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A QUASI-EXPERIMENTAL STUDY OF A COLLABORATIVE SERVICE MODEL BETWEEN AN AFFORDABLE HOUSING PROVIDER AND A MANAGED CARE ORGANIZATION

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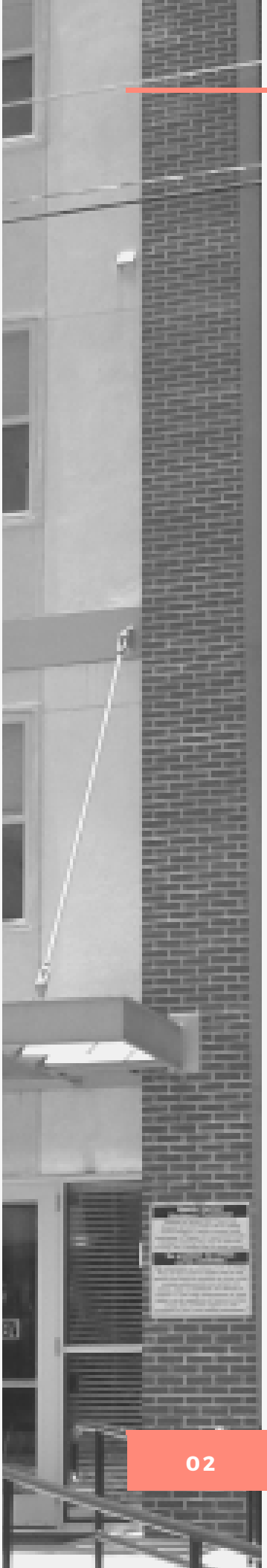


EXECUTIVE SUMMARY

Many managed care organizations (MCOs) are now focused on screening and addressing social determinants of health. Unique partnerships between MCOs with community providers are being explored but there has been little formal evaluation of these partnerships. In this study, we evaluated a collaborative, community-based service model in which participants had healthcare coverage through Superior HealthPlan, the largest Medicaid MCO in Texas, and lived in properties maintained by Prospera Housing Community Services, an affordable housing provider. This Prospera+Superior collaborative model allowed for facilitated care and joint programs aimed to improve social determinants of health, including access to nutritious foods, transportation, affordable healthcare, and secure housing.

Using a quasi-experimental two-groups research design, we compared a sample of 104 participants served by the Prospera+Superior collaborative model to a demographically matched group of 104 participants who had healthcare coverage through the Superior HealthPlan Medicaid MCO but did not live at Prospera properties (i.e., Superior Only group). The primary outcomes were healthcare utilization and costs. We analyzed data from medical claims to examine change in outcomes from 12 months before implementation of the Prospera+Superior collaborative model in 2019 to 12 months after implementation. We conducted regression-based adjusted analyses which revealed **the Prospera+Superior group had a 56% lower rate of emergency department/urgent care visits and spent $2,061 less than the Superior Only group after implementation.** Together, these findings provide needed evidence of the clinical and economic value of forming multi-sector collaborative models between MCOs and other community providers.

BACKGROUND

There is widespread interest from the medical and healthcare field to address social determinants of health. The housing and communities in which people live can impact their health and access to healthcare. There are well-documented links between income, housing, and health. For example, financial hardship is a robust predictor of health among low-income housing residents (1) and financial strain may mediate the link between mental illness and homelessness (2). However, there is a need to examine policy levers and service models that comprehensively and effectively improve financial health, housing stability, and access to healthcare services.

In the healthcare landscape of the U.S., managed care organizations (MCOs) play an essential role in supporting the health of low-income and disabled populations. Many states are beginning to require MCOs to screen for and address social determinants of health among enrollees (3, 4). However, despite experimenting with various diverse programs to address social determinants of health, many MCOs are struggling with service integration, financing, and evaluation efforts to determine the effectiveness and sustainability of these programs (5).

Many low-income individuals face challenges with obtaining and maintaining stable housing. Service-enriched affordable housing programs often include housing subsidies and are a promising housing option for individuals who need long-term support. However, as concluded in a report by the National Academies of Sciences, Engineering, and Medicine, there is no substantial evidence as yet that supportive housing programs improve health outcomes (6). In other words, supportive housing programs improve housing outcomes (7, 8), but may not necessarily improve health (6, 9).

Collaborative service models that combine healthcare and homeless services have shown promise. For example, federally-funded Health Care for the Homeless (HCH) clinics around the country serve as primary care “health homes” for individuals experiencing and at-risk of homelessness and have grown to over 200 sites over the past 3 decades (10). The U.S. Department of Veterans Affairs (VA) has implemented the Homeless Patient Aligned Care Team (H-PACT) program which is a multidisciplinary medical care home that offers tailored primary care services to homeless veterans. There is evidence that use of H-PACT is associated with reductions in emergency department (ED) use, improvements in primary care utilization, and positive patient experiences (11). However, most of the existing models have largely been hospital-based instead of community-based.

Unique collaborative models can offer clients multiple services on-site and provide a variety of partnered services. These models can also increase communication between different providers and entities which can enhance care and improve continuity of care. Experts have argued for over a decade for innovative ways to integrate health insurance and housing services. A well-known policy brief that was disseminated over a decade ago made a business case for Medicaid-financed services in supportive housing to lower costs associated with avoidable hospitalizations and other crisis services (12). There is a need to empirically study new, innovative community-based service models between housing providers and insurance payers.

PROJECT AIMS

In the current study, we conducted a quasi-experimental study to examine a collaborative, community-based service model that involved a service-enriched affordable housing provider and a MCO compared to a comparison group enrolled in the MCO. Our primary outcomes were use of healthcare services and costs.

WE HYPOTHESIZED THAT THE COLLABORATIVE SERVICE MODEL WOULD BE ASSOCIATED WITH LESS USE OF ACUTE CARE AND LOWER OVERALL MEDICAL CARE COSTS THAN A COMPARISON GROUP.

