Child Mental Health, Homelessness, and the Shelter System: Evidence from Medicaid in New York City

Mike Cassidy, Janet Currie, Sherry Glied, and Renata Howland

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Author affiliations: Center for Health and Wellbeing, Princeton University, Princeton New Jersey, United States (Mike Cassidy, Janet Currie); New York University Wagner Graduate School of Public Service, New York University, New York, New York, United States (Sherry Glied); New York University Grossman School of Medicine, New York, NY, United States (Renata Howland).

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Abstract

We identified children who resided in the New York City shelter system during 2015-2020 by matching address histories in Medicaid insurance claims to publicly available homeless shelter addresses, permitting examination of health care use before, during, and after shelter stays. We found that 4.5% of NYC children aged 4-17 with consistent Medicaid coverage entered shelter over a three-to-five-year period. After shelter entry, children had increased probabilities of receiving mental health services, including therapy and diagnoses of neurodevelopmental disorders, but little change in physical health service use. Children placed in shelters co-located with mental health services were similar to children entering other shelters prior to entry but had particularly large and sustained increases in use of mental health services afterwards. Children without prior mental health claims placed in shelters co-located with mental health services were 38-48% more likely to receive mental health therapy and 14-16% more likely to receive neurodevelopmental diagnoses than similar children placed elsewhere. These children were also more likely to receive Supplemental Security Income and stayed in shelter longer. This example illustrates the potential of linking administrative data sets in order to study vulnerable populations.

Both homelessness and children's mental health have become crisis-level public health concerns. [1–3] While the U.S. Surgeon General has issued an urgent public health advisory about youth mental health generally, [2] children experiencing homelessness are an especially vulnerable group [4,5] who may be at elevated risk for mental illness. [6–8]

Lack of data is a significant challenge facing social epidemiologists seeking to study this population. The unstably housed are often omitted from surveys. [9] Administrative data about homelessness can be difficult to obtain and does not typically allow researchers to follow people before and after spells of homelessness. [10,11]

To overcome these challenges, we linked addresses from Medicaid insurance claims to publicly available information about shelter locations in New York City (NYC). This enabled us to identify children who used the shelter system, and to follow them before, during, and after shelter stays. In addition, public data about the locations of Medicaid providers allowed us to study the relationship between health care services co-located with shelters and children's use of these services.

We asked four questions. What is the prevalence of sheltered homelessness among school-aged children receiving Medicaid? How does their use of mental health care compare to more stably housed children? What are the patterns of mental health care use around the time of shelter entry? How do these patterns differ by whether mental health services are available at shelters?

NYC is home to a quarter of families experiencing homelessness nationwide. [4,12] Hence, the NYC experience offers considerable insight into unhoused children and their mental health needs. To avoid the negative associations of the word "homeless," the modifiers "unhoused," "sheltered," or "experiencing homelessness" are used to describe people in temporary shelter for the remainder of this article.

Methods

We link administrative records from New York State (NYS) Medicaid, the public insurance program that covers low-income children, to publicly available data about locations of homeless shelters and Medicaid providers. We then analyze the relationship between sheltered homelessness and children's mental and physical health. The study was reviewed and approved by the NYU Grossman School of Medicine Institutional Review Board.

Data Sources

The primary data source was the New York State (NYS) Medicaid claims database ("Medicaid data") maintained by New York University's Health Evaluation and Analytics Lab (NYU HEAL, n.d.). In addition to information about coverage, demographics, diagnoses, procedures, pharmaceutical prescriptions, and categories of service, the Medicaid data include members' address histories and effective dates. The federal government views NYS as a model in keeping members' addresses updated. [13] We geocoded NYC member addresses using the NYC Department of City Planning's Geosupport Desktop Edition application. [14] Eighty-five percent of 11.4 million unique addresses (88.2 percent of beneficiaries) successfully geocoded.

Homeless Shelter

We identified spells of sheltered homelessness by compiling the addresses of emergency shelters from the U.S. Department of Housing and Urban Development's (HUD's) publicly available Housing Inventory

Count (HIC) data for the NYC Continuum of Care (CoC) for 2015-2022.[15] CoC's are required to provide HUD with an inventory of the addresses of all projects providing beds to those experiencing homelessness. After standardizing the shelter addresses, we linked them to Medicaid addresses deterministically by building number, street, borough, and zip code. Matches identified shelter spells. NYC has a unique municipal right to shelters, but families must demonstrate they have no alternative place to live through an eligibility process. Families are granted conditional stays while these investigations are completed. Conditional and official placements typically occur in the same location[16] and we do not observe families switching shelters in consecutive months. We use the first observed shelter spell for each family—93% of sample children have only one spell. The most common eligibility reasons are eviction, overcrowding, and domestic violence.[4]

Study Samples

The sample was comprised of families (people who ever shared a Medicaid case number) with children 4-17 years of age, who had at least two years of continuously active Medicaid coverage from 2015-2020 and at least one successfully geocoded address. We focus on children 4-17 because relatively few children received mental health services before preschool. We dropped 2015 from our analysis because 2016 was the first full calendar year in which ICD-10 codes were uniformly used to classify diagnoses. We aggregated and reshaped the data so that there was one observation per member per month (with inactive months excluded).

Since the resulting dataset was large, we first took a 10 percent random sample of all NYC families meeting these criteria. This sample consisted of 129,901 children in 109,191 families, and 5.6 million child-month observations. We used this panel to estimate the prevalence of sheltered homelessness among Medicaid-enrolled children, as well as to compare the health care use of unhoused and housed children.

Second, we took a census of all Medicaid children aged 4-17 who ever experienced homelessness in NYC from 2016 to 2020. For this second sample, we restricted the analysis to the eight quarters before and after a child's first-observed shelter spell (for a total of 17 quarters where quarter 0 is the quarter ending in shelter entry). We also required that children in the unhoused sample had continuous Medicaid coverage for at least the six months pre and six months post shelter entry (13 months total). About two-fifths of the potential sample of unhoused children were lost because their families' shelter spells commenced prior to 2016. The resulting dataset included 19,284 children in 13,464 families with 1.2 million total monthly observations. Unhoused children were observed (with active coverage) for an average of 35.2 months while aged 4-17.

Outcomes

Our primary outcomes measured children's mental health. They were binary indicators for: any mental-health-related claim, mental health therapy, mental health pharmacy, and neurodevelopmental diagnoses (which are among the most common child mental health conditions). Secondary outcomes included the following physical health measures: indicators for emergency department use, well visits, asthma diagnosis, ear diagnosis, as well as Supplemental Security Income (SSI) receipt, and residence in homeless shelter. Asthma and ear-related claims were examined separately because they are among the most common childhood illnesses.

Diagnoses (neurodevelopmental, asthma, ear) were classified using the Clinical Classification Software Refined (CCSR) for ICD-10-CM Diagnoses, v2023.1.[17] Procedures (mental health therapy, well visits) were classified using Current Procedural Terminology (CPT)/Healthcare Common Procedure Coding System (HCPCS) codes.[18] Mental health drugs were classified (mental health pharmacy) using the formulary code present in the Medicaid data. A "mental health claim" was defined as any claim including

a mental health diagnosis, procedure, or prescription. Emergency department visits were classified using the categories of service contained in the claims. SSI receipt was obtained from the corresponding indicator in the Medicaid data. The child was considered to be resident in a shelter in any month in which the members' address matched a shelter address.

Co-Located Mental Health Providers

Data from the NYS Medicaid Enrolled Provider Listing (revised April 2022) were used to identify shelters co-located with mental health and primary care providers.[19] These data give the service addresses, identities, and specialties of all providers enrolled in NYS Medicaid. The match was deterministic based on standardized street addresses.

Figure 1 shows a map of NYC where each small area is a census tract. Darker colors—which are common in the South Bronx and East Brooklyn—indicate areas where more Medicaid children ever experienced homelessness (i.e., where they lived when not in shelter). Red, orange, and black dots indicate shelters co-located with mental health providers, primary care providers, or no providers, respectively. Circle size is proportional to the number of children in residence during 2016-2020. Of the 451 unique shelter addresses, 43 were co-located with mental health services. These shelters housed 5,119 unique children from 2016 to 2020, 6% of the sample children. Nineteen shelters (housing 4,808 children) were co-located with primary care but not mental health services. 389 shelters (housing 75,106 children) were not co-located with health services.

Statistical Analysis

The analysis began by describing sheltered homelessness among the school-aged Medicaid population. Next, we compared the period prevalence of selected health characteristics for ever-sheltered and never-sheltered children using separate bivariate regressions of each characteristic on an indicator for ever sheltered, with standard errors clustered by family.

Since housed and unhoused children differed in many respects (discussed below), the remaining analysis was restricted to the census of unhoused children in the Medicaid data. We began by looking at trends in health care and public benefit use around the time of shelter entry, focusing especially upon the relationship between the health services co-located with shelters and the services children received.

The relationship between co-located services and their use was complicated by the possibility that children with particular needs were selected into certain types of shelter. However, prior research suggested that in NYC shelter placements are typically driven by the available vacancies.[20] To test this idea, we compared children placed in shelters with co-located mental health services to those placed in other shelters in the 4 quarters before shelter entry by estimating the following equation:

$$Y_i = \beta^1 X_i + \beta^2 MHS_i + \varepsilon_i, \qquad (1)$$

where Y_i was a (pre-shelter year) outcome for individual i and the vector X_i included family size fixed effects, borough fixed effects, a cubic in age, and a constant. MHS_i was an indicator equal to 1 if a shelter was co-located with mental health services and zero otherwise. The coefficient β^2 is the regression-adjusted mean difference in outcomes for children in the two types of shelters. Standard errors (ε_i) were clustered by family to allow for within-family correlations in unobserved variables. Analogous models were estimated replacing MHS_i with $PCHS_i$, an indicator equal to 1 if a shelter was co-located with primary care services.

