IPRO

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Health Services Utilization of North Dakota Youth in Foster Care

Department of Health and Human Services
Medical Services Division

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NORTH Dakota | Health & Human Services

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Executive Summary

The purpose of this study was to understand the health needs and utilization of children in foster care to inform changes in policy or practice that could address any unmet healthcare needs, promote appropriate healthcare management, and improve health outcomes. IPRO examined the use of services by Medicaid enrollees in foster care and compared them to children not in foster care based on Medicaid claims from 2022. This report presents findings related to demographics, underlying health conditions, pharmaceutical prescribing, and use of preventive health care services. Of concern based on prior studies were the high rates of hospitalization and medication prescribing for foster care youth, including attention-deficit/hyperactivity disorder (ADHD) medication, antidepressants, and antipsychotics. Polypharmacy increases the risk of harmful side effects such as weight gain, type 2 diabetes, and lipid abnormalities, leading to overall poorer health.

This study found:

- 6.57% of Medicaid enrollees under 21 years of age were in foster care in 2022. Of note, American Indian enrollees enter foster care at higher rates than other youth. American Indian enrollees comprised 41.97% of foster care enrollees, but only 20.07% of non-foster care enrollees.
- 26.76% of foster care enrollees resided in the counties with the lowest ranked socioeconomic status, compared to 20.01% of all other Medicaid enrolled youth.
- Almost five times as many youth in foster care had an alcohol or substance-related disorder than children not in foster care. Rates of serious mental illness were three to four times higher for youth in foster care than children not in foster care.
- Youth in foster care were much higher utilizers of any psychotropic medication, as well as being much more likely to have two or more psychotropic medications prescribed concurrently than youth not in foster care. The percentage using psychotropic medications was relatively small, but the disparities by foster care status are large.
- Annual preventive care was received by a greater proportion of foster care enrollees than all other Medicaid youth, including well-child visits, topical fluoride application, and behavioral health screenings and assessments. There is room for improvement in rates, however, compared to national data.
- Foster care enrollees aged 6-17 years of age are almost four times more likely than non-foster care enrollees of that same age group to be hospitalized for mental illness.
- Risk factors for hospitalization for mental illness among all Medicaid enrollees aged 6-17 were the following:
  - demographic: ages 13-17, female;
  - behavioral health diagnoses: substance use/dependence, schizophrenia or other psychotic disorders, mood disorders, anxiety and trauma, autism spectrum disorders, disruptive behavioral disorders, impulse control; and
  - metabolic risk factors: one risk factor, two or more risk factors; polypharmacy: chronic use of two psychotropics.
- The relationship between foster care status and hospitalization for mental illness is not independent of these risk factors based on statistical analysis. Therefore, understanding the disparities in the distribution of these drivers of hospitalization for mental health among foster care and non-foster care enrollees is key to understanding and addressing the susceptibilities of foster care enrollees.
- Of the risk factors for hospitalization for mental illness, children in foster care were statistically significantly disproportionately over-represented by the adolescent age group; all the above listed behavioral health diagnoses except autism spectrum disorder; polypharmacy; and the following metabolic risk factors: abnormal blood glucose (other than prediabetes and diabetes mellitus) and hyperlipidemia.

Conclusion

This focus study provides evidence of higher rates of hospitalization for mental illness for youth in foster care but shows that it is not being in foster care itself, that is the driver. Instead, it's underlying differences in mental health, polypharmacy, and associated metabolic factors that make this group more susceptible to hospitalization. In 2024, IPRO will conduct further claims data analysis to evaluate foster care enrollees' receipt of other types of health care services.

Key Recommendation

While this study points to various disparities between youth in foster care and those not in foster care, it does not explain why differences occur. In order to design interventions to close gaps and help improve the health of those in foster care, information should be gathered from foster youth, their caretakers, and their providers about access to and experiences with using health services. IPRO recommends a survey or focus groups with individuals or organizations that can speak on behalf of those impacted.

Appropriate management of children on antipsychotics is a key component of evidence-based care. A recommended strategy for North Dakota is to collaborate with providers to ensure evidence-based prescribing practices consistent with the American Academy of Child & Adolescent Psychiatry's "Practice Parameter on the Use of Psychotropic Medication in Children and Adolescents."

Introduction

Background

Prior studies of health care utilization by youth in foster care has shown that they experience higher rates of medication and hospitalization for mental illness than children not in foster care. One in four youth in foster care between the ages of 6 and 17 are administered at least one psychotropic drug and a significant number of children are given a combination of two, three, or four drugs at the same time.[1] Among North Dakota Medicaid enrollees, a greater proportion of children and adolescents in foster care are prescribed attention-deficit/hyperactivity disorder (ADHD) medication, antidepressants, and antipsychotics compared to all other youth insured by Medicaid.[2] Polypharmacy increases the risk of harmful side effects, such as weight gain, type 2 diabetes mellitus, and lipid abnormalities, yet safe prescribing practices for foster youth are not routinely followed.[1] Known barriers to safe and judicious use of antipsychotic medication in children include rural residence and social determinants of health.[3] A study of Medicaid enrollees in 10 states, that did not include North Dakota, found that children in foster care were twice as likely as non-foster care enrollees to receive multiple concurrent antipsychotic medications.[4]

The purpose of this study was to understand the health needs and health services utilization of children in foster care to inform changes in policy or practice that could address any unmet health care needs, promote appropriate healthcare management, and improve health outcomes.

Research Objectives

1. Profile and compare the prevalence of behavioral health conditions, polypharmacy, and any hospitalization for mental illness (ages 6–17 years) among youth in foster care compared to non-foster care youth.
2. Quantify the risk for any hospitalization for mental illness among youth in foster care to non-foster care youth.
3. Quantify additional demographic, clinical, and utilization risk factors for any hospitalization for mental illness (all Medicaid enrollees ages 6–17 years).
4. Profile use of Health Tracks preventive services by youth in foster care compared to non-foster care youth (ages 0-20).

Methodology

Study Design, Eligibility, and Data Source

This study relied on Medicaid claims and community-level descriptive information to report on the prevalence of behavioral health conditions and metabolic risk factors; variation in receipt of preventive care and hospitalization for mental illness; and risk factors for hospitalization for mental illness among youth in foster care compared to non-foster care enrollees (ages 6–17 years) in North Dakota. The clinical, demographic, and healthcare utilization data are extracted from claims and enrollment data files for the eligible population of North Dakota Medicaid enrollees, ages 0–20 years during the measurement period from January 1, 2022, to December 31, 2022. Community level context is from County Health Rankings & Roadmaps (CHRR), a data resource compiled by the University of Wisconsin Population Health Institute.[5]

Enrollee Data and Measurement

Clinical, behavioral health and metabolic risk factors were specified using ICD-10 codes. Psychotropic polypharmacy was specified using Therapeutic Class codes provided by HHS, who also provided CPT and HCPCS codes to identify dental screenings, fluoride treatment, behavioral health screenings, brief behavioral health assessment, and developmental screenings. Neither HEDIS nor CMS measures were utilized in their entirety for preventive care and healthcare utilization; however, the focus study measure for well-child visits built on CMS Core Set numerator specifications and the study measure for hospitalization for mental illness built on the CMS Core Set denominator specifications, as described, below.

The following characteristics are profiled by foster care status:

- **Demographic characteristics:** age group, race, ethnicity, race/ethnicity combined, area of residence, and county quartile for health ranking (least to most healthy). Enrollee counties of residence were grouped into quartiles from most healthy to least healthy based on county measures of social and economic factors including education, employment, income, family and social support, and community safety. The county with the best health was ranked number one in that state and the county with the worst health was assigned the lowest rank in that state.[5]
- **Clinical or behavioral health conditions:** serious mental illness (SMI), substance use disorder (SUD), alcohol use disorder, substance (drug) use disorder, schizophrenia or other psychotic disorders, mood disorders, anxiety and trauma, autism spectrum disorder, other neurodevelopmental disorders, attention-deficit/hyperactivity disorder, and impulse control. Serious mental illness includes diagnoses of schizophrenia or other psychotic disorders, mood disorders, and anxiety/trauma. Substance use disorder includes alcohol use/dependence or substance (drug) abuse/dependence.
- **Clinical or metabolic risk factors:** blood glucose disorders (prediabetes, other abnormal blood glucose, type 1 and type 2 diabetes); hyperlipidemia; weight diagnosis; and metabolic risk.
- **Psychotropic polypharmacy:** three concurrent classes of psychotropic use, two concurrent classes of psychotropic use, and single-class psychotropic use. Such combinations include attention-deficit/hyperactivity disorder (ADHD) medications, antidepressants, and antipsychotics. Psychotropic polypharmacy is defined as the concurrent use of at least two classes of psychotropic medications with at least a 90-day overlap. The polypharmacy categories are not mutually exclusive as an enrollee may have been in one category for one 3-month period and another for a different 3-month period.
- **Preventive care:** annual well-care visit, topical fluoride application by dentist or PCP, behavioral health screening/assessments. Well-child visits were specified using the numerator specification for the CMS Core Set measure WCV-CH (Child and adolescent well-care visits, ages 3 to 21 years) and W30-CH (Well-Child Visits in the First 30 months of life, modified to measure any visit rather than multiple visits) and applied to the focus study eligible population ages 0 to 20 years.

- **Healthcare utilization:** the measurement for any hospitalization for mental illness used the denominator specifications for the Centers for Medicare & Medicaid Services (CMS) Child Core Set Follow-Up After Hospitalization for Mental Illness: Ages 6–17 Years (FUH-CH) measure. The measure for any hospitalization for mental illness (6–17 years) was profiled by:
    - demographic characteristics
    - clinical or behavioral health conditions
    - metabolic risk factors
    - psychotropic polypharmacy

Additional details about specific statistical tests used are in **Appendix A: Statistical Methods**.

Findings

Enrollee Characteristics by Foster Care Status

The study population included 53,649 Medicaid enrollees less than 21 years of age, comprised of 3,524 enrollees in foster care (6.57%) and 50,125 not in foster care (93.43%). Results that are statistically significantly different between children in foster care and non-foster care children are presented in the body of the report. All results, including those that are not statistically significant, are summarized in **Appendix B**.

Demographic Characteristics (Table B1)

- Age: Children in foster care are slightly older than children not in foster care. Older youth (ages 13-20) comprised 38.56% of the foster care population and 30.72% of the non-foster care population.
- Race/Ethnicity: Youth in foster care are more likely to be American Indian than are non-foster care youth as shown in **Figure 1**. American Indian enrollees comprised 41.97% of foster care enrollees, compared to 20.07% of non-foster care enrollees. White enrollees comprised 48.44% of foster care enrollees, and 62.60% of non-foster care enrollees. Analysis of ethnicity showed fewer Latino/Hispanic enrollees as a percent of the foster care population. Latino/Hispanic enrollees comprised 3.83% of foster care enrollees and 7.41% of non-foster care enrollees.
- Place of residence: **Figure 2** displays the zip code of residence of American Indian youth in foster care and **Figure 3** displays the zip code of residence of non-American Indian youth in foster care. Together, the two maps provide evidence of statistically different places of residence. **Figure 4** shows children in foster care are disproportionately living in the least healthy portions of the state. The proportion of foster care enrollees residing in the least healthy counties was 26.76%, whereas 20.01% of non-foster care enrollees resided in the least healthy counties.