METHODS

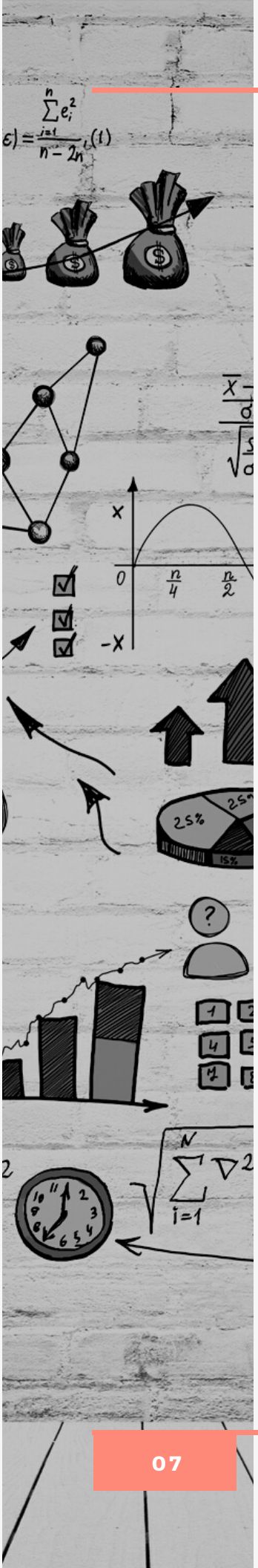
PROGRAM DESCRIPTION

RESEARCH DESIGN

DATA SOURCES

MEASURES

DATA ANALYSIS

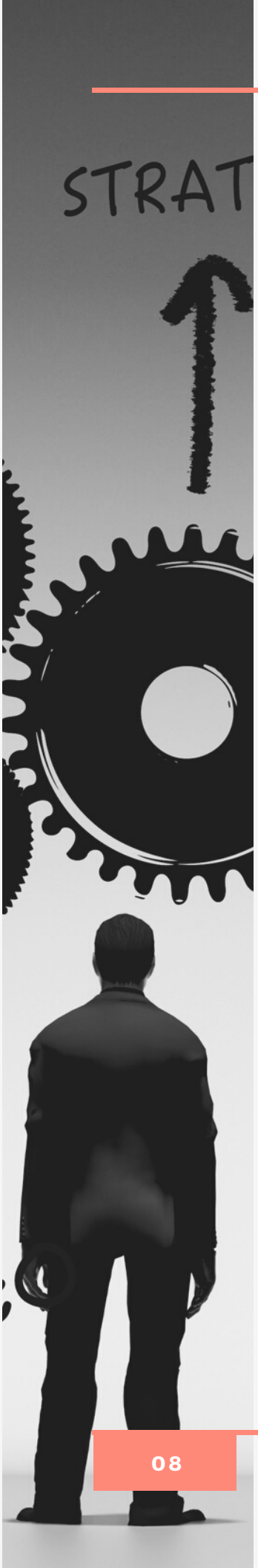


PROGRAM DESCRIPTION

Prospera Housing Community Services is an organization that has been building and operating affordable housing with resident support services in Texas for nearly 30 years. In their service-enriched housing model, long-term housing and supportive services are provided to individuals without time limits or retributions regardless of service engagement. Prospera Housing Community Services serves individuals and families by providing safe, high-quality, affordable housing and support services at over 50 sites across 19 cities throughout South and Central Texas. At each site, there are on-site service managers that help offer resident services and facilitate care and billing of services with insurance payers like Superior HealthPlan. In this study, residents across 11 sites were included and these sites are listed in Appendix A.

Superior HealthPlan was founded in 1999 in El Paso and has become the largest Medicaid MCO in Texas. Superior HealthPlan operates under parent company, Centene Corporation, the largest Medicaid provider in the U.S. Superior HealthPlan provides enrollees with access to all Medicaid programs in Texas, including STAR, STAR+PLUS, STAR Kids, and STAR Health. Additionally, Superior provides coverage through the Children's Health Insurance Program (CHIP), Medicare, and the Health Insurance Marketplace.

A collaborative service model involving the affordable housing provider, Prospera Housing Community Services, and the Superior HealthPlan, was implemented in 2019. This partnership allowed for facilitated care between the two organizations and joint programs that aimed to improve social determinants of health, including access to nutritious foods, transportation, affordable healthcare, and secure housing (13). Over 50 programs were offered through this partnership, which are detailed in Appendix B. This study focused on testing this partnership holistically as a collaborative service model and not individual programs.

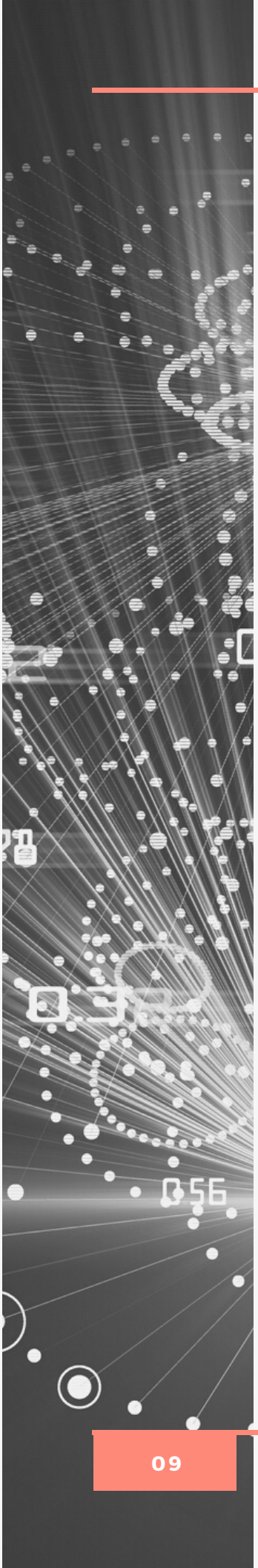


RESEARCH DESIGN

This study used a matched-groups design (matching on age, gender, service delivery area, and having 6 months of coverage) combined with regression-based adjusted analyses to compare a group of 104 residents living at properties at Prospera Housing Community Services with coverage by Superior HealthPlan (herein referred to at Prospera+Superior) to a matched group of 104 residents who did not live at Prospera Housing Community Services and only had coverage by Superior HealthPlan (herein referred to as Superior Only). Prior to the regression analysis, participants in the Prospera+Superior group were matched with similar individuals from the Superior only group, to develop a comparable control group. These groups were matched on demographics (age, gender service delivery area), any dual coverage (e.g., Medicaid-Medicare coverage).

