This suggests that while HDHP enrollees were responsive to changes in cost-sharing, the shift to $0 telehealth did not serve to meet any previously unmet needs of this chronically-ill population during 2020. However, when available, this study should be replicated using 2023 and 2024 data, to evaluate the effect of the waning of the COVID-19 pandemic coupled with the exclusion of telehealth from HDHP deductibles afforded by the Consolidated Appropriations Act of 2023.

We found sex-based differences in response to this policy change; within HDHP plans, females were significantly more likely to increase their use of $0 telehealth. Females have well-documented wealth and pay disparities relative to men.[26] It therefore stands to reason that a decrease in cost-sharing may be more appealing to females, for whom these disparities result in lower disposable income available for cost-sharing. Our findings also highlight the need for further investigation into sex-based differences in cost-sharing and patient financial burden, a topic that has been understudied in the literature. This is particularly important to investigate, as females are also more likely than males to be diagnosed with chronic illness,[15] and therefore require regular access to healthcare.

While ours is the first HDHP study to evaluate the effect of a policy shock, our findings echo others in the literature, namely, that HDHP enrollees have lower overall use of care than non-HDHP enrollees, that telehealth as a proportion of outpatient care increased at the beginning of the pandemic and then waned slightly throughout 2020, and that there was a rebound in in-person outpatient care that occurred near the end of 2020.[27,28]

As discussed earlier, the Consolidated Appropriations Act of 2023 allows HDHPs to offer first-dollar coverage for telehealth. These provisions expire in 2024. Our results indicate that providing such first-dollar coverage can be an effective way to connect chronically-ill patients, who require regular contact with the healthcare system to manage the sequalae of their diseases, with access to medical care. Future investigations using data from 2022 and beyond would also be helpful in ascertaining the degree to which uptake of this $0 telehealth served as a substitute to in-person care or served to increase overall use of care.

Lastly, our work underscores the importance of conducting both disease-specific and pooled analyses. Pooled-disease analyses are important for informing public policy decisions. Yet only conducting pooled-disease analyses may hide important nuances, such as whether results are being driven by a particular patient subpopulation. Our work, using both disease-specific and pooled-disease analyses, finds the same direction and similar magnitude of effect for all conditions and shows that $0 telehealth policies can affect a wide range of patient populations in a similar manner.

4.1 | Limitations

This study is a retrospective analysis of observational data and has certain limitations. First, our data do not allow us to determine whether visits were indicated for treatment of the identified chronic conditions. However, our use of a chronically ill cohort, which is recommended to have outpatient visits each year to manage their illness(es), makes moral hazard less likely.[29–32] The use of a chronically-ill cohort was also a deliberate choice to increase the likelihood that patients were aware of the policy shift. However, results may not generalize to non-chronically ill patients. Our analysis evaluates care received from 2019 to 2020, with the latter year representing the first year of the COVID-19 pandemic. The pandemic impacted nearly all aspects of American life to one degree or another; economic stimulus payments, social distancing preferences, and an increase in remote work each may have impacted the preference for telehealth services and $0 cost-sharing medical services. While we have no reason to believe that they impacted this cohort of employer-sponsored HDHP- and non-HDHP enrollees differentially, our results may not fully generalize to a post-pandemic world. Finally, we do not observe the full choice set of care options for each individual and thus we cannot assess whether HDHP or non-HDHP patients had greater access to $0 telehealth. Although we show that the share of telehealth visits that were $0 was similar between groups, it possible that access to $0 telehealth was different in ways we cannot observe.

4.2 | Conclusion

This is the first study to rely on a policy shock – the shift to $0 telehealth – to evaluate the effects of HDHPs on consumer behavior. We find that HDHP enrollees respond to selective decreases in cost-sharing by shifting their care utilization to the $0 cost services more so than non-HDHP enrollees. Our results indicate that eliminating or reducing cost-sharing, such as through recent legislation exempting telehealth from HDHP deductibles, can help ensure receipt of outpatient care for chronically ill patients.

AUTHOR CONTRIBUTIONS

Concept and design: Gidwani, Wagner, Burgette. *Acquisition, analysis, or interpretation of data*: Gidwani, Kofner, Burgette, Wagner, Yank, Asch. *Drafting of the manuscript*: Gidwani. *Critical revision of the manuscript for important intellectual content*: Gidwani, Yank, Kofner, Burgette, Wagner. *Statistical analysis*: Gidwani, Wagner, Burgette. *Obtained funding*: Gidwani. *Supervision*: Gidwani.

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CONFLICT OF INTEREST STATEMENT

The authors report no conflicts of interest.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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