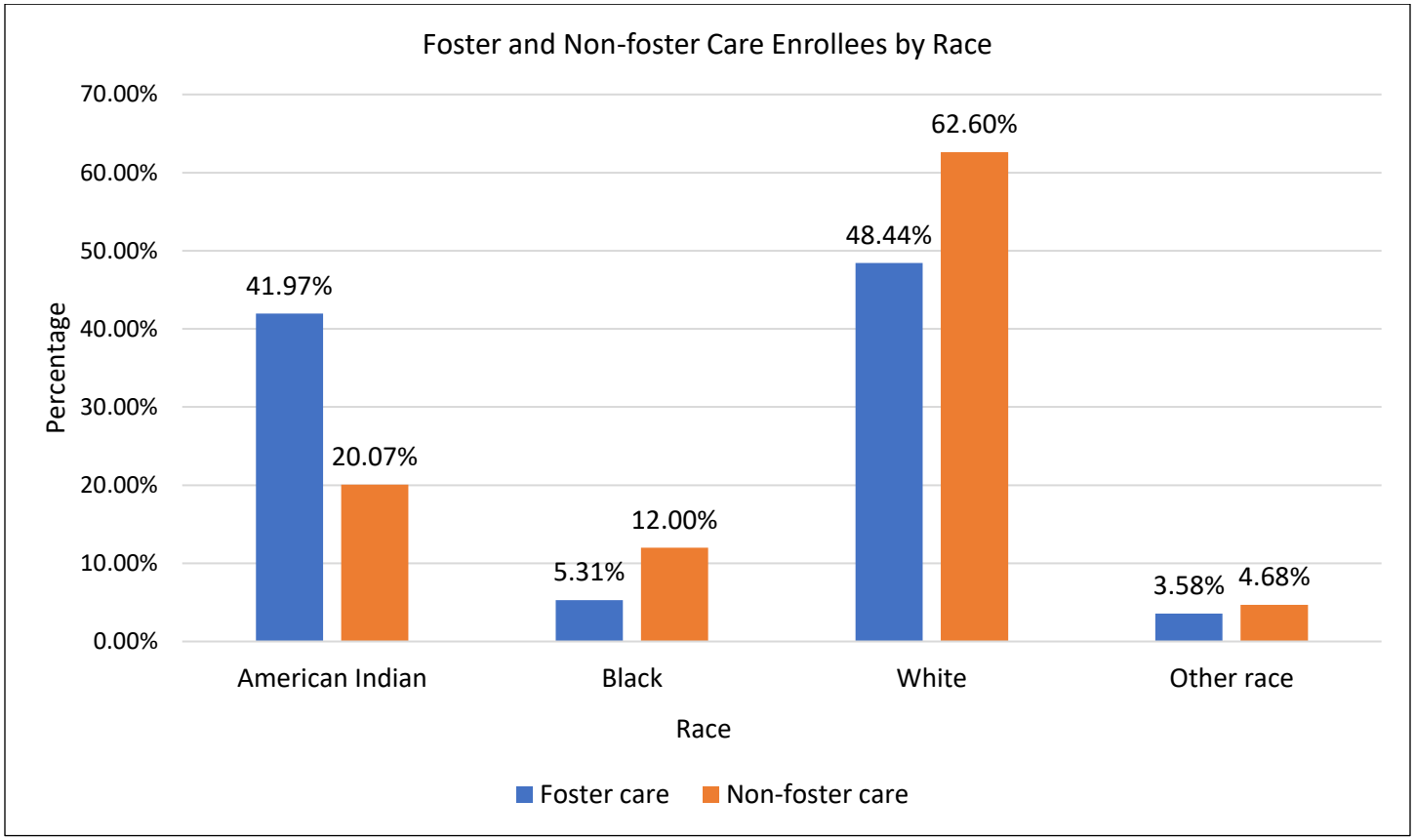


Figure 1: Racial Composition of Foster and Non-foster Care Enrollees Percent of foster care (blue bars) and non-foster care (orange bars) enrollees by American Indian, Black, White, and other race.

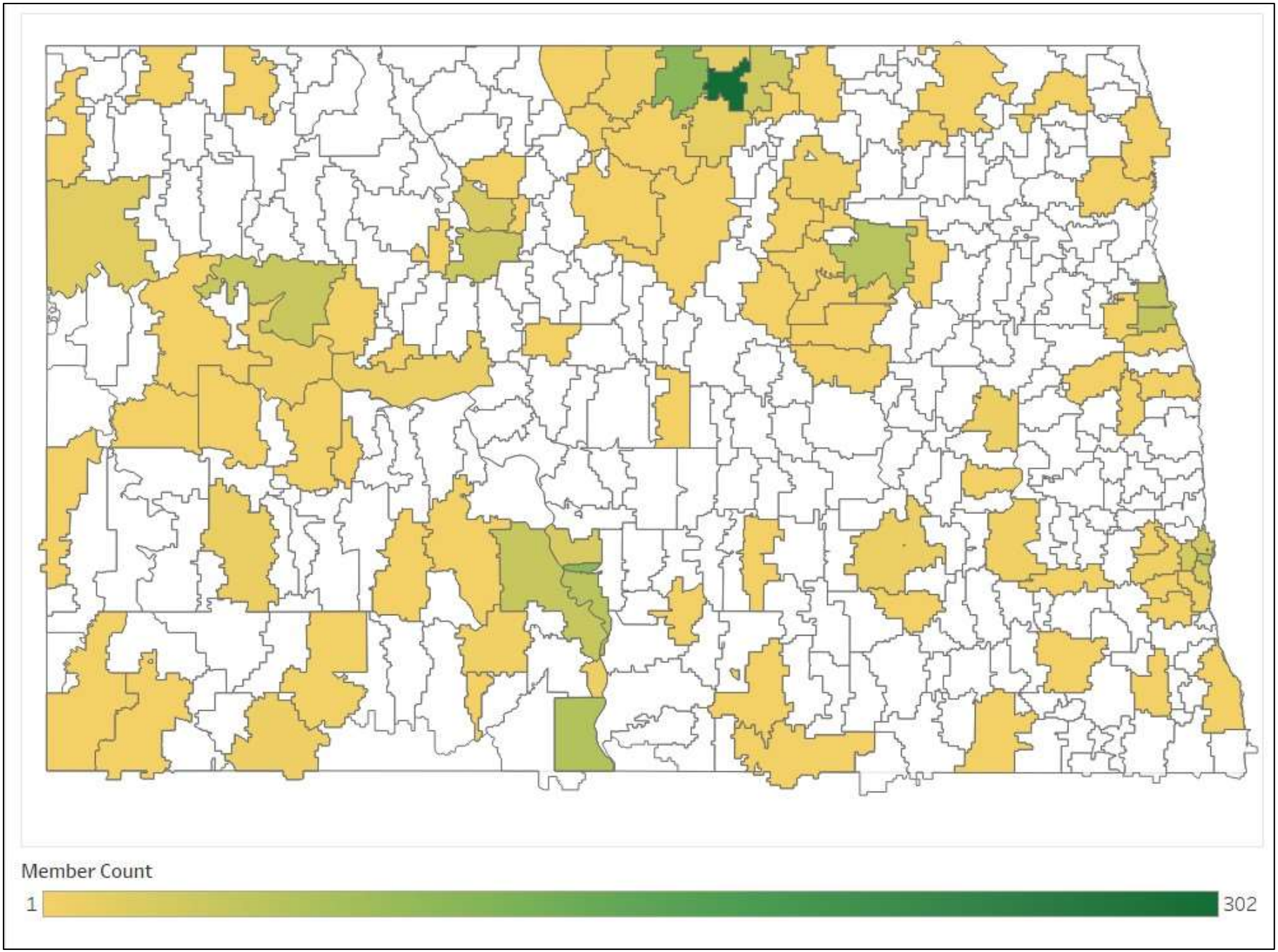


Figure 2: ZIP Code of Residence of American Indian Youth in Foster Care A heat map of North Dakota to illustrate ZIP code-level member counts of American Indian youth in foster care. The heat map starts at low member count (yellow, 1) and builds to high member count (dark green, 302).

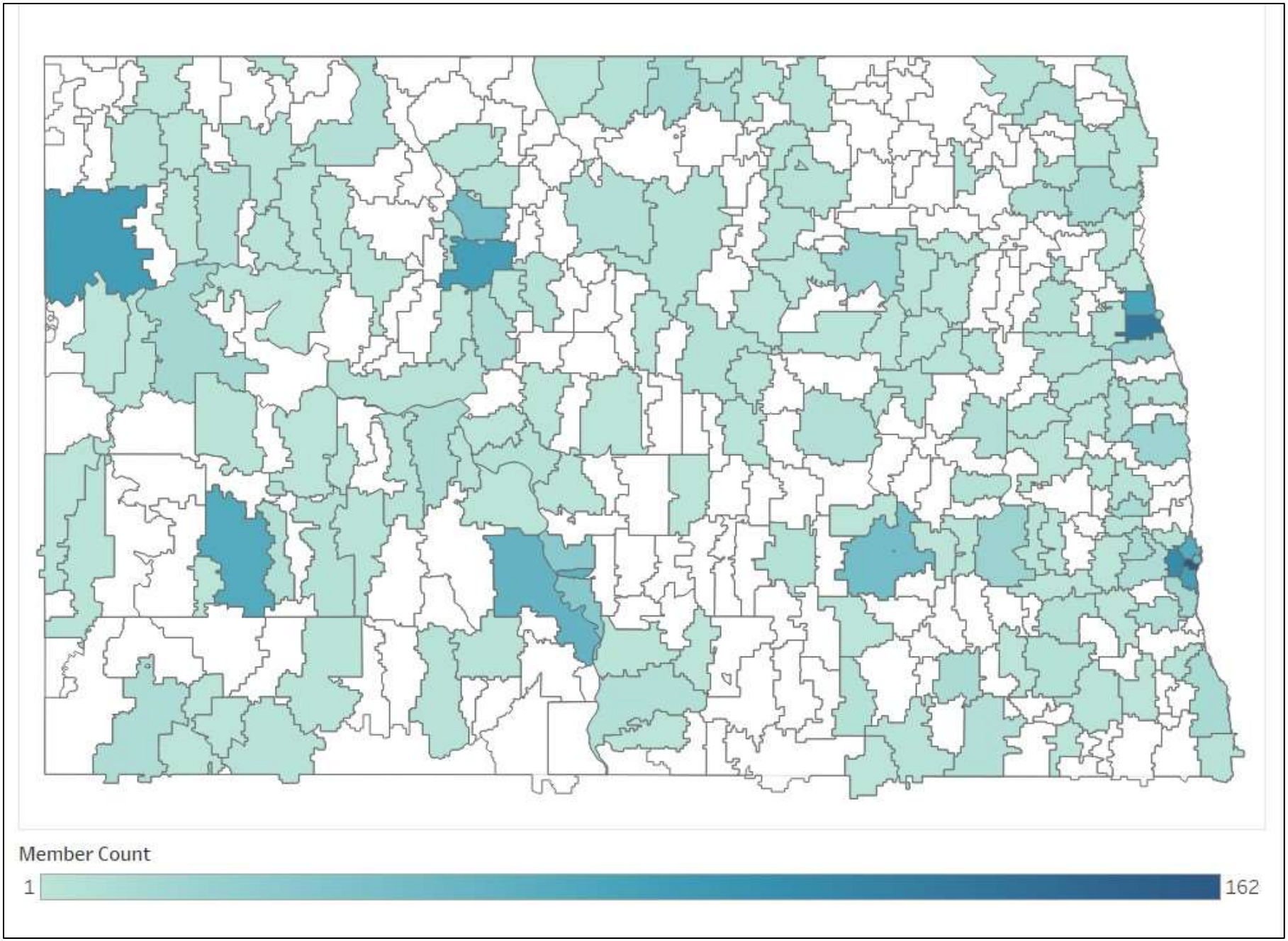


Figure 3: ZIP Code of Residence of Non-American Indian Youth in Foster Care A heat map of North Dakota to illustrate ZIP code-level member counts of non-American Indian youth in foster care. The heat map starts at low member count (light blue, 1) and builds to high member count (dark blue, 162).