To test our study hypothesis, we examined the Prospera+Superior and Superior Only groups in the 12 months before implementation of the Prospera+Superior collaboration (i.e., before 2019) and the 12 months after implementation. The main outcomes were healthcare utilization and costs.

All study procedures were approved by the institutional review board at the University of Texas Health Science Center at Houston (Project # HSC-SPH-21-0841).

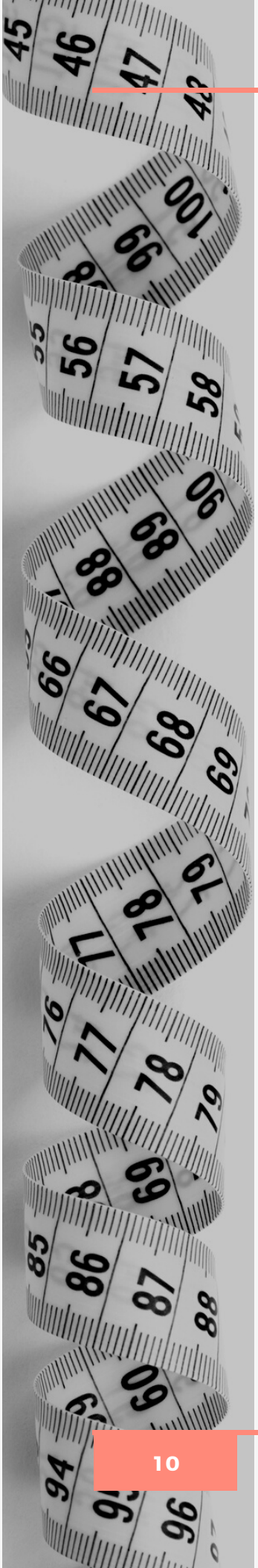


DATA SOURCES

Data from enrollment, medical and pharmacy files in 2018-2020 from Superior HealthPlan for both Prospera+Superior and Superior Only groups were transferred to the research team at UTHealth Center for Health Care Data. Among dual eligible participants, some were those enrolled in the Medicaid-Medicare Managed Care waiver program (MMP) and some were not. Full claims history data were received for those in the MMP program; for dual eligible participants not in the MMP, data were pulled from Medicare claims files available through the UTHealth Center for Health Care Data, which is a Centers for Medicare & Medicaid Services (CMS) Qualified Entity. This linkage allowed for a more complete review of healthcare utilization and costs for the study samples.

To ensure there was no overcounting of services and costs, manual review of data from randomly selected participants was conducted and compared across different data sources. The analytic dataset created for this study contained information on participants' registration in Prospera housing (for the Prospera+Superior group), demographic characteristics, Medicaid enrollment information, healthcare utilization (i.e., emergency department visits, inpatient admissions, outpatient visits) and spending for healthcare services.

The first day the Prospera+Superior collaboration was implemented at each housing site in 2019 served as the index date and the analytic dataset included the 12 months before and after the index date.

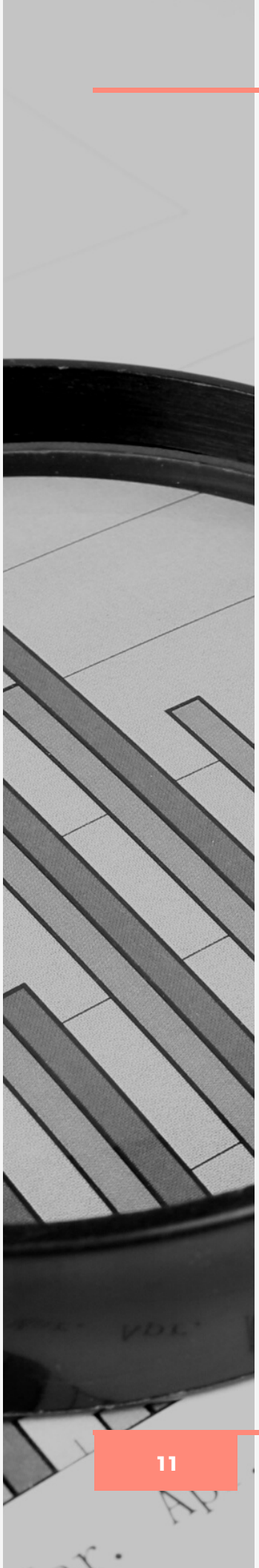


MEASURES

Information on demographic characteristics and healthcare coverage of participants were extracted from eligibility and enrollment files.

Medical claims were reviewed to examine medical diagnoses and to measure each participant's Charlson Comorbidity Index (CCI), a method of categorizing and weighting comorbidities to predict mortality risk (14).

Four healthcare utilization measures and two types of healthcare costs were examined before and after implementation of the Prospera+Superior collaboration to study the effect of the collaborative service model on participants. These measures were, outpatient visits, ED/urgent care visits, inpatient visits and inpatient length of stay, medical care costs, and pharmaceutical costs.



DATA ANALYSIS

First, the Prospera+Superior and Superior Only groups were compared on demographics, healthcare coverage, and clinical diagnoses using bivariate tests with independent t-tests and chi-square tests.

Second, the groups were compared descriptively on healthcare utilization and costs before and after implementation of the Prospera+Superior collaboration. Wilcoxon signed rank test was used to compare the average mean between groups unadjusted for pre-implementation differences.