Even if children who entered different types of shelters were observably similar, unobserved differences might have remained. Hence, we estimated difference-in-differences (DiD) models which allowed for differences between the two groups—so long as those differences evolved along "parallel trends." The DiD models were estimated by ordinary least squares:

$$Y_{it} = \alpha_i + \delta_t + \beta^1 X_{it} + \beta^{POST} post_{it} + \beta^{DiD} post_{it} \times MHS_i + \varepsilon_{it}, \qquad (2)$$

where, for child i in month t, $post_{it} = 1$ in the month the family entered shelter and in the following months, and zero in pre-shelter months. The coefficient β^{DiD} gave the change in the probability of the outcome associated with placement in a shelter with mental health services. Since both groups experienced shelter entry, the model included a $post_{it}$ indicator as well as calendar month fixed effects, δ_t. The α_i denotes a child-specific fixed effect controlling for time-invariant child characteristics.

Finally, we estimated dynamic DiD models that allowed coefficients to vary by quarter relative to shelter entry, $R = Q(t - e_i)$, where t indexes calendar month and e_i indexes shelter entry month. $Q(\cdot)=0$ in the four months ending in shelter entry, but otherwise months were grouped in threes. This equation was:

$$Y_{it} = \alpha_i + \delta_t + \gamma_{r(t,e_i)} + \beta^1 X_{it} + \sum_{\substack{-8 \leq r \leq 8, \\ r \neq -1}} \beta^{DiD}_r \mathbf{1}[R_{i,(t,e_i)} = r] \times treatment_i + \varepsilon_{it} \qquad (3)$$

where relative quarter fixed effects ($\gamma_{r(t,e_i)}$) were added to equation 2 and the single post indicator was replaced with a series of indicators measuring quarter-relative-to-shelter-placement in the treatment group (the group with co-located mental health services). We focused on relative quarters instead of relative months to smooth the plots and to allow for the fact that actual shelter entry may proceed the date when the Medicaid address is updated by a short period.

Because shelter entry occurred at a single point in relative time and was treated as an absorbing state, recent concerns about two-way fixed effect (TWFE) DiD estimates with staggered treatment timing do not apply. The coefficients from pre-shelter quarters provided evidence about the plausibility of the parallel trends assumption.

Results

Table 1 provides a means comparison of ever-sheltered (column 1) and never-sheltered children (column 2). In the 10% random sample of Medicaid children, 4.5% were ever sheltered. Ever-sheltered children were 1.5 percentage points (pp) more likely to be female, 0.95 years younger, and had one more person in their families than the never sheltered. Ever-sheltered children spent an average of 16.5 months in shelter. They had mean monthly mental health expenditures \$35 higher than the never sheltered, but lower claims for physical health and similar overall health spending. Compared to never-sheltered children, ever-sheltered children were more likely to have had any mental health claims (by 37.1%), therapy (66.7%), mental health pharmaceuticals (27.4%), and neurodevelopmental diagnoses (53.2%). Non-mental health claims indicated that the ever sheltered were 35.2% more likely to use the emergency department (ED) and 56.3% more likely to have had an asthma diagnosis. But they were 19.2% less likely to have had ear-related diagnoses and 1.7% less likely to have had well visits. Finally, ever-sheltered children were more than twice as likely to receive SSI (0.092 vs. 0.044). All differences were statistically significant at the $P < 0.05$ level, usually with $P < 0.01$.

Table 2 provides the results of the balance test that compared children entering shelters with and without mental health services in the 4 quarters prior to shelter entry using equation 1. The table shows the regression-adjusted means and differences in means (the coefficient β^2) as well as the P values for the

differences. Of the 14 differences, only one, for well visits, has a $P < 0.05$. Table S1 shows a similar comparison for children who entered shelters with and without primary care services. Together these tables suggested that assignment to shelters was not based on pre-existing health conditions.

We next examined patterns of health service use before and after shelter entry graphically, comparing children who entered shelters with (blue) and without (red) mental health services, controlling for age, family size, and borough (Figures 2-4). The dots indicate point estimates. The shading shows 95% confidence intervals.

Figure 2 examines claims for mental health services. The probabilities of mental health claims (panel A) were similar pre-shelter but increased more sharply post-entry for children co-located with services. Eight quarters after shelter placement, 20.0% of children in shelters with mental health services had a mental health claim, compared with 16.0% of children in other shelters. Panel B shows a similar pattern for the probability that children received therapy. After eight quarters, 10.6% of children in shelters co-located with services received therapy, compared to 7.4% in shelters without services. Panel C shows a post-shelter gap for mental health pharmaceuticals (5.8% versus 4.0% by eight quarters. Notably, the therapy gap was quicker to emerge, larger, and more sustained than the pharmaceutical gap. Panel D depicts neurodevelopmental disorders. Again, the trends in the two groups were similar and flat in the pre-period but diverged after shelter entry. By eight quarters post entry, 13.7% of children in shelters with co-located services had received a diagnosis compared to 11.4% of children in shelters without services.

Figure 3 examines trends in other types of health care utilization. Co-located mental health services were not associated with differential trends in the probabilities of ED use, well visits, asthma diagnoses, or ear-related diagnoses. There was a notable spike in well visits during the quarter of shelter entry and a smaller spike in asthma diagnoses, but those increases did not persist.

Figures S1 and S2 repeat these analyses for shelters with co-located primary care. Unlike the pattern in shelters with mental health services, there were no differences in primary care service use associated with assignment to shelters with co-located primary care services.

Figure 4 examines time trends in receipt of SSI and shelter stays. Panel A shows that children placed in shelters with mental health services were less likely to receive SSI pre-shelter but more likely to receive it following shelter entry. This pattern is consistent with the higher rate of diagnosis of neurodevelopmental disorders in shelters with mental health services, since over half of children on SSI qualify because of a neurodevelopmental disorder (Social Security Administration, 2023). Panel B shows that children placed in shelters with mental health services also remained in shelter longer.

Table 3 presents the formal difference-in-differences analysis, giving point estimates and 95% confidence intervals corresponding to β^{DiD} in equation 2. Estimates are shown for all children (columns 1 and 2), children without mental health claims prior to shelter entry (column 3), children with prior mental health claims (column 4), and children with neither prior own claims nor adult family member prior mental health claims (column 5). Families in columns 3 and 5 were unlikely to have been directed to a shelter with mental health services because of identified needs.

The first row of Table 3 shows that children placed in shelters with mental health services were more likely to have had mental health claims after entry. This pattern was most pronounced for children without prior mental health claims. Following entry to shelters with co-located mental health services, children in families without prior mental health claims were 38-48% more likely to have a therapy claim and 14-16% more likely to receive a diagnosis of a neurodevelopmental disorder. The estimates for mental health pharmaceuticals, ED visits, well visits, asthma and ear-related visits were smaller and imprecisely estimated. Children in shelters with co-located mental health services were significantly more likely to

receive SSI (column 2). Children co-located with mental health services were also 15.4 pp more likely to remain in shelter in the 24-month period following entry, relative to a mean monthly probability of remaining unhoused of 27.5%.

The dynamic DiD model (equation 3) estimated a separate coefficient for each period rather a single "post" coefficient, thus demanding more of the data. Hence, we focused this analysis on children without pre-shelter mental health claims (corresponding to column 3 of Table 3), because this was the subsample where the four primary outcomes were the most precisely estimated.

None of the outcomes in Figure 5 showed trends prior to shelter entry, supporting the parallel trends assumption. However, gaps opened and grew following shelter entry. By eight quarters after entry, children in shelters with co-located mental health services had higher probabilities of mental health claims (3.9 pp), therapy (4.4 pp), mental health pharmaceuticals (1.3 pp), and neurodevelopment diagnoses (1.7 pp). Figure S3 shows that the trends were similar in the full sample of unhoused children (corresponding to column 2 of Table 3).

Figures S4 (all unhoused children) and S5 (children without pre-shelter mental health claims) show that as in Figure 3, there were no significant differences in the probability of claims for ED visits, asthma, or ear diagnoses among children in shelters with mental health services, though there was a brief uptick in the probability of well child visits (which are recommended for children prior to commencing mental health treatment) during the quarter of shelter entry.

Figure S6 shows differences in the probability of SSI receipt and residence in a shelter for among all unhoused children (panels A and B) and for the subsample without prior mental health claims (panels C and D). As in Table 3, shelters with mental health services were associated with increases in SSI receipt and longer shelter stays.

Discussion

By combining Medicaid claims featuring member address histories with public information about the locations of shelters and health care providers, we were able to study health care use among unhoused children. Over the average of three years that we observed them while school-aged, 4.5% of NYC children with consistent Medicaid coverage entered shelters. These children were significantly more likely to use mental health services. Among the unhoused, children placed in shelters co-located with mental health services were much more likely to receive mental health diagnoses (particularly neurodevelopmental) and treatment (especially therapy). These findings align with prior research describing elevated use of mental health services among unhoused children.[1,21-23] These findings were especially pronounced among children without pre-shelter mental health claims. In contrast, there was little association between co-located primary care services and health care use.

One possible reason for these patterns is that there is a severe shortage of mental health services available to children on Medicaid in NYC, and many areas of the city lack providers.[24] This shortage combined with the finding that families stay longer in shelters with co-located mental health services, suggests that shelters may be an important point of access to mental health services for unstably housed children. A question for future research is the extent to which longer stays reflect the value families place on access to services.