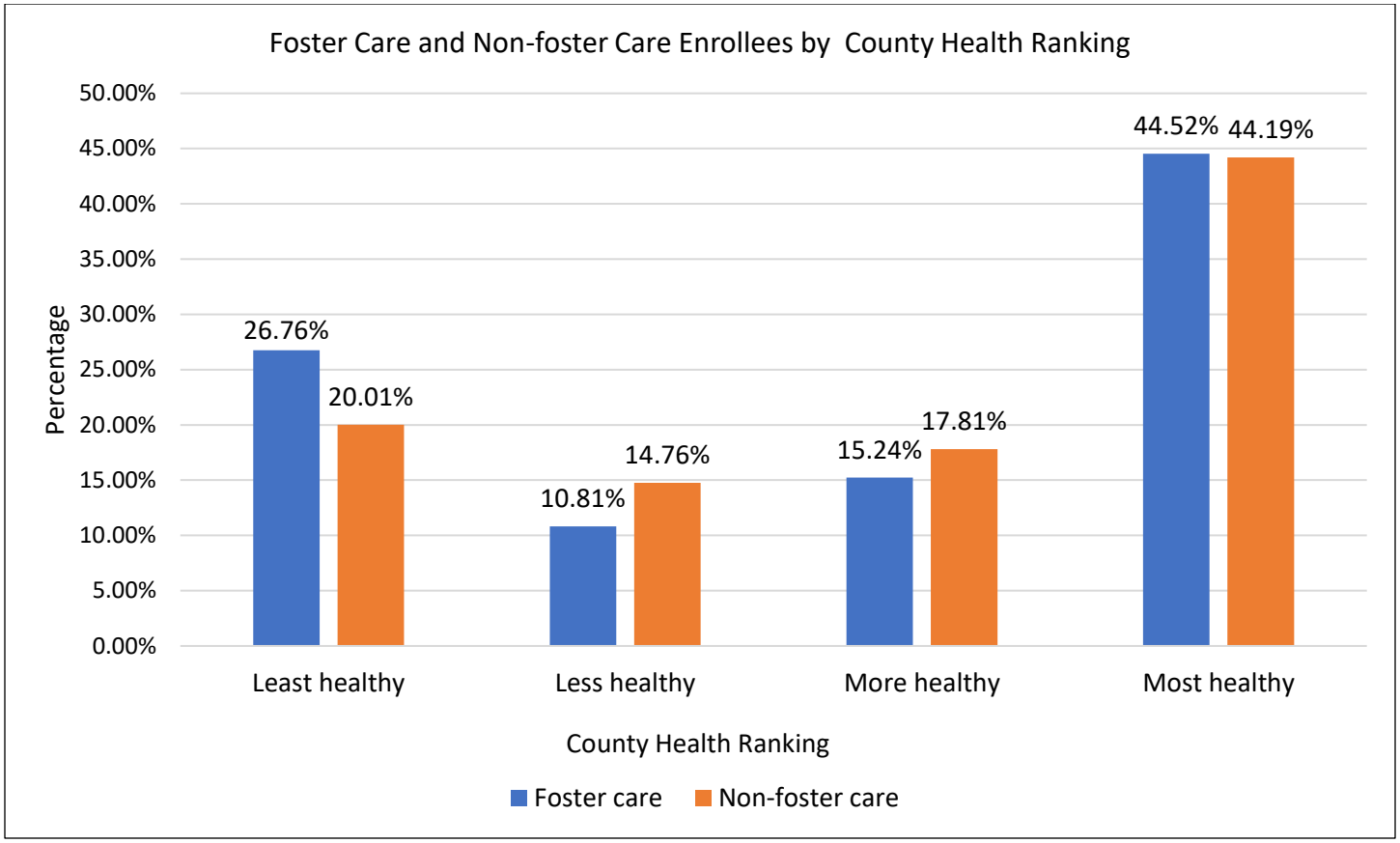


Figure 4: Foster and Non-foster Care Enrollees by County Health Ranking Percent of foster care (blue bars) and non-foster care (orange bars) enrollees by county quartile for health ranking, which includes rankings of least healthy, less healthy, more healthy, and most healthy.

Clinical Characteristics (Table B2)

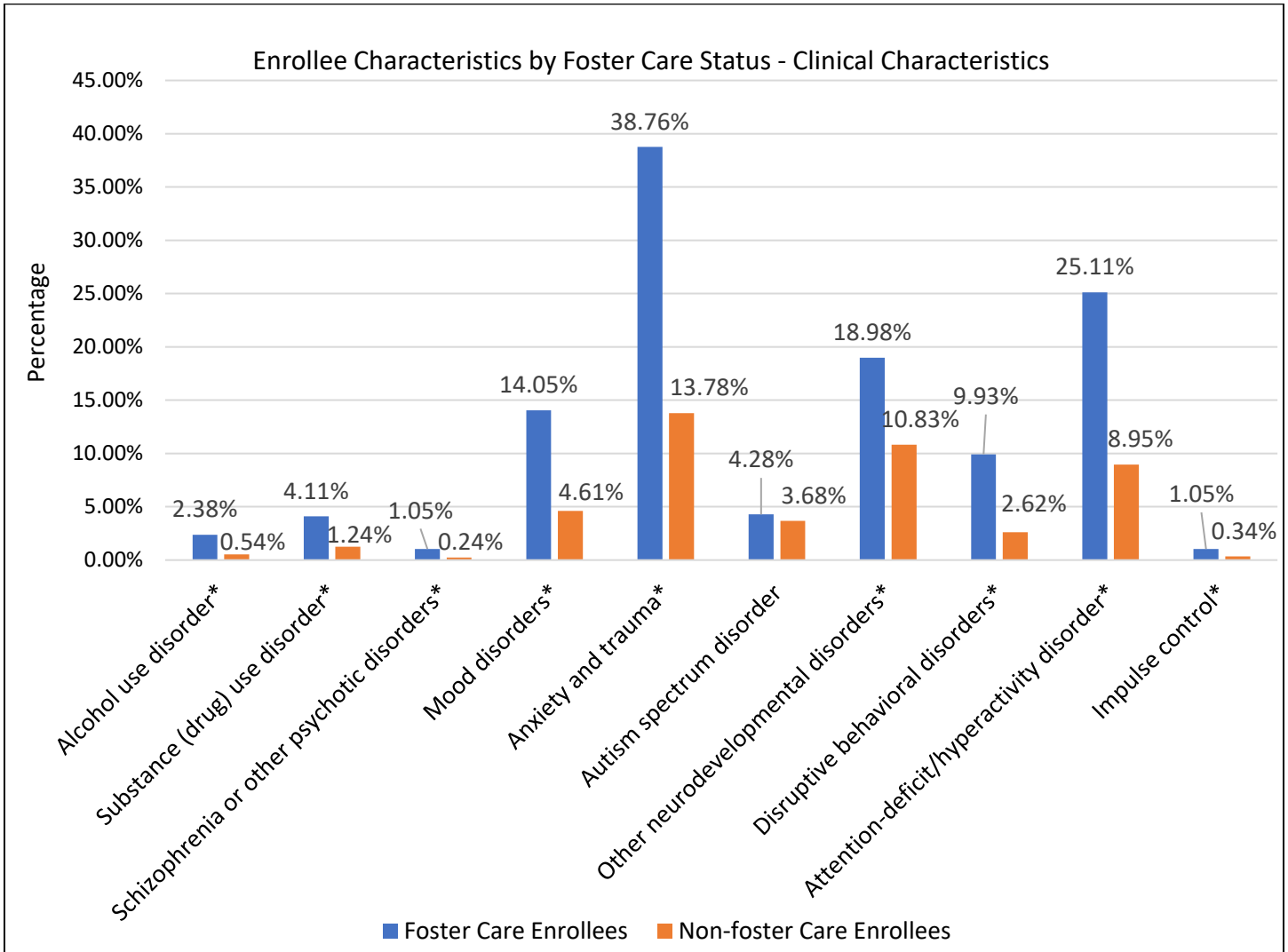
Children in foster care tend to have higher rates of mental health and substance use disorders. **Table 1** and **Figure 5** compare the prevalence of behavioral health diagnoses for children in foster care versus those not in foster care.

- Alcohol- or substance-related disorders: Almost five times as many children in foster care had an alcohol- or substance-related disorder than children not in foster care. Enrollees with alcohol use disorders comprised 2.38% of foster care enrollees, yet only 0.54% of non-foster care enrollees. Enrollees with substance (drug) use disorders comprised 4.11% of foster care enrollees, yet only 1.24% of non-foster care enrollees.
- Serious mental illness: Enrollees with schizophrenia or other psychotic disorders comprised 1.05% of foster care enrollees, yet only 0.24% of non-foster care enrollees. Mood disorders are nearly four times more prevalent in foster care enrollees than in non-foster care enrollees. Enrollees with mood disorders comprised 14.05% of foster care enrollees, yet only 4.61% of non-foster care enrollees. Enrollees with anxiety and trauma comprised 38.76% of foster care enrollees, yet only 13.78% of non-foster care enrollees.
- Developmental disorders: Enrollees with other neurodevelopmental disorders comprised 18.98% of foster care enrollees, yet only 10.83% of non-foster care enrollees.
- Behavioral disorders: Behavioral disorders, anxiety and trauma, and ADHD are more prevalent among foster care enrollees than in non-foster care enrollees. Enrollees with disruptive behavioral disorders comprised 9.93% of foster care enrollees, yet only 2.62% of non-foster care enrollees. Enrollees with anxiety and trauma comprised 38.76% of foster care enrollees and 13.78% of non-foster care enrollees. Enrollees with ADHD comprised 25.11% of foster care enrollees, yet only 8.95% of non-foster care enrollees.

Table 1: Behavioral Health Diagnoses of Children in Foster Care and Children not in Foster Care

Diagnoses	Foster Care Enrollees	Non-foster Care Enrollees
Alcohol use disorder*	2.38%	0.54%
Substance (drug) use disorder*	4.11%	1.24%
Schizophrenia or other psychotic disorders*	1.05%	0.24%
Mood disorders*	14.05%	4.61%
Anxiety and trauma*	38.76%	13.78%
Autism spectrum disorder	4.28%	3.68%
Other neurodevelopmental disorders*	18.98%	10.83%
Disruptive behavioral disorders*	9.93%	2.62%
Attention-deficit/hyperactivity disorder*	25.11%	8.95%
Impulse control*	1.05%	0.34%

*Differences are statistically significant.



*This enrollee characteristic showed a statistically significant association with foster care status (foster vs. non-foster care Medicaid enrollees); *chi*-squared $p < 0.05$.

Figure 5: Behavioral Health Diagnoses by Foster Care Status Percent of foster care (blue bars) and non-foster care (orange bars) enrollees by clinical characteristics.

- Four times as many children in foster care as non-foster care have both serious mental illness and substance use disorder (3.94% versus 0.99%) (**Figure 6**). Whereas 84.73% of non-foster care enrollees had neither a serious mental illness nor substance use disorder diagnosis, only 59.08% of foster care enrollees were without any of these diagnoses. The proportion of foster care enrollees with serious mental illness, only, was 36.41%, compared to 13.86% of non-foster care enrollees.