Third, the groups were compared on healthcare utilization and costs controlling for differences in healthcare coverage and clinical diagnoses before implementation of the Prospera+Superior collaboration.

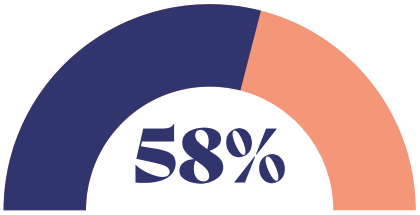
Since the data has a panel structure where the patients are repeat sampled before and after implementation, panel data regressions were used based on various specification tests to help pick the right regressions. The fixed effect panel data regression analysis was used, which is the most conservative regression method in this context. For healthcare utilizations, which had large ranges, a fixed effects linear regression was used. For healthcare utilizations, such as ED/urgent care visits and number of inpatient admissions, which had a limited range, fixed effects Poisson regression was used to account for the “count” data-like nature of the utilization measures. We tried other mixed effects models, and our results were robust to the type of regression used.

RESULTS - DEMOGRAPHIC DIFFERENCES

Average Age

59.96 Superior Only

57.72 Prospera + Superior



Female

Dual Status

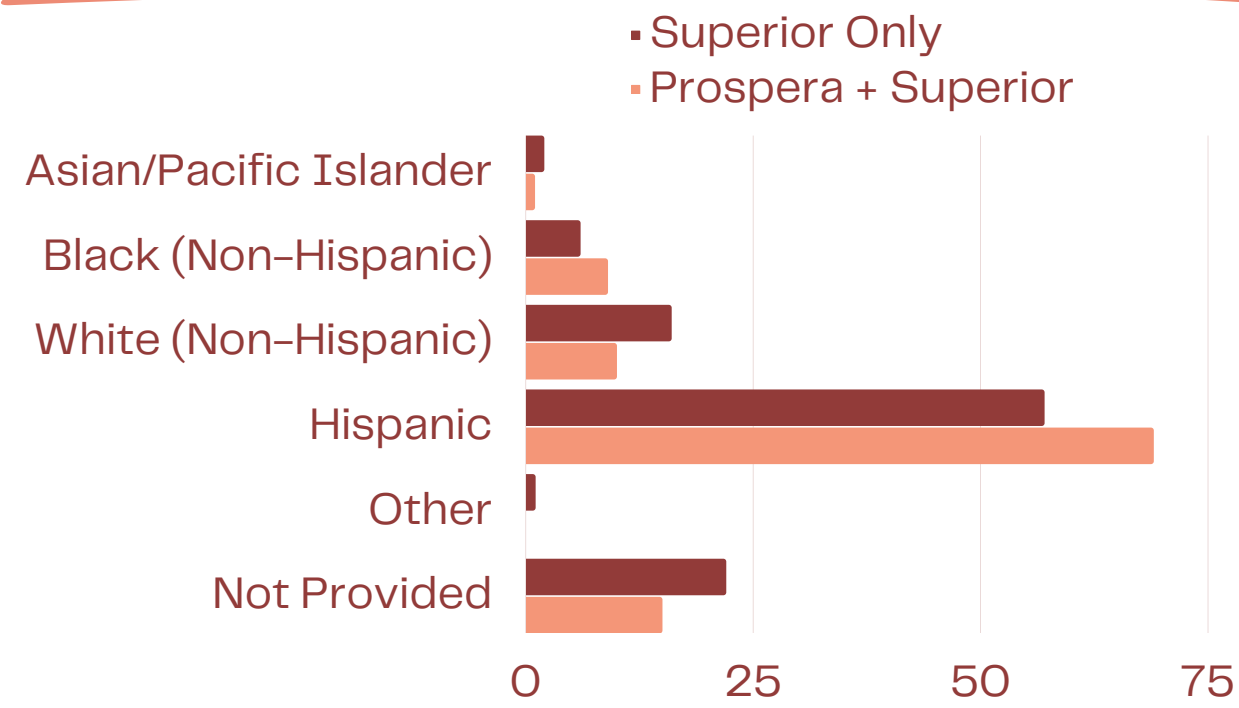
Yes No **60%**

Superior Only

Yes No **52%**

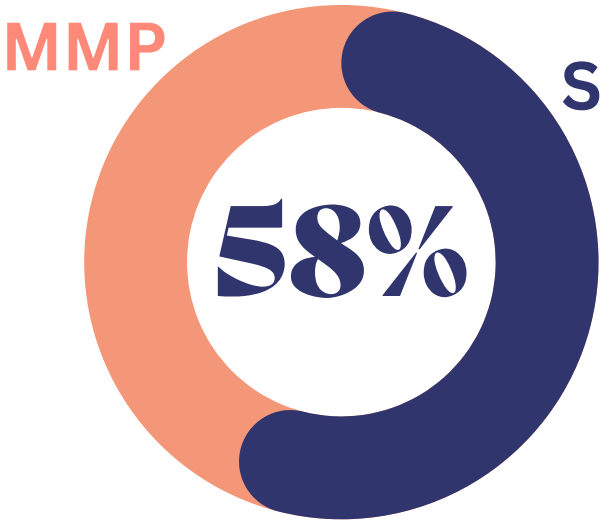
Prospera + Superior

There were no significant demographic differences between the Prospera+Superior and Superior groups.