As of 2022, only six of NYC's 225 shelters for families with children featured on-site mental health services.[25] However, recent public policy developments have emphasized expanding access. In the fall of 2023, NYC passed Local Law No. 35, which requires the Department of Homeless Services to make

mental health professionals available at the 30 largest shelters for families with children by July 31, 2024—and in every shelter by July 31, 2025 (NYC Admin. Code §§ 21-330 (L.L. 2023/035, 3/14/2023, eff. 9/10/2023)). Our findings suggest that this increase in mental health providers may help to address the mental health needs of children entering the shelter system.

The patterns of child health care use that we observe around shelter entry complement recent work on adults experiencing homelessness. Treglia et. al.[26] combine data on adult ED visits and hospitalizations with administrative data on shelter stays from NYC and find that ED visits increase in the year leading up to shelter entry, spike both at entry and after adults leave shelter, and then decline over the next year. In contrast, we found little evidence of deterioration in children's physical or mental health preceding shelter entry. After shelter entry, there was an increase in mental health claims but little change in claims for physical health problems.

These results raise the question of whether the shelter-coincident increase in mental health claims represents a deterioration in children's mental health or an increase in access to services. While we cannot answer this question definitively, much of the increase was attributable to therapy, which may be beneficial for children undergoing the traumatic experience of homelessness. The increase in claims was also associated with a rise in diagnoses of neurodevelopmental disorders in children without prior mental health claims. Since neurodevelopmental disorders, such as autism spectrum disorder and attention deficit hyperactivity disorder (ADHD), are typically lifelong conditions, we interpret this finding as evidence that shelter entry may increase the probability that previously undiagnosed conditions are detected. Identifying these conditions may also explain the observed increase in SSI, a source of income which may support families' abilities to maintain permanent housing.

This work is subject to several limitations. First, health care use is not the same as health and mental health status cannot be observed directly in Medicaid claims data. Second, we observed children for an average of three years, not throughout childhood, and the HUD shelter address data was limited to point-in-time annual inventories, so 4.5% represents a lower bound on the fraction of school-aged children on Medicaid who will ever reside in a shelter. Third, many unhoused families live doubled-up with other households or in other temporary settings besides shelters; our methods do not measure these children. Fourth, the estimation period pre-dates the COVID-19 pandemic and the current migrant housing crisis. Fifth, despite its many advantages, Medicaid claims data is subject to the accuracy and timeliness of the underlying administrative processes.

Finally, although most poor children in New York (including immigrants) are eligible for Medicaid, many are not continuously covered. Our analysis was limited to those who were continuously enrolled around shelter entry because we could not observe health care use otherwise. About 6% of ever-homeless children aged 4-17 gain Medicaid coverage for the first time coincident with shelter entry which is consistent with the idea that shelter may facilitate access to services. However, to the extent that the most vulnerable children are also the most unstably attached to Medicaid, we may be missing these children.

In conclusion, a considerable share of school-aged children on Medicaid are at risk for housing instability. These children are likely to have elevated mental health needs. Points of entry to the social services system, such as homeless shelters, may promote access to mental health care. Current policy and practice places strong emphasis on preventing homelessness; the evidence we collect here suggests that until that goal is achieved, the role homeless shelters can play in enhancing health and wellbeing should not be overlooked.

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Table 1. Period Prevalence of Selected Health Characteristics[a] among New York City Children on Medicaid[b] by Homelessness Status, 2016-2020.

| | Shelter Experience | | | |
	Ever Mean (1)	Never Mean (2)	Difference[c] (3)	P-value of Diff. (4)
Observations	5,837	124,064		
Share	0.045	0.955		
Female	0.495	0.480	0.015	0.027
Age (years; mean observed)	9.30	10.25	-0.95	0.000
Family Size (persons; mean observed)	3.03	2.01	1.02	0.000
Covered Months	35.20	35.10	0.11	0.727
Months in Homeless Shelter	16.53	0.00	16.53	0.000
Medicaid Mental Health Amount (dollars per month)	165.80	131.09	34.70	0.025
Medicaid Non-Mental Health Amount (dollars per month)	196.52	223.23	-26.71	0.079
Mental Health Claim	0.384	0.280	0.104	0.000
Mental Health Therapy	0.180	0.108	0.072	0.000
Mental Health Pharmacy	0.093	0.073	0.020	0.000
Neurodevelopmental Diagnosis	0.239	0.156	0.083	0.000
Emergency Department	0.483	0.358	0.126	0.000
Well Visit	0.745	0.758	-0.013	0.044
Asthma Diagnosis	0.247	0.158	0.089	0.000
Ear Diagnosis	0.205	0.254	-0.049	0.000
Supplemental Security Income	0.092	0.044	0.048	0.000

[a] The characteristics given in rows are binary indicators for ever-experiencing the characteristic while on Medicaid and aged 4–17 and corresponding units are percentages, except when other units are given, in which case the reported statistics are means while aged 4–17.

[b] 10 percent random sample of children aged 4–17 on Medicaid.

[c] Results obtained from separate bivariate regressions of each row-indexed characteristic on an indicator for ever residing in a homeless shelter, with standard errors clustered by family.

Table 2. Balance Test of Pre-Shelter[a] Health Characteristics of New York City Medicaid Children[b], by Presence of Co-Located Mental Health Services in Shelter, 2016–2020

| | Co-Located Mental Health | | | |
	Yes Mean (1)	No Mean (2)	Difference[c] (3)	P-value of Diff. (4)
Female	0.474	0.491	-0.017	0.371
Unadjusted Age (years)	8.701	9.070		
Unadjusted Family Size (persons)	2.671	3.421		
Covered Months	10.50	10.44	0.06	0.636
Medicaid Mental Health Amount (dollars per month)	132.87	178.57	-46.06	0.268
Medicaid Non-Mental Health Amount (dollars per month)	200.55	174.47	26.29	0.344
Mental Health Claim	0.286	0.269	0.018	0.330
Mental Health Therapy	0.149	0.135	0.013	0.312
Mental Health Pharmacy	0.076	0.073	0.004	0.695
Neurodevelopmental Diagnosis	0.192	0.175	0.017	0.280
Emergency Department	0.284	0.262	0.022	0.241
Well Visit	0.617	0.575	0.042	0.043
Asthma Diagnosis	0.210	0.199	0.011	0.532
Ear Diagnosis	0.069	0.066	0.003	0.803
Supplemental Security Income	0.058	0.077	-0.019	0.070
Family Mental Health Claim	0.537	0.511	0.026	0.270
Observations	703	16,243		

[a] Characteristics measured 4 quarters prior to shelter entry.

[b] Age 4 to 17 during the month of shelter entry.

[c] Results obtained from separate regressions of each row-indexed characteristic on an indicator for residing in a shelter with mental health services (reported coefficient ("Difference") and P value), controlling family size fixed effects, borough fixed effects, and a cubic in age. Standard errors clustered by family. Unless otherwise noted, the means in columns 1 and 2 also adjust for these controls.

Table 3. Difference-in-Differences Estimates[a] of the Relationship between Co-Located Mental Health Services at Homeless Shelters and Monthly Child Health Outcomes, +/-24 Months around Shelter Entry, New York City Medicaid Population Age 4–17[b], 2016-2020

	Monthly Mean[c] (1)	All Children (2)	No Prior Child MH (3)	Prior Child MH (4)	No Prior Child or Adult MH (5)
Mental Health Claim	0.1238	0.0214 [0.0019,0.0409]	0.0223 [0.0048,0.0397]	0.0187 [-0.0255,0.0629]	0.0269 [0.0035,0.0504]
Mental Health Therapy	0.0560	0.0202 [0.0049,0.0356]	0.0212 [0.0071,0.0353]	0.0162 [-0.0180,0.0504]	0.0273 [0.0076,0.0470]
Mental Health Pharmacy	0.0291	0.0070 [-0.0027,0.0167]	0.0070 [-0.0008,0.0147]	0.0059 [-0.0175,0.0294]	0.0089 [-0.0022,0.0200]
Neurodevelopmental Diagnosis	0.0831	0.0137 [-0.0026,0.0301]	0.0122 [-0.0001,0.0246]	0.0168 [-0.0241,0.0576]	0.0131 [-0.0032,0.0293]
Emergency Department	0.0423	-0.0033 [-0.0098,0.0032]	-0.0019 [-0.0092,0.0055]	-0.0066 [-0.0191,0.0059]	-0.0003 [-0.0099,0.0093]
Well Visit	0.0610	0.0020 [-0.0034,0.0075]	0.0024 [-0.0042,0.0091]	0.0029 [-0.0059,0.0118]	0.0046 [-0.0040,0.0131]
Asthma Diagnosis	0.0373	0.0041 [-0.0025,0.0107]	0.0056 [-0.0011,0.0123]	0.0011 [-0.0130,0.0152]	0.0031 [-0.0048,0.0111]
Ear Diagnosis	0.0121	-0.0001 [-0.0036,0.0033]	-0.0008 [-0.0048,0.0032]	0.0015 [-0.0047,0.0076]	-0.0012 [-0.0063,0.0038]
Supplemental Security Income	0.0828	0.0141 [0.0004,0.0279]	0.0118 [-0.0013,0.0249]	0.0178 [-0.0132,0.0488]	0.0070 [-0.0094,0.0234]
Homeless Shelter Stay	0.2756	0.1539 [0.1233,0.1845]	0.1466 [0.1125,0.1806]	0.1733 [0.1227,0.2239]	0.1148 [0.0730,0.1565]
	700,242	691,067	473,304	217,762	318,715

[a] Results obtained from separate regressions of each row-indexed outcome on an indicator for mental health shelter interacted with an indicator for time period post-shelter entry (reported coefficient), controlling for individual fixed effects, calendar month fixed effects, an indicator for month post shelter entry, a cubic in age, borough fixed effects, and family size fixed effects. 95 percent confidence intervals reported in brackets. Standard errors clustered by family. Each cell represents a separate regression. Unit of observation is person-month.

[b] Age 4 to 17 during the month of shelter entry.