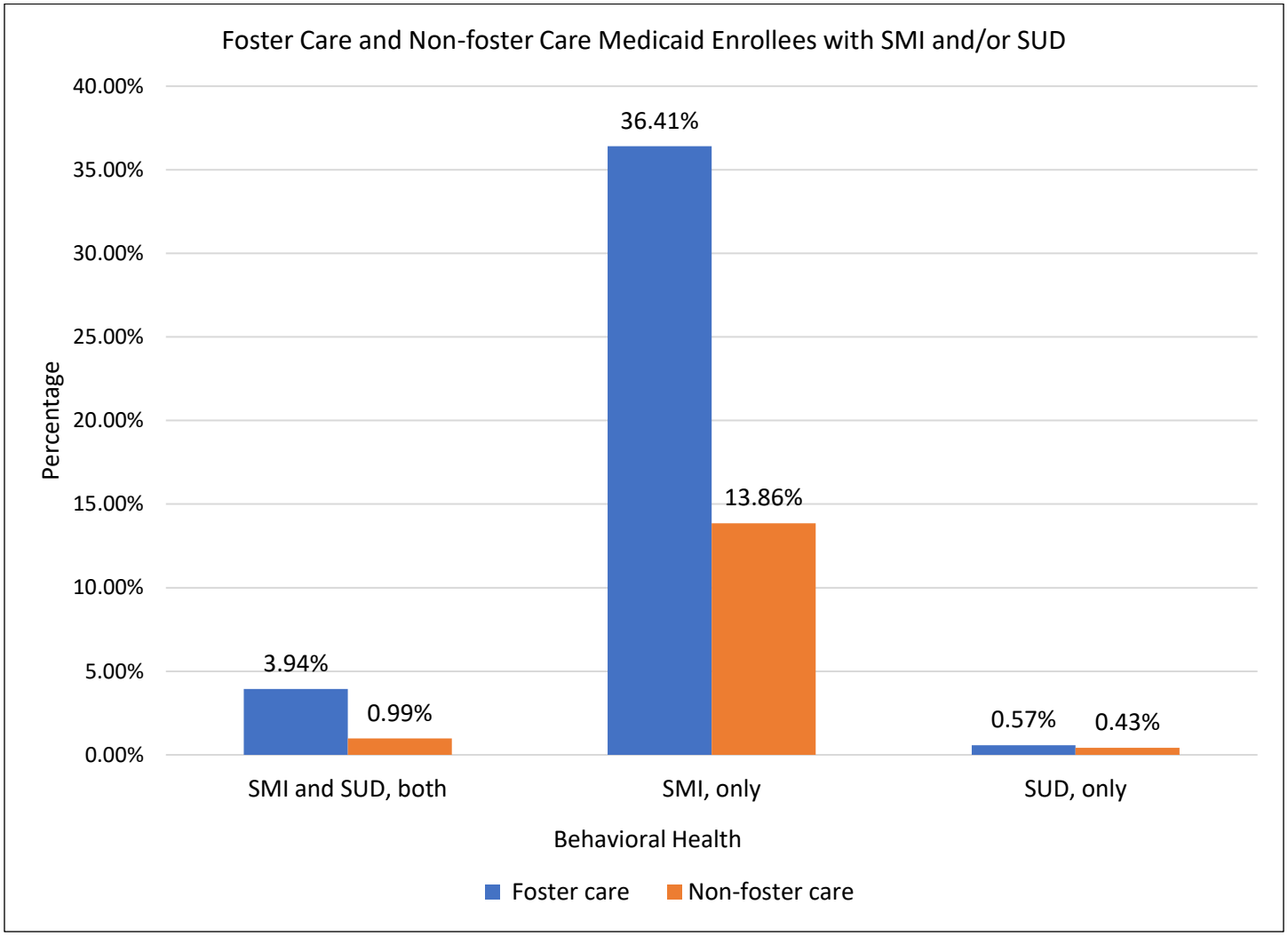


Figure 6: Behavioral Health Percentage of foster care (blue bars) and non-foster care (orange bars) Medicaid enrollees younger than 21 years old with serious mental illness (SMI) and/or substance use disorder (SUD).

Metabolic Risk Factors

Figure 7 and **Table B3** show the prevalence of metabolic risk factors among all youth in North Dakota Medicaid. Although the prevalence for most conditions is higher among foster care youth, the rates of these conditions are still small, and so few differences are statistically significant. The two statistically significant differences are:

- Blood glucose disorders: Enrollees with abnormal blood glucose diagnoses other than prediabetes, type 1, and type 2 diabetes comprised 0.60% of foster care enrollees and 0.32% of non-foster care enrollees.
- Hyperlipidemia: Enrollees with hyperlipidemia comprised 0.91% of foster care enrollees and 0.46% of non-foster care enrollees.

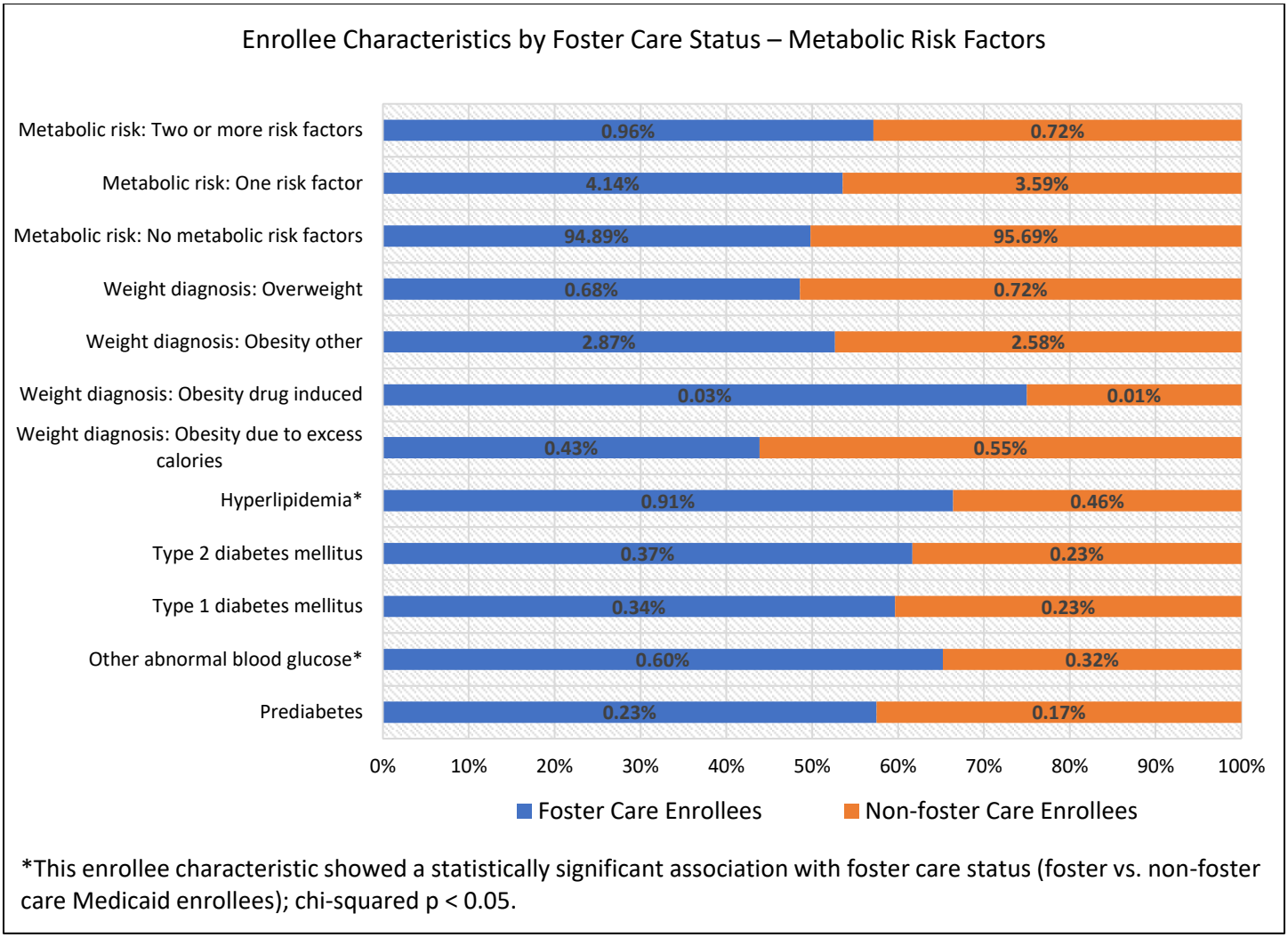


Figure 7: Metabolic Risk Factors Percentage of foster care (blue bars) and non-foster care (orange bars) Medicaid enrollees younger than 21 years old with metabolic risk factors.

Psychotropic Polypharmacy

There were significant differences in psychotropic drug use and polypharmacy, with children in foster care much more likely to be receiving all types of medication studied (**Figure 8** and **Table B4**).

- Three concurrent classes of psychotropic use: 1.31% of foster care enrollees, yet only 0.27% of non-foster care enrollees had at least three concurrent classes of psychotropic use.
- Two concurrent classes of psychotropic use: 2.81% of foster care enrollees, and 0.67% of non-foster care enrollees had concurrent use of ADHD medication and antidepressants. Enrollees with concurrent use of ADHD medication and antipsychotics comprised 2.24% of foster care enrollees, yet only 0.38% of non-foster care enrollees. Enrollees with concurrent use of antidepressants and antipsychotics comprised 0.48% of foster care enrollees, yet only 0.17% of non-foster care enrollees.
- Single-class psychotropic use: 0.57% of foster care enrollees and 0.21% of non-foster care enrollees had single-class antipsychotic use. Enrollees with single-class antidepressant use comprised 2.75% of foster care enrollees and 1.50% of non-foster care enrollees. Enrollees with single-class ADHD medication use comprised 7.21% of foster care enrollees and 1.93% of non-foster care enrollees.

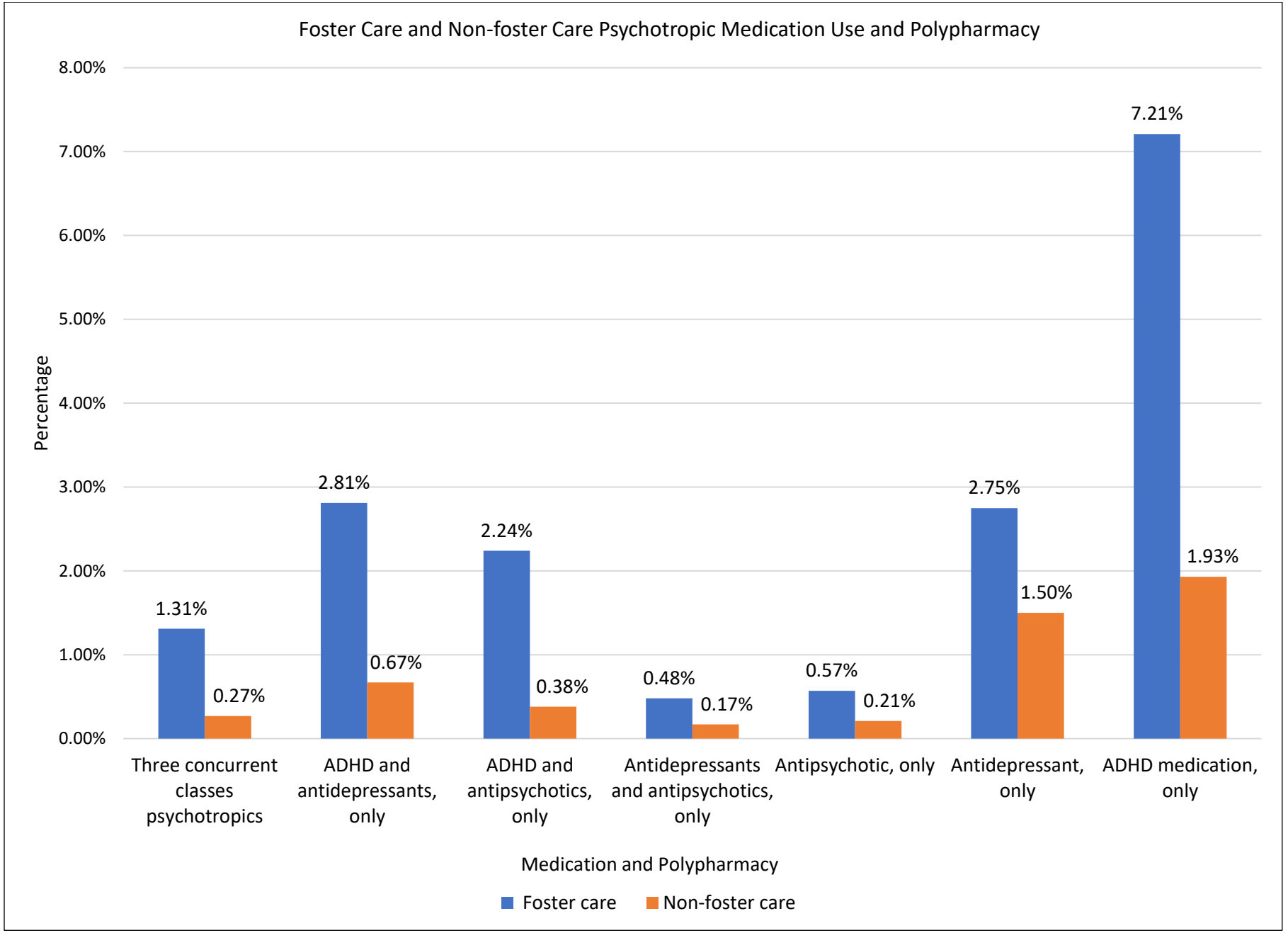
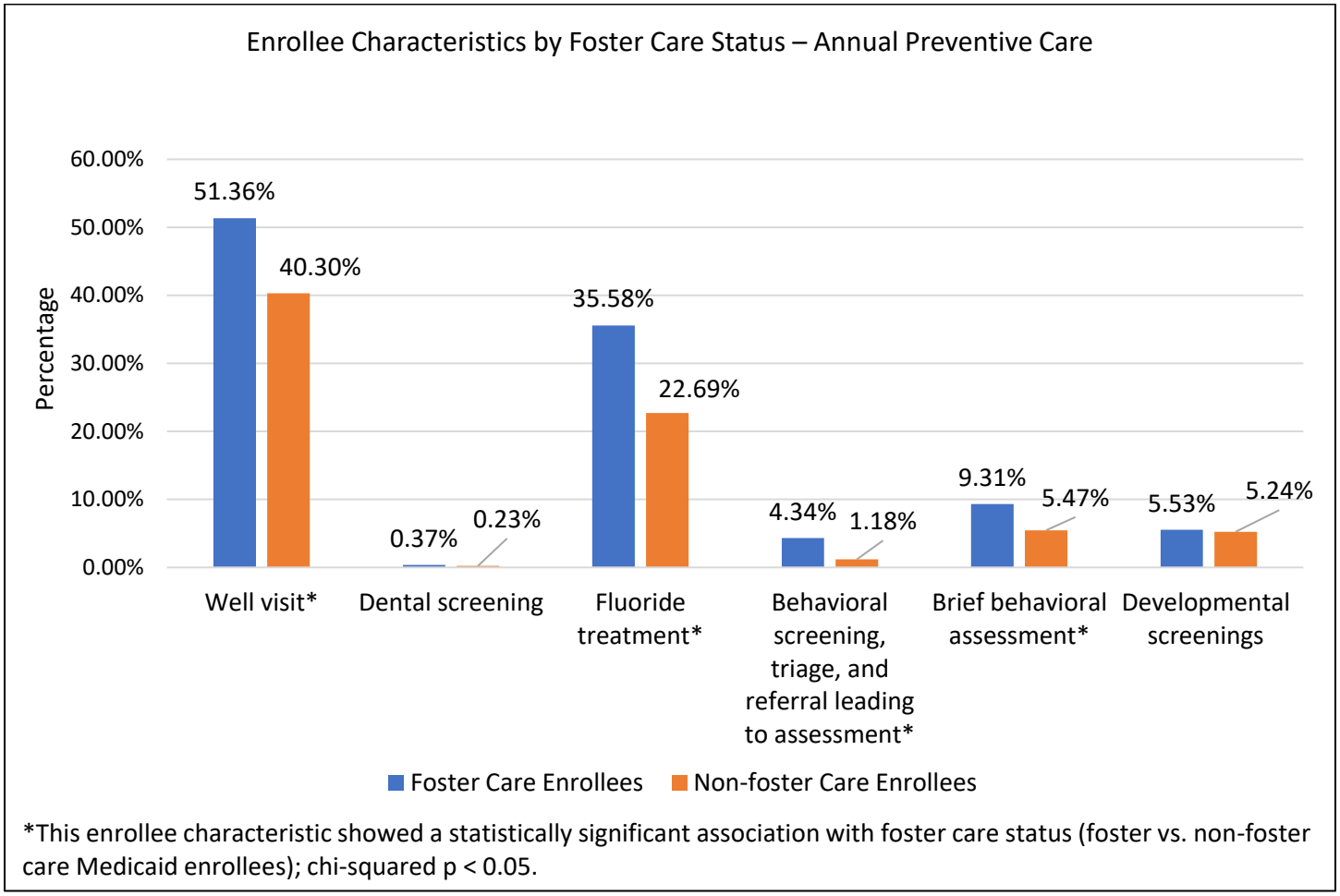