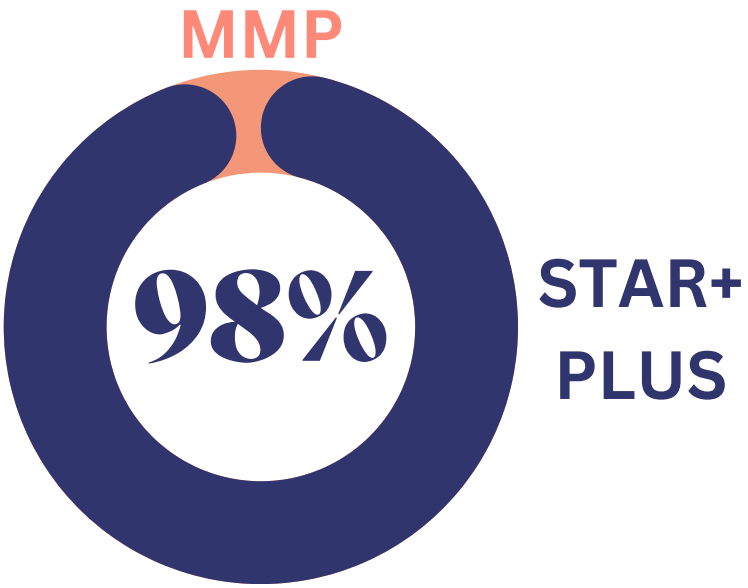
See more details in Table 1

RESULTS - MEMBER PRODUCT



Superior Only

THOSE IN THE PROSPERA + SUPERIOR GROUP WERE SIGNIFICANTLY MORE LIKELY TO HAVE STAR+PLUS THAN THOSE IN THE SUPERIOR ONLY GROUP.

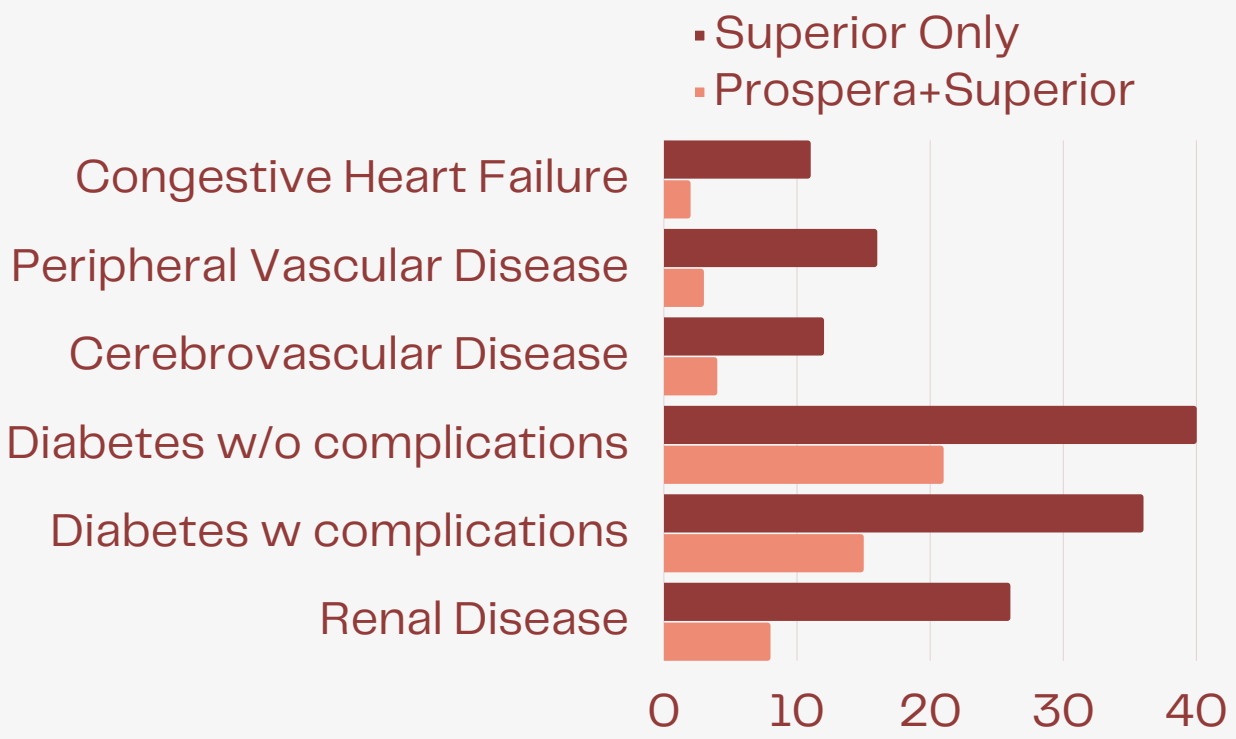


Prospera + Superior

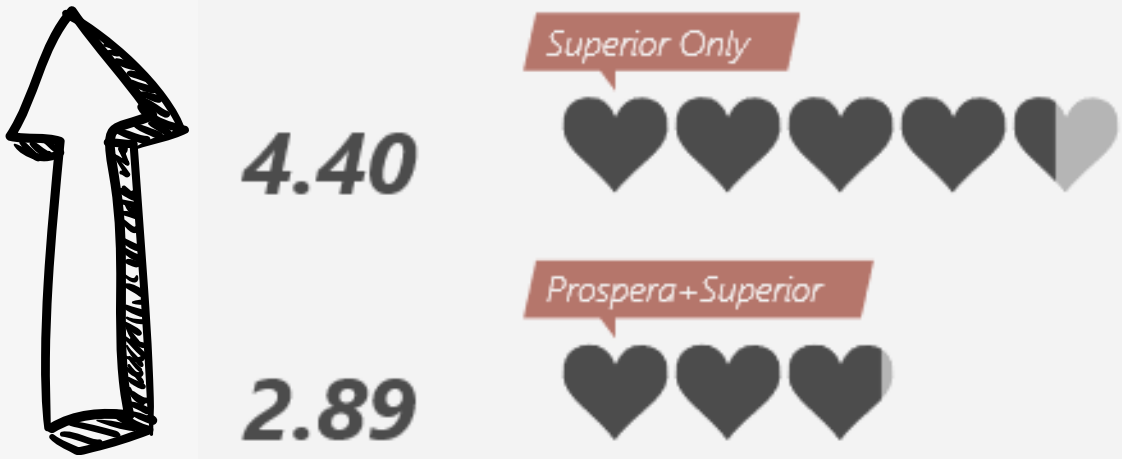
See more details in Table 1

CHARLSON COMORBIDITY INDEX (CCI)

The most common medical conditions were diabetes with and without complications, and renal disease.