[c] Each mean is the average monthly probability of the outcome of interest having occurred during the period +/-24 months of the month of shelter entry. Coefficients give the difference-in-differences estimates of the changes in the outcome probabilities post-shelter entry for children placed in mental health shelters.
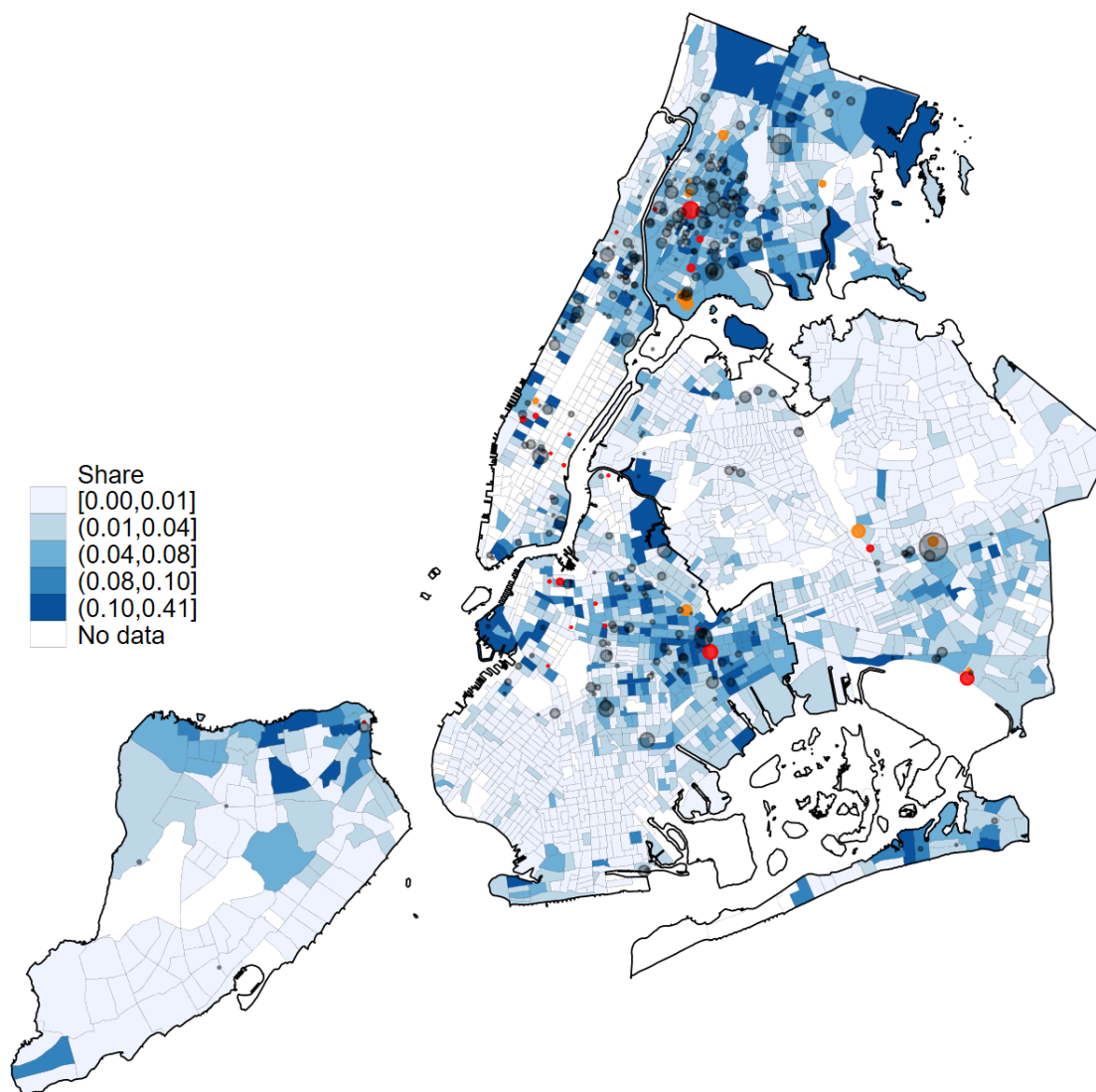
Figure 1. Share of Medicaid children aged 4–17 years experiencing homelessness by census tract when not in shelter, New York City, 2016–2020. The figure depicts where children on Medicaid who experienced homelessness between 2016 and 2020 lived when housed, weighted by months in residence. The limits of the shading bins are the 0, 50, 75, 90, 95, 100 percentiles of within-sample rates of child homelessness. The red circles indicate the locations of 22 shelters co-located with Medicaid mental health providers. The orange circles denote shelters co-located with Medicaid primary care providers. The black circles denote regular shelters. The sizes of the circles are proportional to the number of unique children in residence during 2016–2020. For clarity in this figure, we excluded census tracts with fewer than 15 observations and shelters with fewer than 10 child residents during the five-year period. We obtained the shapefiles from the NYC Department of City Planning; census tracts correspond to the 2010 vintage.

A)

Pr(Mental Health Claim)

B)

Pr(Therapy)

C)

Pr(MH Pharmacy)
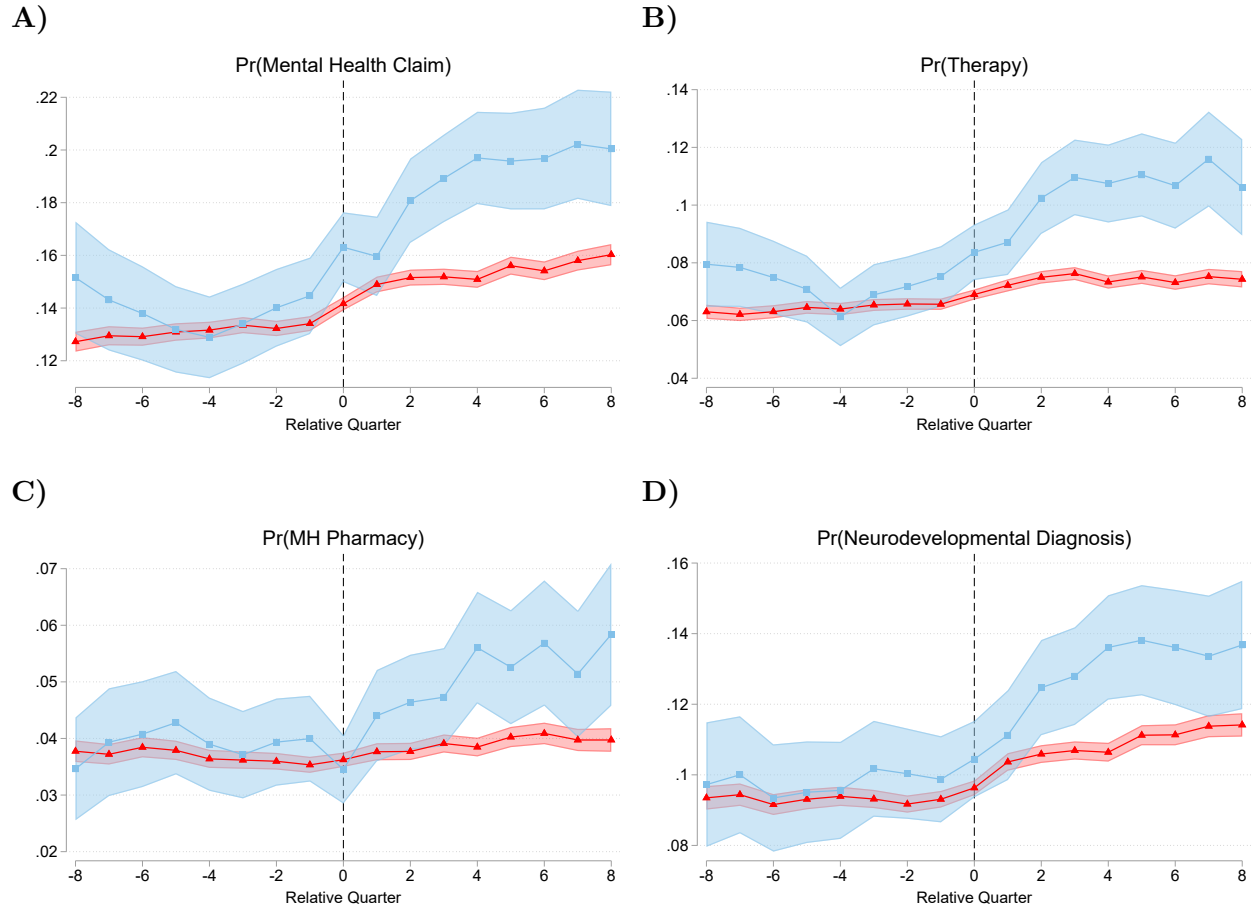
D)

Pr(Neurodevelopmental Diagnosis)

Figure 2. Probability of selected mental health outcomes around homeless shelter entry (+/-8 quarters), by presence of co-located mental health services, Medicaid children age 4-17, New York City, 2016–2020. A) Any mental health claim. B) Therapy. C) Mental health pharmaceuticals. D) Neurodevelopmental diagnosis. Blue squares denote shelters with co-located mental health services. Red triangles denote all other homeless shelters. Shaded areas give 95 percent confidence intervals. All graphs control for family size fixed effects, borough fixed effects, and a cubic in age, and are scaled to age-11 means within sample. Unit of observation is person-year. 16,946 children; 746,900 observations.