Figure 8: Psychotropic Medication Use and Polypharmacy Among Enrollees Use of antipsychotic, antidepressant, and attention-deficit/hyperactivity disorder (ADHD) medication alone and in combination with each other (polypharmacy) among youth in foster care (blue bars) and non-foster care (orange bars) younger than 21 years old and enrolled in Medicaid.

Annual Preventive Care

Foster care enrollees received more preventive care than non-foster care enrollees, as shown in **Figure 9** and **Table B5**.

- Well-child visit: 51.36% of foster care enrollees and 40.30% of non-foster care enrollees had at least one annual well-child visit in the year.
- Topical fluoride application: 35.58% of foster care enrollees and 22.69% of non-foster care enrollees had at least one topical fluoride application during the year.
- Behavioral health screenings/assessments: 4.34% of foster care enrollees and 1.18% of non-foster care enrollees had at least one behavioral health screening, triage, and/or referral leading to an assessment during the year. 9.31% of foster care enrollees and 5.47% of non-foster care enrollees had at least one brief behavioral assessment during the year.



*This enrollee characteristic showed a statistically significant association with foster care status (foster vs. non-foster care Medicaid enrollees); chi-squared $p < 0.05$.

Figure 9: Use of Annual Preventive Care by Youth in Foster Care and Non-foster Care Percentage of foster care (blue bars) and non-foster care (orange bars) Medicaid enrollees younger than 21 years old with annual preventive care.

Healthcare Utilization, Ages 6–17 Years

There were higher rates of hospitalization for mental illness among foster care enrollees than non-foster care enrollees. This variable was restricted to enrollees ages 6–17 years, consistent with the CMS Child Core Set FUH-CH measure denominator.

- Any hospitalization for mental illness: Among foster care enrollees, 5.03% had any hospitalization for mental illness, whereas the corresponding percentage for non-foster care enrollees was only 1.36% (**Table B6**).

Enrollee Characteristics by Any Hospitalization for Mental Illness, Ages 6–17 Years

Overview

This section delves more deeply into the characteristics of the 531 Medicaid enrollees ages 6–17 years (1.62% of all enrollees 6-17 years old) with one or more hospitalizations for mental illness in 2022.

Demographic Characteristics

Higher rates of hospitalization for mental illness were found among youth in foster care, teens, minorities, females, and living in healthier counties. Demographic characteristics are summarized in **Table B7**.

- Foster care status: A greater percentage of foster care enrollees had any hospitalization for mental illness (5.03%) relative to non-foster care enrollees (1.36%).
- Age: A greater percentage of enrollees ages 13–17 years had any hospitalization for mental illness (3.30%) relative to enrollees ages 6–12 years (0.58%).
- Race: The greatest percentages of enrollees with any hospitalization for mental illness were observed among the following race subsets: More than one race (2.31%), American Indian (1.74%), and White (1.72%) enrollees.
- Gender: A greater percentage of females had a hospitalization for mental illness (1.96%) than did males (1.30%).

Clinical Characteristics

The greatest percentages of enrollees with any hospitalization for mental illness were observed among enrollees with the following diagnoses: schizophrenia or other psychotic disorders (45.38%), substance abuse or dependence (29.51%), and impulse control (26.40%), followed by enrollees with mood disorders (19.98%), disruptive behavioral disorders (16.52%), anxiety and trauma (7.52%), autism spectrum disorder (6.93%), ADHD (6.12%), and other neurodevelopmental disorders (4.70%; **Table B8**). Children with these diagnoses were statistically significantly more likely to be hospitalized for mental illness than children without these diagnoses.

Metabolic Risk Factors

The greatest percentage of enrollees with any hospitalization for mental illness was observed among enrollees with two or more metabolic risk factors (10.48%), followed by enrollees with one metabolic risk factor (6.75%) and no metabolic risk factors (1.29%; **Table B9**).

Psychotropic Polypharmacy

The greatest percentage of enrollees with any hospitalization for mental illness was observed among enrollees with chronic use of three concurrent classes of psychotropics (26.11%), followed by enrollees with chronic use of two psychotropics (14.56%), enrollees with nonconcurrent psychotropic use (5.67%) and enrollees without psychotropic use (0.97%; **Table B10**).

Risk Factors for Any Hospitalization for Mental Illness, Ages 6–17 Years

Primary Comparison

Children in foster care were almost four times more likely to be hospitalized for mental illness relative to non-foster care children (**Table B11**). However, once demographic and health differences between foster children and non-foster children, such as age, race, diagnoses, and polypharmacy, were taken into account, being in foster care was no longer a predictor of any hospitalization for mental illness. Narrative findings are presented for all other enrollee characteristics with a statistically significant association with hospitalization for mental illness in adjusted analysis using multiple logistic regression. All odds ratios in the narrative and in **Tables B11–B14** represent adjusted statistics using multiple logistic regression, except as noted for "enrolled in foster care – unadjusted analysis," which represents an odds ratio unadjusted for all other enrollee characteristics using simple logistic regression. Multiple logistic regression analysis adjusted for each of the characteristics displayed in **Figure 10** and **Tables B11–B14**.

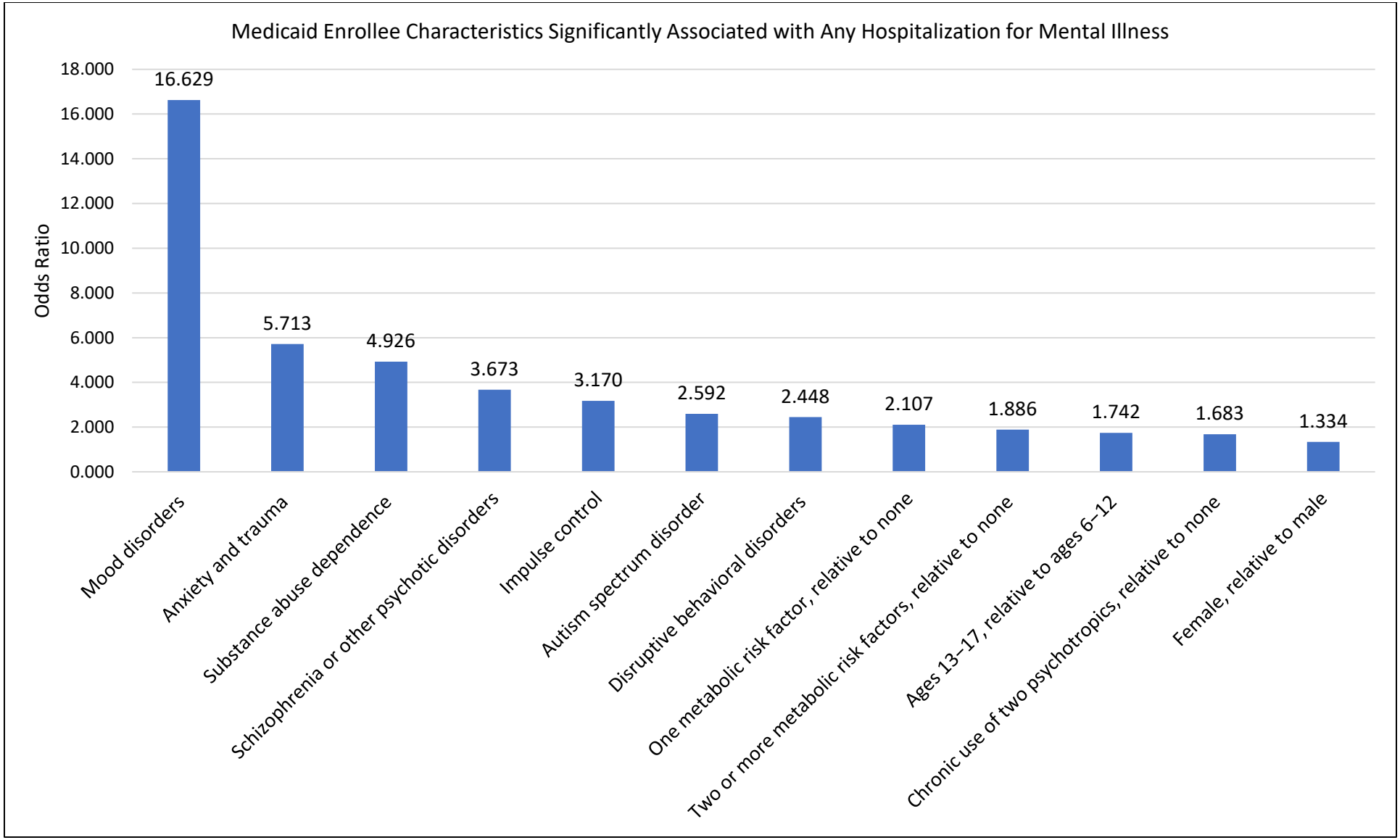


Figure 8: Enrollee Characteristics Significantly Associated with Any Hospitalization for Mental Illness Odds ratios (blue bars) indicating characteristics of enrollees younger than 21 years old significantly associated with any hospitalization for mental illness, using multiple logistic regression analysis.