Mean # of CCI Conditions



The Superior Only group had more CCI conditions than the Prospera+ Superior group.

See more details in Table 2

HEALTHCARE UTILIZATION

Healthcare utilization before (pre) and after (post) implementation of the collaborative model intervention in the Prospera+Superior group.

Healthcare Visits	Pre-implementation Difference	Post-implementation Difference
# inpatient admissions	-	↓
Inpatient length of stay	-	↓
# of ED/urgent care vists	-	-
# of outpatient visits	↓	↓

- No difference between groups at timepoint.

↓ Utilization lower in Prospera + Superior group than Superior Only group.

After implementation, the Prospera + Superior Only group continued to have significantly lower outpatient & inpatient utilization.

THE PROSPERA + SUPERIOR GROUP HAD A 56% LOWER RATE OF ED/URGENT CARE VISITS RELATIVE TO THE SUPERIOR ONLY GROUP.

See more details in Table 3

HEALTHCARE COSTS

Pharmaceutical costs before (pre) and after (post) implementation of the collaborative model intervention in the Prospera+Superior group.

Costs	Pre-implementation Difference	Post-implementation Difference
Medical Cost Dollars	-	-
Pharmacy Cost Dollars	-	↓

- No difference between groups at timepoint.

↓ Costs lower in Prospera + Superior group than Superior Only group.

The Prospera+Superior group spent

$2,061

less than the Superior Only group after implementation of the Prospera+Superior collaborative model after controlling for pre-implementation differences.

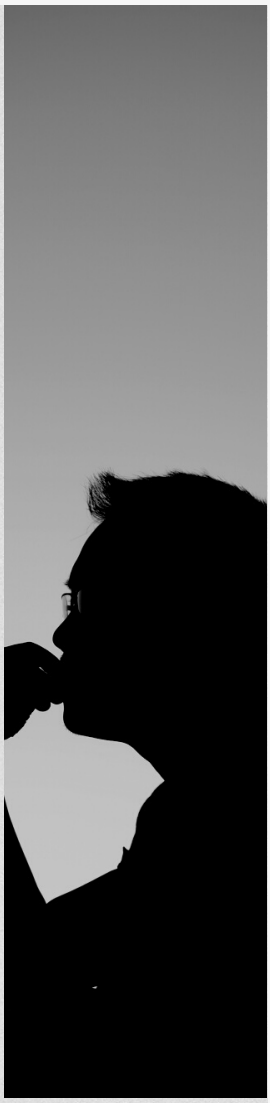
See more details in Table 4

DISCUSSION

There has been wide interest in multi-sector collaborative models of care, particularly between MCO and community providers. However, there has been limited empirical data to support the effectiveness of particular models. This study contributes to the literature by controlled comparison between a collaborative service model partnering an MCO and an affordable housing provider. Our main finding showed this model was associated with decreased use of ED/urgent care services compared to a group that was under the same Medicaid MCO but did not have the opportunities of the collaborative services with a housing provider. While participants were not randomized so we cannot infer causality, the finding does suggest the collaborative model improved access to care and facilitated greater participation in healthcare prevention activities upstream that resulted in fewer acute care needs.

FINDINGS

A secondary and important finding was that the collaborative service model was associated with lower overall pharmaceutical costs among its participants than a comparison group. This finding provides further data in supporting a business case for these type of collaborative models (12). Furthermore, given the wide reliance on medications and efforts to reduce inappropriate polypharmacy (15, 16) as well as concerns about rising medication costs in the U.S. (17), the observed decrease in pharmaceutical costs may have broad program and policy implications. For example, one study of the top 150 medications administered and prescribed in EDs in the U.S. found the costs increased by 28-125% over the past decade. It may be important to note that while our findings support other collaborative efforts to integrate care in different settings, the Prospera+Superior collaborative model is different from more medically-based models such as the National Health Care for the Homeless clinics (10) and the VA H-PACT programs (11). The Prospera+Superior model is embedded in where people live and work to address multiple social determinants of health instead of specific health conditions.