A)

Pr(Emergency Department)

B)

Pr(Well Visit)

C)

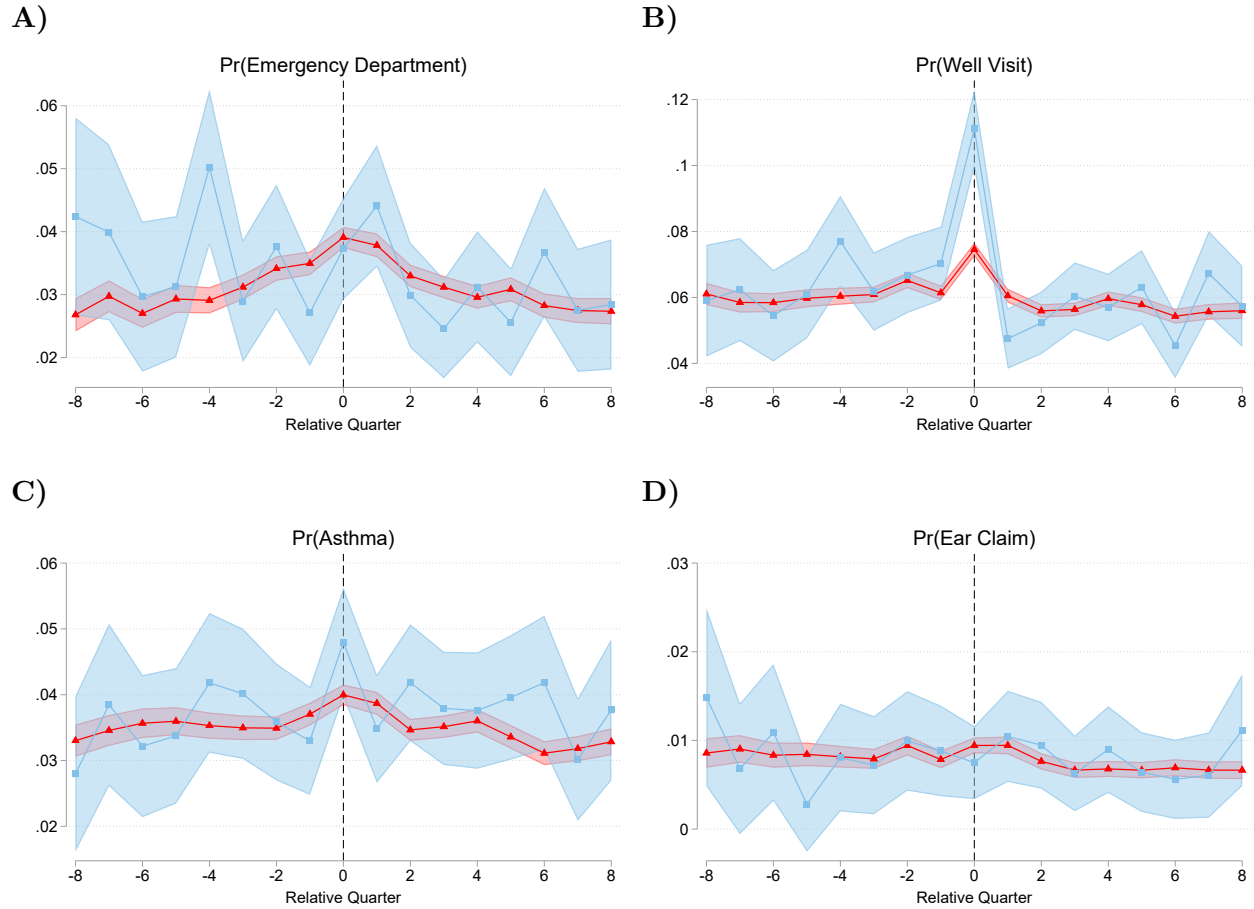Pr(Asthma)

D)

Pr(Ear Claim)

Figure 3. Probability of selected physical health outcomes around homeless shelter entry (+/-8 quarters), by presence of on-site mental health services, Medicaid children age 4-17, New York City, 2016–2020. A) Emergency department visit. B) Well visit. C) Asthma diagnosis. D) Ear diagnosis. Blue squares denote shelters with co-located mental health services. Red triangles denote all other homeless shelters. Shaded areas give 95 percent confidence intervals. All graphs control for family size fixed effects, borough fixed effects, and a cubic in age, and are scaled to age-11 means within sample. Unit of observation is person-year. 16,946 children; 746,900 observations.
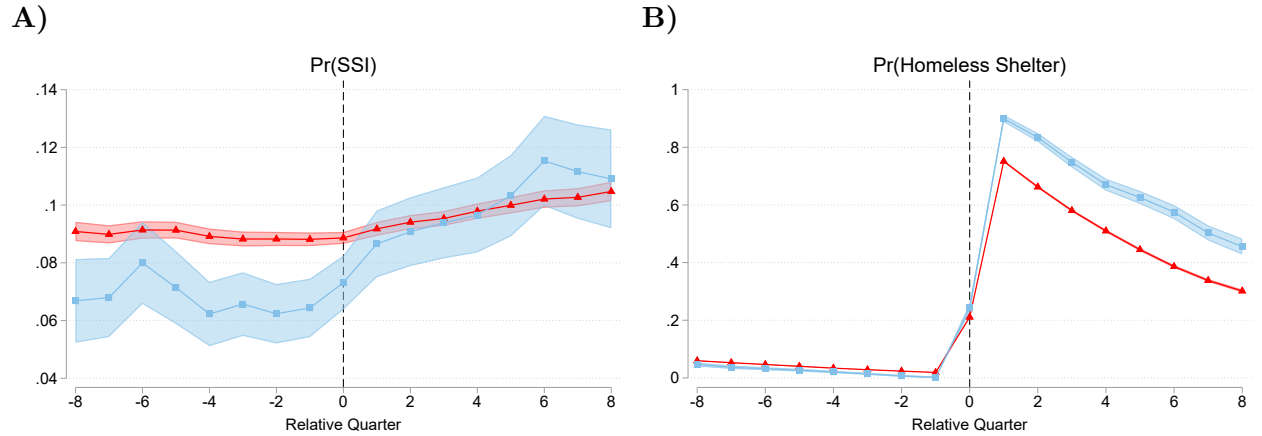
Figure 4. Probability of selected outcomes around homeless shelter entry (+/-8 quarters), by presence of on-site mental health services, Medicaid children age 4-17, New York City, 2016–2020. A) Supplemental Security Income receipt. B) Residence in homeless shelter. Blue squares denote shelters with co-located mental health services. Red triangles denote all other homeless shelters. Shaded areas give 95 percent confidence intervals. All graphs control for family size fixed effects, borough fixed effects, and a cubic in age, and are scaled to age-11 means within sample. Unit of observation is person-year. 16,946 children; 746,900 observations.

A)

Pr(Mental Health Claim)

B)

Pr(Therapy)

C)

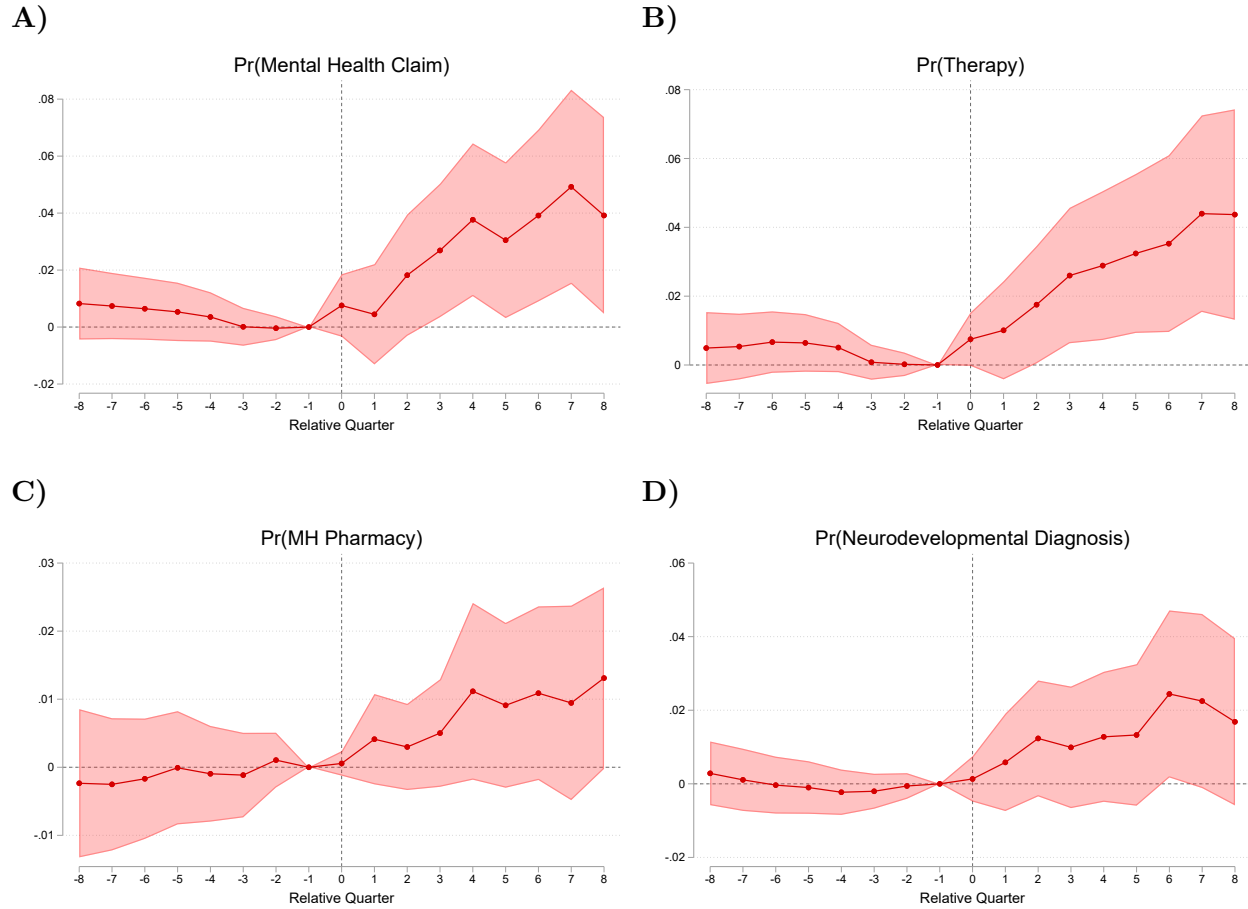Pr(MH Pharmacy)

D)

Pr(Neurodevelopmental Diagnosis)

Figure 5. Dynamic difference-in-differences estimates of the relationship between co-located shelter mental health services and the probability of selected mental health outcomes, +/-8 quarters around homeless shelter entry, Medicaid children age 4-17 without pre-shelter mental health claims, New York City, 2016–2020. A) Any mental health claim. B) Therapy. C) Mental health pharmaceuticals. D) Neurodevelopmental diagnosis. The red circles denote the quarterly point estimates; shaded areas give the 95 percent confidence intervals. Unit of observation is person-month. 11,799 individuals; 473,304 observations.