Demographic Characteristics

Teens and females were at greater risk for hospitalization for mental illness.

- Age: Relative to enrollees ages 6–12 years, enrollees ages 13–17 years had almost twice the odds for hospitalization for mental illness (OR = 1.742; 95% CI = 1.345, 2.255; **Table B11**).
- Gender: Relative to male enrollees, female enrollees had one-third greater odds for hospitalization for mental illness (OR = 1.334; 95% CI = 1.062, 1.676).

Clinical Characteristics

Children with mental health and substance use conditions were highly likely to be hospitalized for mental illness. Detailed findings are in **Table B12**.

- Mood disorders: Relative to enrollees without a mood disorder, children with mood disorders were more than 16 times as likely to be hospitalized for mental illness. This is the strongest association with hospitalization of any traits tested (OR = 16.629; 95% CI = 12.399, 22.301).
- Anxiety and trauma: Relative to enrollees without anxiety and trauma, enrollees with this clinical characteristic had more than five times greater odds for hospitalization for mental illness (OR = 5.713; 95% CI = 4.029, 8.099; **Table 12**).
- Alcohol or drug abuse or dependence: Relative to enrollees without alcohol or drug abuse or dependence, enrollees with this clinical characteristic had almost five times greater odds for hospitalization for mental illness (OR = 4.926; 95% CI = 3.693, 6.570).
- Schizophrenia or other psychotic disorders: Relative to enrollees without schizophrenia or other psychotic disorders, enrollees with this clinical characteristic had almost four times greater odds for hospitalization for mental illness (OR = 3.673; 95% CI = 2.299, 5.868).
- Impulse control: Relative to enrollees without impulse control diagnoses, enrollees with this clinical characteristic had more than three times greater odds for hospitalization for mental illness (OR = 3.170; 95% CI = 1.971, 5.096).
- Autism spectrum disorder: Relative to enrollees without autism spectrum disorder, enrollees with this clinical characteristic had more than twice the odds for hospitalization for mental illness (OR = 2.592; 95% CI = 1.883, 3.568).
- Disruptive behavioral disorders: Relative to enrollees without disruptive behavioral disorders, enrollees with this clinical characteristic had more than twice the odds for hospitalization for mental illness (OR = 2.448; 95% CI = 1.908, 3.140).

Metabolic Risk Factors

Enrollees with metabolic risk factors had approximately double the risk for hospitalization for mental illness. Relative to enrollees with no metabolic risk factors, enrollees with one metabolic risk factor had slightly more than twice the odds for hospitalization for mental illness (OR = 2.107; 95% CI = 1.560, 2.847; **Table B13**), and enrollees with two or more metabolic risk factors had slightly less than twice the odds for hospitalization for mental illness (OR = 1.886; 95% CI = 1.116, 3.187), with overlapping confidence intervals.

Psychotropic Polypharmacy

Chronic polypharmacy was associated with increased risk for hospitalization for mental illness.

- Relative to enrollees with no psychotropic use, enrollees with chronic use of two psychotropics had almost twice the odds for hospitalization for mental illness (OR = 1.683; 95% CI = 1.217, 2.328; **Table B14**).

Discussion

A key finding of the current study is that while foster care enrollees are more likely to be hospitalized for mental illness relative to all other Medicaid enrollees ages 6–17 years; being in foster care is not independent of the clinical, metabolic, psychotropic polypharmacy, and demographic drivers of hospitalization for mental illness (**Table B11**). Therefore, understanding the disparities in the distribution of these drivers among foster care and non-foster care enrollees is key to understanding and addressing the susceptibilities of foster care enrollees.

*The behavioral health diagnoses with the greatest likelihood for hospitalization for mental illness, as well as greater prevalence among foster care enrollees relative to non-foster care enrollees, provide insights into the clinical nature of foster care enrollees' vulnerabilities (**Table B12**).* North Dakota Medicaid enrollees with mood disorders showed the greatest likelihood for behavioral hospitalization relative to those without mood disorders (OR = 16.629), and the prevalence among foster care enrollees was 14.05% compared to only 4.61% of non-foster care enrollees. Enrollees with anxiety and trauma comprised the subset with the next highest likelihood relative to those without these conditions (OR = 5.713), with prevalence among foster care enrollees of 38.76% compared to only 13.78% of non-foster care enrollees (Table 2). Similar likelihood for behavioral health hospitalization was observed for Medicaid enrollees with substance use disorders (compared to those without substance use disorders) and, although the prevalence was lower compared to the above diagnoses, disparities were observed when comparing prevalence among foster care enrollees (4.11%) to non-foster care enrollees (1.24%).

*Compared to Medicaid youth with no psychotropic use, Medicaid youths with chronic use of two psychotropics were twice as likely to be hospitalized for mental illness, and polypharmacy was considerably more prevalent among foster care enrollees (**Table B14**).* Specifically, a greater prevalence of the following polypharmacy drug classes was observed among foster care enrollees relative to all other Medicaid youth: three concurrent classes, ADHD medication and antidepressants, and the dual combinations of ADHD medication or antidepressants with antipsychotics (Table 4). Use of three concurrent classes of psychotropics showed a similar likelihood for hospitalization as use of two psychotropics, albeit findings were not statistically significant, likely due to the smaller number of enrollees with three concurrent classes of psychotropics. Metabolic side effects of antipsychotics include abnormal blood glucose and hyperlipidemia; both of which showed greater prevalence among foster care enrollees (**Table B3**). It is notable that Medicaid enrollees with one or more metabolic risk factors had approximately twice the odds for hospitalization for mental illness (**Table B13**).

Disparities were observed among demographic subsets. Adolescents and females were the only demographic subsets among Medicaid enrollees ages 6–17 years with increased likelihood for hospitalization for mental illness (Table 11), yet the following minority subsets showed a higher prevalence among Medicaid enrollees with a hospitalization for mental illness relative to those without hospitalization: Enrollees of more than one race and American Indian enrollees (Table 7). Of note, American Indian enrollees comprised 41.97% of foster care enrollees, but only 20.07% of non-foster care enrollees (**Table B1**). Another notable disparity is that 26.76% of foster care enrollees resided in the counties with the lowest ranked socioeconomic status, compared to 20.01% of all other Medicaid enrolled youth.

Annual preventive care was received by a greater proportion of foster care enrollees than all other Medicaid youth, including well-child visits, topical fluoride application, and behavioral health screenings and assessments (**Table B5**). It should be noted, however, that North Dakota Medicaid's reported 2022 administrative rate of 37.8% for Child and Adolescent Well-Care Visits, ages 3 to 21, fell below the national median of 54.2% and below the bottom quartile of 48.8%[6]. Further research is merited to assess whether children in foster care received timely preventive care in accordance with foster care requirements. Specifically, foster care case managers must ensure each foster child has a Health Tracks or a well-child check completed within 30 days of entry into foster care.

Conclusion

This focus study provides evidence to suggest that children in foster care are more likely to be hospitalized for mental illness, and that disparities in clinical, polypharmacy, and associated metabolic factors represent underlying vulnerabilities among this susceptible subpopulation of Medicaid enrollees. Further research is merited to evaluate foster care enrollees' receipt of timely preventive care, as well as evidence-based care for children on psychotropic medications.

Study Strengths and Limitations

A key strength of this study is the sufficient sample size to detect statistically significant differences in associations between enrollee characteristics and foster care status, as well as hospitalization for mental illness. "Internal validity" is the extent to which the study measures what it intends to measure; in the current study, internal validity was maximized by specifying the hospitalization for mental illness measure in accordance with denominator specification in the CMS Child Core Set FUH-CH measure. Internal validity was also strengthened by using the Health Tracks procedure codes, pharmacy class codes, and foster care enrollment codes utilized by North Dakota Medicaid, as well as *International Classification of Diseases, Tenth Revision* (ICD-10) codes to specify diagnostic categories consistent with the scientific literature.[6] "External validity" is the extent to which findings may be generalized to the population of interest; in the current study, external validity was maximized by utilizing a study population that is representative of the North Dakota Medicaid population less than 21 years of age, including the subpopulation of children in foster care.

Study limitations include the potential for residual confounding, as in any observational study, as well as the cross-sectional study design, which precludes determinations of causality. Therefore, findings regarding risk factors for behavioral hospitalization should be interpreted with caution in terms of directionality of the association. Variability in provider coding practices is a related study limitation. Another study limitation is the absence of data on date of enrollment, and thus, timeliness of receipt of preventive care by foster care enrollees could not be evaluated. Finally, the time frame to conduct this study precluded a more extensive analysis of receipt of evidence-based care based on HEDIS or CMS measures, specifically for children on antipsychotics for whom metabolic monitoring and first-line psychosocial care are recommended, as well as well-child visits. Therefore, comparisons with national benchmarks are precluded.

Recommendations

Appropriate management of children on antipsychotics is a key component of evidence-based care.[7] Research on a national sample of Medicaid enrollees in 10 states, that did not include North Dakota, has shown that children in foster care were more likely than other Medicaid youth to receive front-line psychosocial care and metabolic monitoring;[8] however, corresponding performance indicator rates for North Dakota Medicaid enrollees are unknown. A second phase of research is merited to evaluate receipt of evidence-based care recommended for children on antipsychotic medications, with comparisons between foster care and non-foster care enrollees, as well as to national benchmarks, for the following CMS Child Core Set measures:

- Use of First-Line Psychosocial Care for Children and Adolescents on Antipsychotics (APP-CH)
- Metabolic Monitoring for Children and Adolescents on Antipsychotics (PPM-CH)

Pending the availability of data on date of enrollment in foster care, evaluation of receipt of preventive care within the first 30 days of enrollment in foster care is also recommended for the Phase II portion of this study. To enable comparisons with national benchmarks, it is also recommended that the Phase II study evaluate the following CMS Child Core Set measure rates:

- Well-Child Visits in the First 30 Months of Life (W30-CH)
- Child and Adolescent Well-Care Visits (WCV-CH)

A recommended strategy for North Dakota is to collaborate with providers to ensure evidence-based prescribing practices consistent with the American Academy of Child & Adolescent Psychiatry's "Practice Parameter on the Use of Psychotropic Medication in Children and Adolescents."[7] Thackeray and colleagues[9] describe a Medicaid quality improvement collaborative that focuses on psychotropic medication prescribing for children that worked with an advisory panel of behavioral health experts to develop evidence-supported antipsychotic treatment algorithms, on-line modules, fact sheets and shared decision-making tools for prescribers, school and agency personnel, parents, and youths. The collaborative reported a reduction in antipsychotic prescribing for children younger than six years of age, as well as a reduction in pediatrician and psychiatrists' prescription of two or more concurrent antipsychotics for longer than two months.[9] In addition to provider interventions, member interventions for prevention, such as parent training,[10] as well as parent and child education are recommended.

Understanding providers' perspectives would provide valuable insights regarding barriers to evidence-based prescribing; therefore, qualitative research conducted as part of a provider collaborative is also recommended. Lohr and colleagues[3] conducted qualitative research to identify barriers to optimal care and found that the most common barrier was access to mental health specialists, while social factors and pressure from families contributed to increased use of antipsychotic medications in children. Thus, qualitative research to elicit parent and child feedback on barriers to care is a crucial component of quality improvement efforts. Potential interventions identified from Lohr and colleagues' qualitative study included expert medical review and provider education, prior authorization, improved access to mental health care, and care coordination or case management to address enrollees' behavioral health needs.[3]

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Appendix A: Statistical Methods

The *chi*-squared test was used to identify statistically significant associations between foster care status and clinical characteristics, demographic characteristics, and healthcare utilization. The *chi*-squared test was also used to identify statistically significant associations between enrollee characteristics and hospitalization for mental illness.