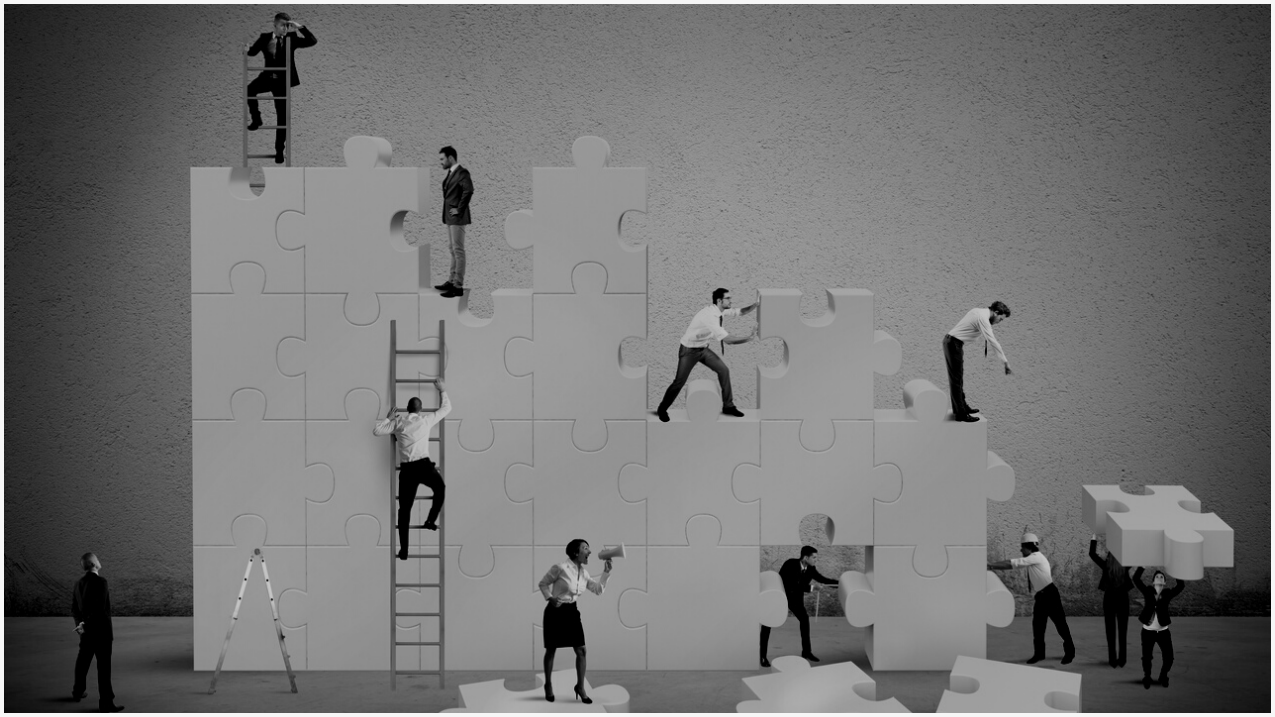


LIMITATIONS

There were several limitations of the study worth noting. First, as mentioned earlier, we did not randomize participants into groups, so a full randomized clinical trial is needed to confirm these findings. Second, this was a unique partnership between Prospera and Superior HealthPlan and the generalizability of these findings to partnerships with other similar agencies has yet to be determined. Third, given our sample size, we were limited to examining broad categories of healthcare utilization and costs and did not have adequate cell sizes to examine more specific categories as originally intended (e.g., use of specialized preventive services or costs). Further multi-site studies are needed to examine these issues more directly.

THESE LIMITATIONS WERE COUNTERBALANCED BY THE STRENGTHS OF THE STUDY, WHICH INCLUDED A RESEARCH DESIGN WITH A COMPARISON GROUP, A STATISTICALLY RIGOROUS APPROACH THAT INCLUDED MATCHED GROUPS WITH REGRESSION-BASED ADJUSTED ANALYSES, AND EXAMINATION OF BOTH HEALTHCARE UTILIZATION AND COSTS.

CONCLUSIONS



COLLABORATIVE Service Models

There is evidence that collaborative service models between MCOs and housing providers, like between Superior HealthPlan and Prospera Housing Community Services, can reduce use of costly ED and urgent care services and overall pharmaceutical costs. These findings may have policy implications as MCOs focus on social determinants of health and consider new models of care to effectively address them.

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APPENDIX A

LIST OF PROSPERA PROPERTIES IN THE STUDY

Property Name	# of residents in the study n= 104	Start date of Prospera + Superior partnership
Country Club	5 (5%)	1/1/2019
Hacienda Senior	10 (10%)	1/1/2019
Kingsville LULAC	4 (4%)	1/1/2019
La Risa	15 (14%)	1/1/2019
Laredo Manor	7 (7%)	4/30/2019
Las Palmas Gardens	8 (8%)	12/1/2019
Oak Manor	17 (16%)	4/30/2019
Palms at Leopard	10 (10%)	12/1/2019
Terraces at Haven	5 (5%)	12/1/2019
Vista Verde	17 (16%)	4/30/2019
Woodland Creek	6 (6%)	4/30/2019

APPENDIX B

PROGRAMS OFFERED THROUGH PROSPERA-SUPERIOR HEALTHPLAN PARTNERSHIP, SORTED BY SOCIAL DETERMINANTS OF HEALTH

Neighborhood / Environment	Health and Health Care	Social and Community	Education	Economic Stability
1. Secure properties 2. Clean, inviting campus 3. Community rooms 4. Computer labs 5. Classrooms 6. Playgrounds 7. Greenspaces 8. Property Management staff 9. Service Management staff 10. Protocol cleaning and cleaning supplies during COVID 11. Partnerships with other non-profits in area, counties and state wide	12. Weekly wellness checks during COVID 13. Benefit application help 14. Food Bank on site 15. Food distribution projects during COVID 16. Health Fairs 17. Nutritional education 18. Walking Clubs 19. Exercise classes 20. Senior classes 21. Matter of Balance training 22. Partnership with Lighthouse for the Blind	23. Senior Silver Field Trips 24. National Night Out 25. Seasonal Social Events 26. Holiday parties 27. Community Garage Sales 28. Marches 29. Parades 30. Bingo 31. National Night Out 32. MLK Events 33. ZOOM social events during COVID 34. Communication activities to residents	35. Association with Alamo Colleges 36. ESL 37. Literacy programs 38. After- School programs (resident and neighborhood kids) 39. Kid's Field Trips 40. Explore College Days 41. Community events 42. Summer Camp 43. Alamo Colleges co-grant activation, classes on site, etc. 44. Computer lab and tech access during COVID	45. Financial Literacy classes 46. Budget classes 47. Identify Fraud classes 48. Eviction Prevention classes 49. Utilities and rent assistance programs 50. Food Bank, etc. 51. Job Fairs 52. Resume building 53. Texas Workforce Solutions-Vocational Rehabilitation Services

APPENDIX C- TABLE 1.

Table 1. Demographic and coverage characteristics of Prospera+Superior and Superior Only groups

Total Members	Superior Only group n= 104		Prospera+Superior group n=104		*p*-value
	Mean/Count	SD/%	Mean/Count	SD/%	
Age	59.96	17.99	57.22	15.46	0.240
Gender					
Female	60	58%	60	58%	
Male	44	42%	44	42%	
Dual Status					
No	42	40%	50	48%	0.264
Yes	62	60%	54	52%	
Member Product					
MMP	44	42%	2	2%	<0.001
Star+Plus	60	58%	102	98%	
Race/Ethnicity					
Asian/Pacific Islander	2	2%	1	1%	0.301
Black (Non-Hispanic)	6	6%	9	9%	
White (Non-Hispanic)	16	15%	10	10%	
Hispanic	57	55%	69	66%	
Other	1	1%	0	0%	
Not Provided	22	21%	15	14%	
Prospera properties					
Country Club	N/A	N/A	5	4.8%	N/A
Hacienda Senior	N/A	N/A	10	9.62%	N/A
Kingsville LULAC	N/A	N/A	4	3.85%	N/A
La Risa	N/A	N/A	15	14.42%	N/A
Laredo Manor	N/A	N/A	7	6.73%	N/A
Las Palmas Gardens	N/A	N/A	8	7.69%	N/A
Oak Manor	N/A	N/A	17	16.35%	N/A
Palms at Leopard	N/A	N/A	10	9.62%	N/A
Terraces at Haven	N/A	N/A	5	4.81%	N/A
Vista Verde	N/A	N/A	17	16.35%	N/A
Woodland Creek	N/A	N/A	6	5.77%	N/A