<u>**Supplementary Material**</u>

Child Mental Health, Homelessness, and the Shelter System: Evidence from Medicaid
in New York City

Mike Cassidy, Janet Currie, Sherry Glied, and Renata Howland

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Table S1. Balance Test of Pre-Shelter[a] Health Characteristics of New York City Medicaid Children[b], by Presence of Co-Located Primary Care Services in Shelter, 2016–2020

| | Co-Located Primary Care | | | |
	Yes Mean (1)	No Mean (2)	Difference[c] (3)	P-value of Diff. (4)
Female	0.511	0.490	0.021	0.270
Unadjusted Age (years)	8.749	9.068		
Unadjusted Family Size (persons)	3.025	3.407		
Covered Months	10.14	10.45	-0.32	0.023
Medicaid Mental Health Amount (dollars per month)	169.12	177.02	-7.94	0.865
Medicaid Non-Mental Health Amount (dollars per month)	170.04	175.79	-5.78	0.856
Mental Health Claim	0.258	0.270	-0.012	0.464
Mental Health Therapy	0.146	0.135	0.011	0.375
Mental Health Pharmacy	0.073	0.073	0.001	0.936
Neurodevelopmental Diagnosis	0.158	0.176	-0.019	0.184
Emergency Department	0.267	0.263	0.005	0.811
Well Visit	0.528	0.579	-0.052	0.022
Asthma Diagnosis	0.205	0.200	0.005	0.770
Ear Diagnosis	0.065	0.066	-0.002	0.899
Supplemental Security Income	0.048	0.078	-0.030	0.001
Family Mental Health Claim	0.478	0.514	-0.036	0.134
Observations	732	16,214		

[a] Characteristics measured 4 quarters prior to shelter entry.

[b] Age 4 to 17 during the month of shelter entry.

[c] Results obtained from separate regressions of each row-indexed characteristic on an indicator for residing in a shelter with primary care services (reported coefficient ("Difference") and P value), controlling family size fixed effects, borough fixed effects, and a cubic in age. Standard errors clustered by family. Unless otherwise noted, the means in columns 1 and 2 also adjust for these controls.
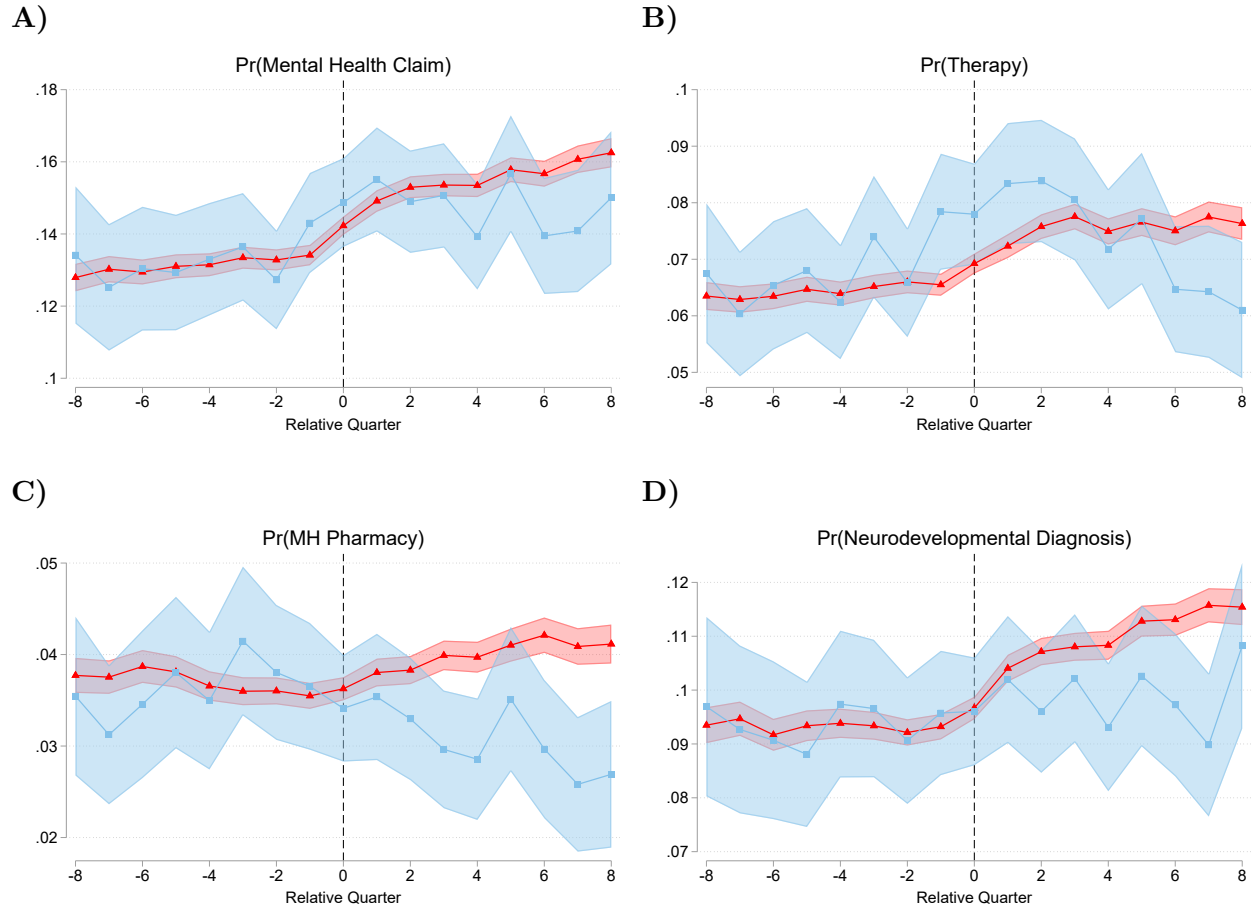
A)

B)

C)

D)

Figure S1. Probability of selected mental health outcomes around homeless shelter entry (+/-8 quarters), by presence of co-located primary care, Medicaid children age 4-17, New York City, 2016–2020. A) Any mental health claim. B) Therapy. C) Mental health pharmaceuticals. D) Neurodevelopmental diagnosis. Blue squares denote shelters with co-located primary care services. Red triangles denote all other homeless shelters. Shaded areas give 95 percent confidence intervals. All graphs control for family size fixed effects, borough fixed effects, and a cubic in age, and are scaled to age-11 means within sample. Unit of observation is person-year. 16,946 children; 746,900 observations.
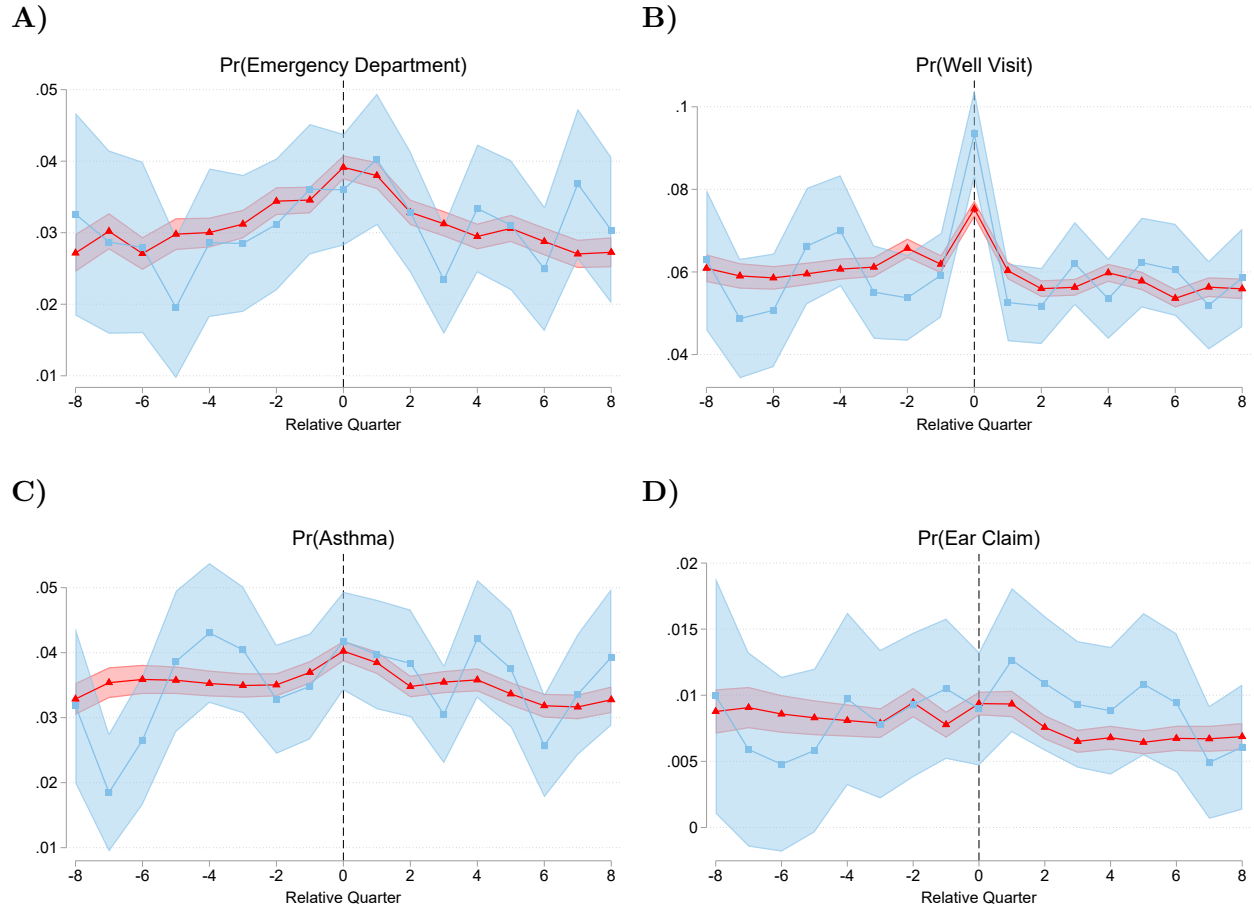
A)