Multiple logistic regression was utilized to quantify the risk factors for any hospitalization for mental illness among Medicaid enrollees ages 6–17 years, including foster care status, as well as clinical and demographic enrollee characteristics. Multiple logistic findings are presented for each enrollee characteristic, adjusted for all other characteristics, except for "enrolled in foster care – unadjusted analysis," which represents unadjusted findings from simple logistic regression. In analyzing the demographic county quartile for health ranking (least to most healthy) data, because both the county quartile and rural variables are county-based and correlated; they require analysis in separate logistic regression models. Therefore, the odds ratio and 95% confidence intervals for the county quartile for health rankings variable are generated by a separate logistic regression model that used this variable in place of rural residence.

Enrollee characteristics are each evaluated for a statistically significant association with any hospitalization for mental illness relative to the referent with 95% confidence intervals not containing the value of 1 demonstrating significance. The primary comparison is foster care enrollment associated with hospitalization for mental illness relative to non-foster care enrollment. Odds ratios (OR) and 95% confidence intervals (CIs) are used.

Narrative findings are presented for all enrollee characteristics with a statistically significant association with hospitalization for mental illness in adjusted analysis using multiple logistic regression. All odds ratios represent adjusted statistics using multiple logistic regression, except as noted for "enrolled in foster care – unadjusted analysis," which represents an odds ratio unadjusted for all other enrollee characteristics using simple logistic regression.

Appendix B: Detailed Findings of Claims Analysis

Table B1: Enrollee Characteristics by Foster Care Status – Demographic Characteristics

Demographic Characteristics[1]	Foster Care Enrollees n	Foster Care Enrollees %	Non-foster Care Enrollees n	Non-foster Care Enrollees %
Total enrollees	3,524	-	50,125	-
Age group[2]: 0–2 years	310	8.80%	6,258	12.48%
Age group[2]: 3–5 years	530	15.04%	9,625	19.20%
Age group[2]: 6–12 years	1,325	37.60%	18,843	37.59%
Age group[2]: 13–17 years	1,041	29.54%	11,517	22.98%
Age group[2]: 18–20 years	318	9.02%	3,882	7.74%
AAP age category[2]: Adolescents (11–21 years)	1,750	49.66%	20,289	40.48%
AAP age category[2]: Middle childhood (5–10 years)	1,125	31.92%	17,077	34.07%
AAP age category[2]: Early childhood (12 months–4 years)	634	17.99%	12,465	24.87%
AAP age category[2]: Infancy (Less than 12 months)	15	0.43%	294	0.59%
Race[2]: American Indian	1,479	41.97%	10,061	20.07%
Race[2]: Asian	9	0.26%	797	1.59%
Race[2]: Black	187	5.31%	6,014	12.00%
Race[2]: Native Hawaiian or Pacific Islander	8	0.23%	221	0.44%
Race[2]: White	1,707	48.44%	31,380	62.60%
Race[2]: More than one	108	3.06%	1,328	2.65%
Race[2]: Unknown	26	0.74%	324	0.65%
Ethnicity[2]: Unknown	41	1.16%	865	1.73%
Ethnicity[2]: Latino/Hispanic	135	3.83%	3,716	7.41%
Ethnicity[2]: Not Latino/Hispanic	3,348	95.01%	45,544	90.86%
Race/Ethnicity[2]: American Indian – Latino	19	0.54%	253	0.50%
Race/Ethnicity[2]: American Indian – not Latino	1,460	41.43%	9,808	19.57%
Race/Ethnicity[2]: Asian – not Latino	8	0.23%	769	1.53%
Race/Ethnicity[2]: Black – Latino	3	0.09%	132	0.26%
Race/Ethnicity[2]: Black – not Latino	184	5.22%	5,882	11.73%
Race/Ethnicity[2]: Latino – all other	9	0.26%	220	0.44%
Race/Ethnicity[2]: Native Hawaiian or Pacific Islander – not Latino	7	0.20%	191	0.38%
Race/Ethnicity[2]: Multiple race – not Latino	103	2.92%	1,235	2.46%
Race/Ethnicity[2]: Unknown or not Latino	24	0.68%	255	0.51%
Race/Ethnicity[2]: White – Latino	104	2.95%	3,111	6.21%
Race/Ethnicity[2]: White – not Latino	1,603	45.49%	28,269	56.40%
Gender: Female	1,761	49.97%	24,446	48.77%
Gender: Male	1,763	50.03%	25,679	51.23%
Area of residence: Rural enrollee residence	1,831	51.96%	25,890	51.65%
Area of residence: Non-rural enrollee residence	1,693	48.04%	24,235	48.35%
County quartile for health ranking[2,3]: Least healthy	943	26.76%	10,031	20.01%
County quartile for health ranking[2,3]: Less healthy	381	10.81%	7,397	14.76%
County quartile for health ranking[2,3]: More healthy	537	15.24%	8,926	17.81%
County quartile for health ranking[2,3]: Most healthy	1,569	44.52%	22,151	44.19%
County quartile for health ranking[2,3]: Not reported	94	2.67%	1,620	3.23%

[1] Foster care enrollees comprised 6.57% of all enrollees less than 21 years of age and non-foster care enrollees comprised 93.43% of all enrollees less than 21 years of age.

[2] This enrollee characteristic showed a statistically significant association with foster care status (foster vs. all other youth Medicaid enrollees); *chi*-squared $p < 0.05$. For non-binary categorical variables with multiple subsets, the *chi*-squared test does not identify the specific subset(s) associated with foster status.

[3] Enrollee counties of residence were grouped into quartiles from most healthy to least healthy based on county measures of social and economic factors including education, employment, income, family and social support, and community safety. The county with the best health was ranked number one in that state and the county with the worst health was assigned the lowest rank in that state.
AAP: American Academy of Pediatrics.

Table B2: Enrollee Characteristics by Foster Care Status – Clinical Characteristics

Clinical Characteristics[1,2]	Foster Care Enrollees n	Foster Care Enrollees %	Non-foster Care Enrollees n	Non-foster Care Enrollees %
Total enrollees	3,524	-	50,125	-
SMI and SUD[3]: Both	139	3.94%	494	0.99%
SMI and SUD[3]: SMI, only[4]	1,283	36.41%	6,947	13.86%
SMI and SUD[3]: SUD, only[5]	20	0.57%	215	0.43%
SMI and SUD[3]: Neither	2,082	59.08%	42,469	84.73%
Alcohol use disorder[3]	84	2.38%	271	0.54%
Substance (drug) use disorder[3]	145	4.11%	622	1.24%
Schizophrenia or other psychotic disorders[3]	37	1.05%	120	0.24%
Mood disorders[3]	495	14.05%	2,309	4.61%
Anxiety and trauma[3]	1,366	38.76%	6,909	13.78%
Autism spectrum disorder	151	4.28%	1,846	3.68%
Other neurodevelopmental disorders[3]	669	18.98%	5,430	10.83%
Disruptive behavioral disorders[3]	350	9.93%	1,315	2.62%
Attention-deficit/hyperactivity disorder[3]	885	25.11%	4,484	8.95%
Impulse control[3]	37	1.05%	170	0.34%

[1] Foster care enrollees comprised 6.57% of all enrollees less than 21 years of age and non-foster care enrollees comprised 93.43% of all enrollees less than 21 years of age.
[2] Behavioral health diagnostic categories are not mutually exclusive because individual enrollees may have more than one diagnosis and, therefore, fall into more than one diagnostic category.
[3] This enrollee characteristic showed a statistically significant association with foster care status (foster vs. all other youth Medicaid enrollees); *chi*-squared $p < 0.05$. For non-binary categorical variables with multiple subsets, the *chi*-squared test does not identify the specific subset(s) associated with foster status.
[4] Serious mental illness (SMI) includes diagnoses of schizophrenia or other psychotic disorders, mood disorders, and anxiety/trauma.
[5] Substance use disorder (SUD) includes alcohol use/dependence or substance (drug) abuse/dependence.

Table B3: Enrollee Characteristics by Foster Care Status – Metabolic Risk Factors

Metabolic Risk Factors[1]	Foster Care Enrollees n	Foster Care Enrollees %	Non-foster Care Enrollees n	Non-foster Care Enrollees %
Total enrollees	3,524	-	50,125	-
Prediabetes[2]	8	0.23%	85	0.17%
Other abnormal blood glucose[2,3]	21	0.60%	158	0.32%
Type 1 diabetes mellitus[2]	12	0.34%	114	0.23%
Type 2 diabetes mellitus[2]	13	0.37%	115	0.23%
Hyperlipidemia[2,3]	32	0.91%	230	0.46%
Weight diagnosis[2]: Obesity due to excess calories	15	0.43%	275	0.55%
Weight diagnosis[2]: Obesity drug induced	1	0.03%	3	0.01%
Weight diagnosis[2]: Morbidly obese	0	0	0	0
Weight diagnosis[2]: Obesity other	101	2.87%	1,293	2.58%
Weight diagnosis[2]: Overweight	24	0.68%	363	0.72%

Metabolic Risk Factors[1]	Foster Care Enrollees n	Foster Care Enrollees %	Non-foster Care Enrollees n	Non-foster Care Enrollees %
Metabolic risk: No metabolic risk factors	3,344	94.89%	47,965	95.69%
Metabolic risk: One risk factor	146	4.14%	1,797	3.59%
Metabolic risk: Two or more risk factors	34	0.96%	363	0.72%

[1] Foster care enrollees comprised 6.57% of all enrollees less than 21 years of age and non-foster care enrollees comprised 93.43% of all enrollees less than 21 years of age.
[2] Categories are not mutually exclusive because individual enrollees may have more than one diagnosis and, therefore, fall into more than one diagnostic category.
[3] This enrollee characteristic showed a statistically significant association with foster care status (foster vs. all other youth Medicaid enrollees); *chi*-squared $p < 0.05$. For non-binary categorical variables with multiple subsets, the *chi*-squared test does not identify the specific subset(s) associated with foster status.

Table B4: Enrollee Characteristics by Foster Care Status – Psychotropic Polypharmacy

Psychotropic Polypharmacy [1, 2, 3]	Foster Care Enrollees n	Foster Care Enrollees %	Non-foster Care Enrollees n	Non-foster Care Enrollees %
Total enrollees	3,524	-	50,125	-
Three concurrent classes of psychotropic use[2]	46	1.31%	136	0.27%
ADHD and antidepressants, only[2,4]	99	2.81%	337	0.67%
ADHD and antipsychotics, only[2,5]	79	2.24%	191	0.38%
Antidepressants and antipsychotics, only[2,6]	17	0.48%	84	0.17%
Antipsychotic, only[2]	20	0.57%	107	0.21%
Antidepressant, only[2]	97	2.75%	752	1.50%
ADHD medication, only[2]	254	7.21%	968	1.93%

[1] Foster care enrollees comprised 6.57% of all enrollees less than 21 years of age and non-foster care enrollees comprised 93.43% of all enrollees less than 21 years of age.
[2] This enrollee characteristic showed a statistically significant association with foster care status (foster vs. all other youth Medicaid enrollees); *chi*-squared $p < 0.05$.
[3] Psychotropic polypharmacy is defined as the concurrent use of at least two classes of psychotropic medications with at least a 90-day overlap. The polypharmacy categories are not mutually exclusive as an enrollee may have been in one category for one 3-month period and another for a different 3-month period.
[4] The member used both an ADHD and antidepressant medication for 90 or more overlapping days, but not an antipsychotic during this same 90-day period.
[5] The member used both ADHD and antipsychotic medication for 90 or more overlapping days, but not an antidepressant during this same 90-day period.
[6] The member used both an antidepressant medication and an antipsychotic medication for 90 days or more, but not an ADHD medication during this same 90-day period.
ADHD: attention-deficit/hyperactivity disorder.