Note: Prospera+Superior group lived on Prospera properties and had coverage through Superior HealthPlan while the Superior Only group did not live on Prospera properties but had Superior HealthPlan coverage. MMP= Medicare-Medicaid Plan. Star+Plus= Texas Medicaid managed care program. N/A= Not applicable. Pink boxes indicate statistically significant values.

Table 1 shows the demographic characteristics and healthcare coverage of participants. The majority of participants were female, Hispanic, and had dual healthcare coverage. There were no significant differences between the Prospera+Superior and Superior Only groups on demographic characteristics and rates of dual coverage, which was expected given the two groups were matched on these characteristics. However, the Prospera+Superior group was more likely to be in the STAR+PLUS program and less likely to be in the MMP program than the Superior Only group.

APPENDIX D- TABLE 2. MEDICAL CONDITIONS

Table 2 shows the CCI's medical conditions among participants. The most common medical conditions were diabetes with and without complications, and renal disease.

Table 2. Medical conditions from the Charlson Comorbiditiy Index (CCI) among Prospera+Superior and Superior Only groups

CCI	Superior Only		Prospera+Superior		*p*-value
	N	%	N	%	
Congestive Heart Failure	11	11%	2	2%	0.010
Peripheral Vascular Disease	17	16%	3	3%	0.001
Cerebrovascular Disease	12	12%	4	4%	0.037
Diabetes w/o complications	42	40%	22	21%	0.003
Diabetes w complications	37	36%	16	15%	0.001
Renal Disease	27	26%	8	8%	<0.001
Mean Average CCI Score (SD)	4.40 (3.63)		2.89 (2.45)		0.001

Note: Prospera+Superior group lived on Prospera properties and had coverage through Superior HealthPlan while the Superior Only group did not live on Prospera properties but had Superior HealthPlan coverage. Pink boxes indicate statistically significant values.

The Superior Only group was significantly more likely to have six medical conditions from the CCI and had higher CCI scores than the Prospera+Superior group.

APPENDIX E- TABLE 3. UTILIZATION

Table 3 shows the healthcare utilization of inpatient, outpatient, and ED/urgent care services 12 months before and after implementation of the Prospera+Superior collaborative model among the Prospera+Superior and Superior Only groups.

Table 3. Unadjusted healthcare utilization and cost measures between the Prospera+Superior and Superior Only groups pre and post-implementation of the Prospera+Superior collaboration

	Pre-implementation period				Post-implementation period			
Utilization Measure (Mean, SD)	**Superior Only**	**Prospera+ Superior**	**Diff**	**p-value**	**Superior Only**	**Prospera+ Superior**	**Diff**	**p-value**
# of inpatient admissions	0.28 (1.07)	0.09 (0.46)	+0.19	0.071	0.27 (0.87)	0.05 (0.32)	+0.22	0.008
Inpatient length of stay	3.81 (19.09)	0.58 (3.79)	+3.23	0.052	1.96 (8.48)	0.13 (0.86)	+1.83	0.003
# of ED/urgent care visits	0.42 (0.94)	0.50 (1.21)	-0.08	0.948	0.56 (1.34)	0.29 (0.77)	+0.27	0.081
# of outpatient visits	6.49 (14.02)	4.66 (11.52)	+1.83	0.014	7.85 (18.55)	4.54 (11.82)	+3.31	0.020
Medical cost dollars	6,508 (17,007)	6,190 (13,934)	+318	0.947	7,398 (14101)	6,297 (10,469)	+1,101	0.509
Pharmacy cost dollars	1,214 (2,913)	3,103 (9,053)	-1,889	0.109	2,656 (5210)	2,483 (8,696)	+173	0.041

Note: Prospera+Superior group lived on Prospera properties and had coverage through Superior HealthPlan while the Superior Only group did not live on Prospera properties but had Superior HealthPlan coverage. ED= Emergency Department. Pink boxes indicate statistically significant values.

Before implementation, the Superior Only group had significantly higher outpatient utilization than the Prospera+Superior group, which is consistent with the higher number of medical conditions found in the Superior Only group. After implementation, the Superior Only group continued to have significantly higher outpatient as well as inpatient utilization and higher pharmaceutical costs than the Prospera+Superior group.

APPENDIX F- TABLE 4. MULTIVARIABLE ANALYSES

Due to group differences in background and clinical characteristics before implementation, multivariable analyses were conducted controlling for these differences to examine differences between groups on healthcare utilization.

Outcomes	Effect Size	Confidence Intervals
Outpatient Visits	-1.48+	-4.88, 1.92
Emergency Department Visits	**0.44#**	**0.24, 0.79**
Inpatient Admissions	0.65#	0.19, 2.22
Length of Stay for Inpatient Admissions	1.40+	-2.10, 4.90
Medical Care Costs	-782.61+	-5107.51, 3542.29
Prescription Medication Costs	**-2,061.24+**	**-3219.22, -903.26**

#Incidence Rate Ratios
+Marginal Effects/Linear Changes

As shown in Table 4, the Prospera+Superior group had a significant 56% lower rate of ED/urgent care visits than the Superior Only group after controlling for differences in baseline utilization and clinical characteristics. The Prospera+Superior group also had significantly lower pharmaceutical costs than the Superior Only group.

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