B)

C)

D)

Figure S2. Probability of selected physical health outcomes around homeless shelter entry (+/-8 quarters),by presence of of co-located primary care, Medicaid children age 4-17, New York City, 2016–2020. A) Emergency department visit. B) Well visit. C) Asthma diagnosis. D) Ear diagnosis. Blue squares denote shelters with co-located primary care services. Red triangles denote all other homeless shelters. Shaded areas give 95 percent confidence i ntervals. All graphs control for family size fixed effects, borough fixed e ffects, an d a cu bic in ag e, an d ar e sc aled to ag e-11 me ans wi thin sa mple. Un it of observation is person-year. 16,946 children; 746,900 observations.

A)

Pr(Mental Health Claim)

B)

Pr(Therapy)

C)

Pr(MH Pharmacy)
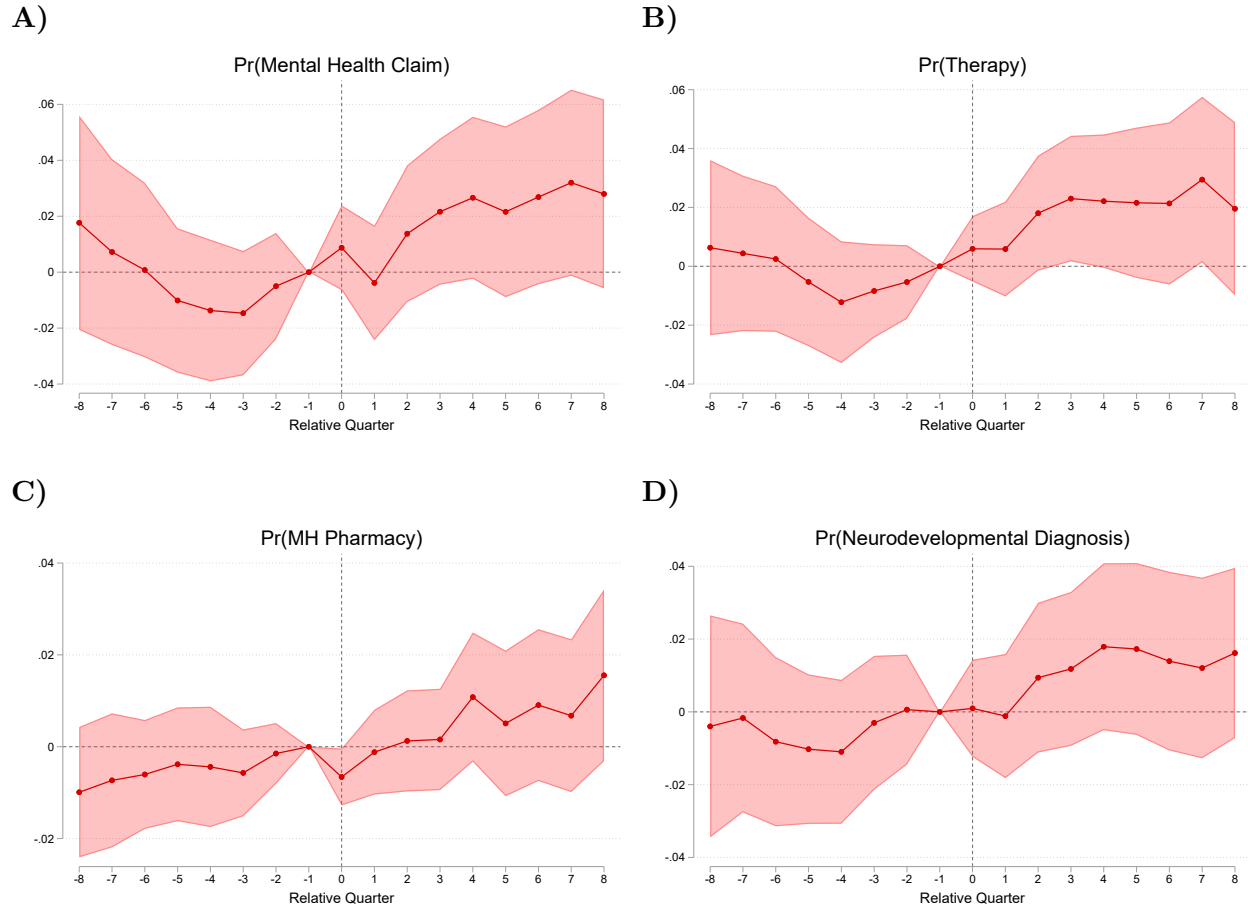
D)

Pr(Neurodevelopmental Diagnosis)

Figure S3. Dynamic difference-in-differences estimates of the relationship between co-located shelter mental health services and the probability of selected mental health outcomes, +/-8 quarters around homeless shelter entry, Medicaid children age 4-17, New York City, 2016–2020. A) Any mental health claim. B) Therapy. C) Mental health pharmaceuticals. D) Neurodevelopmental diagnosis. The red circles denote the quarterly point estimates; shaded areas give the 95 percent confidence intervals. Unit of observation is person-month. 16,946 individuals; 691,067 observations.
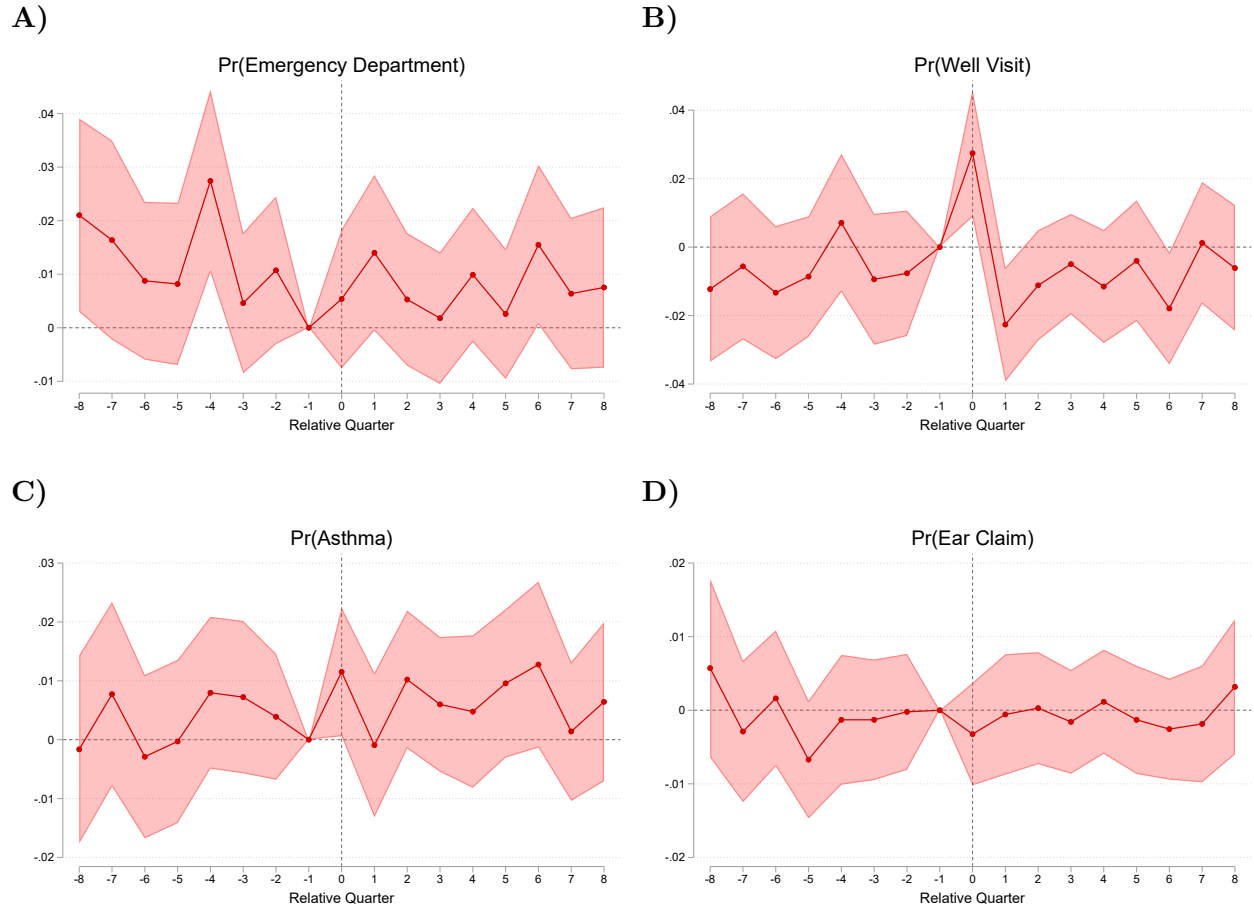
A)