Table B5: Enrollee Characteristics by Foster Care Status – Annual Preventive Care

Annual Preventive Care[1,2]	Foster Care Enrollees n	Foster Care Enrollees %	Non-foster Care Enrollees n	Non-foster Care Enrollees %
Total enrollees	3,524	-	50,125	-
Well-child visit[3]	1,810	51.36%	20,202	40.30%
Dental screening	13	0.37%	116	0.23%
Fluoride treatment[3]	1,254	35.58%	11,374	22.69%

Annual Preventive Care[1,2]	Foster Care Enrollees n	Foster Care Enrollees %	Non-foster Care Enrollees n	Non-foster Care Enrollees %
Behavioral screening, triage, and referral leading to assessment[3]	153	4.34%	590	1.18%
Brief behavioral assessment[3]	328	9.31%	2,743	5.47%
Developmental screenings	195	5.53%	2,626	5.24%

[1] Foster care enrollees comprised 6.57% of all enrollees less than 21 years of age and non-foster care enrollees comprised 93.43% of all enrollees less than 21 years of age.
[2] Preventive care categories are not mutually exclusive because individual enrollees may have received more than one service and, therefore, fall into more than one preventive care service category.
[3] This enrollee characteristic showed a statistically significant association with foster care status (foster vs. all other youth Medicaid enrollees); *chi*-squared $p < 0.05$.

Table B6: Enrollee Characteristics by Foster Care Status – Health Care Utilization, Ages 6–17 Years

Health Care Utilization, Ages 6–17 Years[1]	Foster Care Enrollees n	Foster Care Enrollees %	Non-foster Care Enrollees n	Non-foster Care Enrollees %
Total enrollees	3,524	-	50,125	-
Total enrollees: Ages 6–17 years	2,366	-	30,360	-
Any behavioral health hospitalization[2,3]	119	5.03%	412	1.36%

[1] Foster care enrollees comprised 6.57% of all enrollees less than 21 years of age and non-foster care enrollees comprised 93.43% of all enrollees less than 21 years of age.
[2] This enrollee characteristic showed a statistically significant association with foster care status (foster vs. all other youth Medicaid enrollees); *chi*-squared $p < 0.05$.
[3] This variable was restricted to enrollees ages 6–17 years, consistent with the CMS Child Core Set FUH-CH measure denominator.

Table B7: Enrollee Characteristics by Any Hospitalization for Mental Illness – Demographic Characteristics

Demographic Characteristics[1]	Total Number of Enrollees n	Enrollees with Any Hospitalization for Mental Illness n	Enrollees with Any Hospitalization for Mental Illness % Subset (% Row)
Total enrollees	32,726	531	1.62%
Foster care enrollment[2]: Yes	2,366	119	5.03%
Foster care enrollment[2]: No	30,360	412	1.36%
Age category[2]: Ages 6–12	20,168	117	0.58%
Age category[2]: Ages 13–17	12,558	414	3.30%
Race[2]: American Indian	7,627	133	1.74%
Race[2]: Black	3,716	33	0.89%
Race[2]: White	19,881	341	1.72%
Race[2]: More than one	737	17	2.31%
Race[2]: Other	765	7	0.92%
Gender[2]: Female	15,990	313	1.96%
Gender[2]: Male	16,736	218	1.30%
County quartile for health ranking[2,3]: Most healthy	14,268	245	1.72%
County quartile for health ranking[2,3]: More healthy	5,875	126	2.14%
County quartile for health ranking[2,3]: Less healthy	4,616	50	1.08%
County quartile for health ranking[2,3]: Least healthy	6,974	96	1.38%
County quartile for health ranking[2,3]: Not reported	993	14	1.41%

[1] Medicaid enrollees, ages 6–17 years.

[2] This enrollee characteristic showed a statistically significant association with hospitalization for mental illness (any hospitalization for mental illness vs. no hospitalization for mental illness); *chi*-squared $p < 0.05$. The *chi*-squared test does not identify the specific subset(s) associated with hospitalization for mental illness. For non-binary categorical variables with multiple subsets, the *chi*-squared test does not identify the specific subset(s) associated with hospitalization for mental illness.
[3] Enrollee counties of residence were grouped into quartiles from most healthy to least healthy based on county measures of social and economic factors including education, employment, income, family and social support, and community safety. The county with the best health was ranked number one in that state and the county with the worst health was assigned the lowest rank in that state.

Table B8: Enrollee Characteristics by Any Hospitalization for Mental Illness – Clinical Characteristics

Clinical Characteristics[1,2]	Total Number of Enrollees n	Enrollees with Any Hospitalization for Mental Illness n	Enrollees with Any Hospitalization for Mental Illness % Subset (Row %)
Total enrollees	32,726	531	1.62%
Substance abuse or dependence[3,4]	532	157	29.51%
Schizophrenia or other psychotic disorders[3]	119	54	45.38%
Mood disorders[3]	2,287	457	19.98%
Anxiety and trauma[3]	6,424	483	7.52%
Autism spectrum disorder	1,370	95	6.93%
Other neurodevelopmental disorders[3]	2,892	136	4.70%
Disruptive behavioral disorders[3]	1,410	233	16.52%
Attention-deficit/hyperactivity disorder[3]	4,706	288	6.12%
Impulse control[3]	178	47	26.40%

[1] Medicaid enrollees, ages 6–17 years.
[2] Behavioral health diagnostic categories are not mutually exclusive because individual enrollees may have more than one diagnosis and, therefore, fall into more than one diagnostic category.
[3] This enrollee characteristic showed a statistically significant association with hospitalization for mental illness (any hospitalization for mental illness vs. no hospitalization for mental illness); *chi*-squared $p < 0.05$.
[4] Substance use disorder includes alcohol use or dependence and/or substance (drug) abuse or dependence.

Table B9: Enrollee Characteristics by Any Hospitalization for Mental Illness – Metabolic Risk Factors

Metabolic Risk Factors[1,2]	Total Number of Enrollees n	Enrollees with Any Hospitalization for Mental Illness n	Enrollees with Any Hospitalization for Mental Illness % Subset (Row %)
Total enrollees	32,726	531	1.62%
No metabolic risk factors	30,959	400	1.29%
One risk factor	1,452	98	6.75%
Two or more risk factors	315	33	10.48%

[1] Medicaid enrollees, ages 6–17 years. Metabolic risk factors include the following conditions that are risk factors for metabolic complications: prediabetes, type 1 diabetes mellitus, type 2 diabetes mellitus, other abnormal blood glucose, hyperlipidemia, and overweight or obesity.
[2] This enrollee characteristic showed a statistically significant association with hospitalization for mental illness (any hospitalization for mental illness vs. no hospitalization for mental illness); *chi*-squared $p < 0.05$.

Table B10: Enrollee Characteristics by Any Hospitalization for Mental Illness – Psychotropic Polypharmacy

Psychotropic Polypharmacy[1,2,3]	Total Number of Enrollees n	Enrollees with Any Hospitalization for Mental Illness n	Enrollees with Any Hospitalization for Mental Illness % Subset (Row %)
Total enrollees	32,726	531	1.62%
Three concurrent classes	157	41	26.11%
Chronic use of two psychotropics	680	99	14.56%
Nonconcurrent psychotropic use	1,712	97	5.67%
No psychotropic use	30,177	294	0.97%

[1] Medicaid enrollees, ages 6–17 years.

[2] This enrollee characteristic showed a statistically significant association with hospitalization for mental illness (any hospitalization for mental illness vs. no hospitalization for mental illness); *chi*-squared $p < 0.05$.

[3] Psychotropic polypharmacy is defined as the concurrent use of at least two classes of psychotropic medications with at least a 90-day overlap. The psychotropic categories are mutually exclusive.

Table B11: Multiple Logistic Regression: Any Hospitalization for Mental Illness – Demographic Characteristics

Demographic Characteristics[1]	Odds Ratio	95% CI
All other Medicaid enrolled youth	Referent	Referent
Enrolled in foster care – adjusted analysis	1.024	0.776, 1.350
Enrolled in foster care – unadjusted analysis[2]	3.851	3.127, 4.743
Age category: Ages 6–12	Referent	Referent
Age category: Ages 13–17[2]	1.742	1.345, 2.255
Race: American Indian	1.210	0.927, 1.579
Race: Black	1.233	0.794, 1.916
Race: White	Referent	Referent
Race: More than one	1.196	0.643, 2.226
Race: Other	1.298	0.541, 3.114
Ethnicity: Latino/Hispanic	1.225	0.812, 1.847
Ethnicity: Not Latino/Hispanic/Unknown	Referent	Referent
Gender: Female[2]	1.334	1.062, 1.676
Gender: Male	Referent	Referent
Area of residence: Rural enrollee residence	1.175	0.944, 1.462
Area of residence: Non-rural enrollee residence	Referent	Referent
County quartile for health ranking[3]: Most healthy	Referent	Referent
County quartile for health ranking[3]: More healthy	1.234	0.935, 1.627
County quartile for health ranking[3]: Less healthy	0.917	0.637, 1.321
County quartile for health ranking[3]: Least healthy	1.264	0.917, 1.742
County quartile for health ranking[3]: Not reported	1.031	0.526, 2.021

[1] Multiple logistic findings are presented for each enrollee characteristic, adjusted for all other characteristics, except for "Enrolled in foster care-unadjusted analysis," which represents unadjusted findings from simple logistic regression.

[2] This enrollee characteristic showed a statistically significant association with any hospitalization for mental illness relative to the referent; 95% confidence interval does not contain the value of 1.

[3] Enrollee counties of residence were grouped into quartiles from most healthy to least healthy based on county measures of social and economic factors including education, employment, income, family and social support, and community safety. The county with the best health was ranked number one in that state and the county with the worst health was assigned the lowest rank in that state. Because both the county quartile and rural variables are county-based, they are correlated and require analysis in separate logistic regression models. Therefore, the odds ratio and 95% confidence intervals for county quartile for health rankings variable were generated by a separate logistic regression model that used this variable in place of rural residence. All other variables were included in this model.

CI: confidence interval.

Table B12: Multiple Logistic Regression: Any Hospitalization for Mental Illness – Clinical Characteristics

Clinical Characteristics	Odds Ratio	95% CI
Substance abuse dependence[2,3]	4.926	3.693, 6.570
Schizophrenia or other psychotic disorders[2]	3.673	2.299, 5.868
Mood disorders[2]	16.629	12.399, 22.301
Anxiety and trauma[2]	5.713	4.029, 8.099
Autism spectrum disorder[2]	2.592	1.883, 3.568
Other neurodevelopmental disorders	1.211	0.914, 1.604
Disruptive behavioral disorders[2]	2.448	1.908, 3.140
Attention-deficit/hyperactivity disorder	0.820	0.634, 1.061
Impulse control[2]	3.170	1.971, 5.096

[1] Multiple logistic findings are presented for each enrollee characteristic, adjusted for all other characteristics.
[2] This enrollee characteristic showed a statistically significant association with any hospitalization for mental illness relative to the referent; 95% confidence interval does not contain the value of 1.
[3] Substance use disorder includes alcohol use or dependence and/or substance (drug) abuse or dependence.
CI: confidence interval.

Table B13: Multiple Logistic Regression: Any Hospitalization for Mental Illness – Metabolic Risk Factors

Metabolic Risk Factors	Odds Ratio	95% CI
No metabolic risk factors	Referent	Referent
One risk factor[2]	2.107	1.560, 2.847
Two or more risk factors[2]	1.886	1.116, 3.187

[1] Multiple logistic findings are presented for each enrollee characteristic, adjusted for all other characteristics.
[2] This enrollee characteristic showed a statistically significant association with any hospitalization for mental illness relative to the referent; 95% confidence interval does not contain the value of 1.
CI: confidence interval.

Table B14: Multiple Logistic Regression: Any Hospitalization for Mental Illness – Psychotropic Polypharmacy

Psychotropic Polypharmacy[1,2]	Odds Ratio	95% CI
Three concurrent classes	1.598	0.990, 2.580
Chronic use of two psychotropics[3]	1.683	1.217, 2.328
No psychotropic use	Referent	Referent
Nonconcurrent psychotropic use	1.252	0.938, 1.671

[1] Multiple logistic findings are presented for each enrollee characteristic, adjusted for all other characteristics.
[2] Psychotropic polypharmacy is defined as the concurrent use of at least two classes of psychotropic medications with at least a 90-day overlap. The psychotropic categories are mutually exclusive.
[3] This enrollee characteristic showed a statistically significant association with any hospitalization for mental illness relative to the referent; 95% confidence interval does not contain the value of 1.
CI: confidence interval.