B)

C)

D)

Figure S4. Dynamic difference-in-differences estimates of the relationship between co-located shelter mental health services and and the probability of selected physical health outcomes, +/-8 quarters around homeless shelter entry, Medicaid children age 4-17, New York City, 2016–2020. A) Emergency department visit. B) Well visit. C) Asthma diagnosis. D) Ear diagnosis. The red circles denote the quarterly point estimates; shaded areas give the 95 percent confidence intervals. Unit of observation is person-month. 16,946 individuals; 691,067 observations.
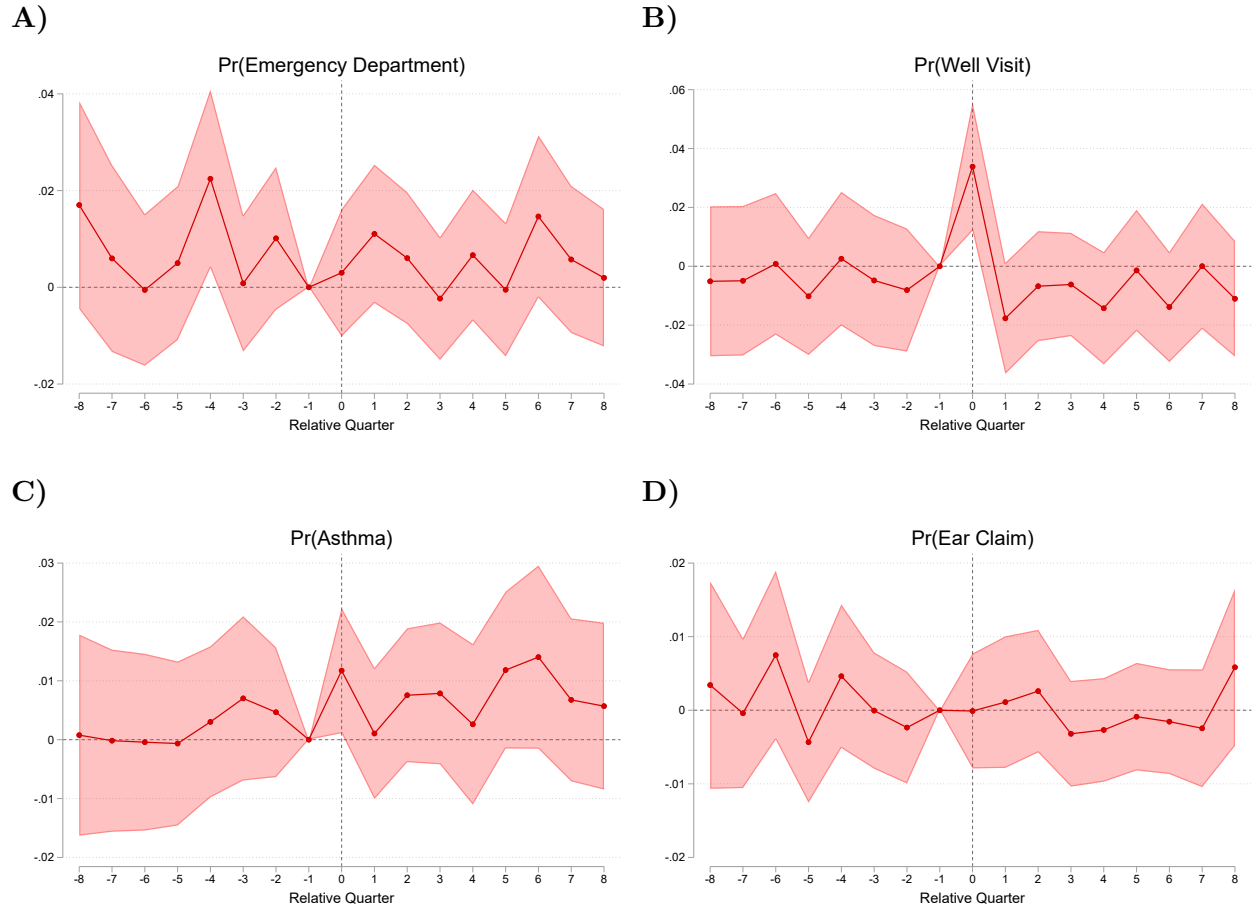
A)

Pr(Emergency Department)

B)

Pr(Well Visit)

C)

Pr(Asthma)

D)

Pr(Ear Claim)

Figure S5. Dynamic difference-in-differences estimates of the relationship between co-located shelter mental health services and and the probability of selected physical health outcomes, +/-8 quarters around homeless shelter entry, Medicaid children age 4-17 without pre-shelter mental health claims, New York City, 2016–2020. A) Emergency department visit. B) Well visit. C) Asthma diagnosis. D) Ear diagnosis. The red circles denote the quarterly point estimates; shaded areas give the 95 percent confidence intervals. Unit of observation is person-month. 11,799 individuals; 473,304 observations.
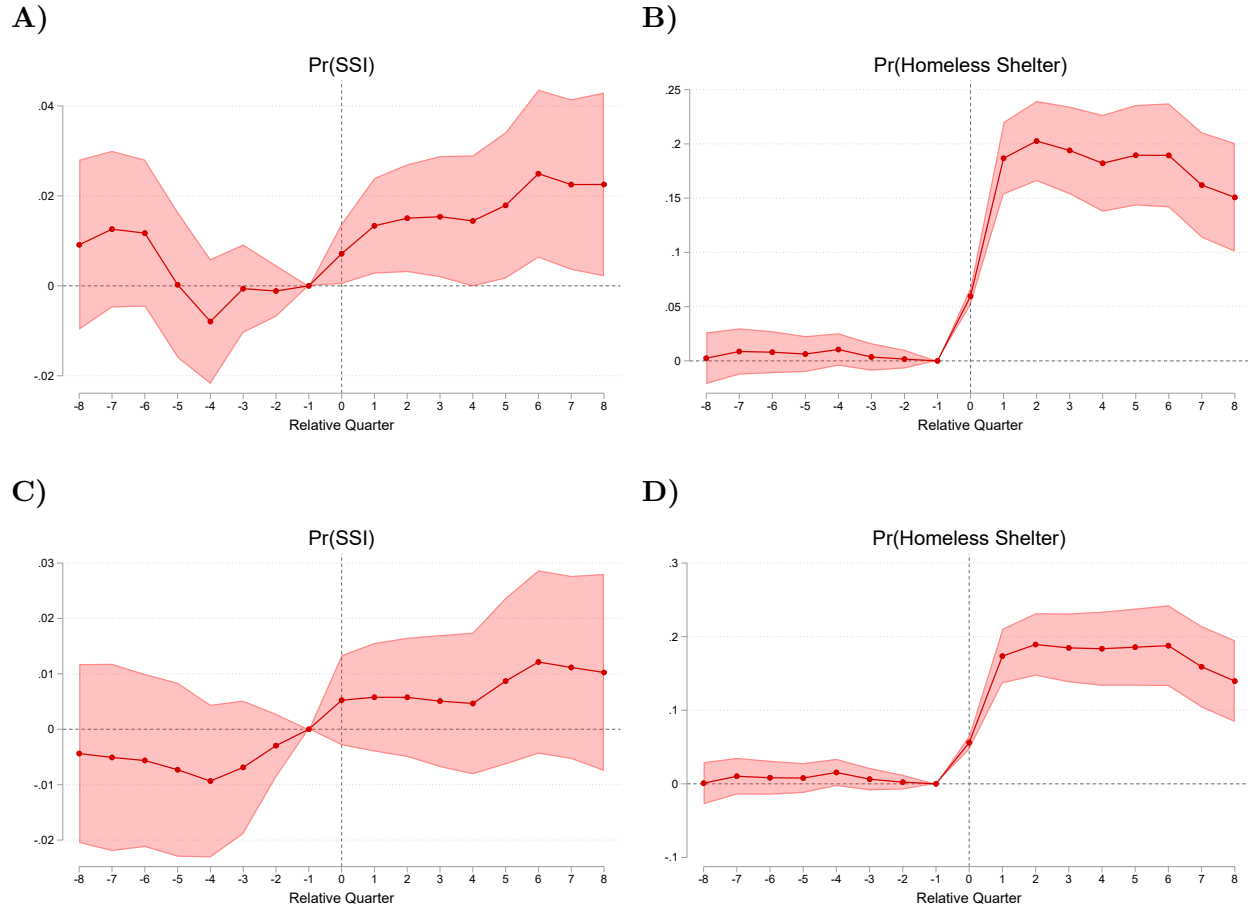
A)

Pr(SSI)

B)

Pr(Homeless Shelter)

C)

Pr(SSI)

D)

Pr(Homeless Shelter)

Figure S6. Dynamic difference-in-differences estimates of the relationship between co-located shelter mental health services and and the probability of selected public benefit outcomes, +/-8 quarters around homeless shelter entry, Medicaid children age 4-17, New York City, 2016–2020. A) Supplemental Security Income receipt, all children in shelter. B) Residence in homeless shelter, all children in shelter. C) Supplemental Security Income receipt, children without pre-shelter mental health claims. D) Residence in homeless shelter, children without pre-shelter mental health claims. The red circles denote the quarterly point estimates; shaded areas give the 95 percent confidence intervals. Unit of observation is person-month. Panels A and B: 16,946 individuals; 691,067 observations. Panels C and D: 11,799 individuals; 473,304 observations.