

Children with Autism Spectrum Disorder (ASD) More Likely to be Diagnosed with Leukemia Than Those Without ASD

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Key Findings:

- Children diagnosed with autism spectrum disorder (ASD) are 49% more likely to be diagnosed with leukemia than children without ASD.
- Siblings of children with ASD are slightly more likely to be diagnosed with leukemia than children without a sibling with ASD. However, this increase was not statistically significant.

Studies have suggested a link between autism spectrum disorder (ASD) and cancer.^{1,2} To further explore the relationship between ASD and leukemia in children, we studied the likelihood of children with ASD and their siblings being diagnosed with leukemia.

We studied 7,075 children born between September 30, 2006, and September 30, 2018, and observed them through September 30, 2024. To assess the impact on siblings of children with ASD, we studied 2,385 children born in the same period. We adjusted for patient race, ethnicity, sex, Social Vulnerability Index quintile, and Rural-Urban Commuting Area score. For the sibling analysis, we also adjusted for birth order.

We found that children who were diagnosed with ASD were 49% more likely to be diagnosed with leukemia compared to children without ASD, as seen in Figure 1. An analysis of siblings of children with ASD showed an increased likelihood of leukemia compared to children without a sibling with ASD, as seen in Figure 2. However, that increase was not statistically significant.

Likelihood of Leukemia in Children with ASD

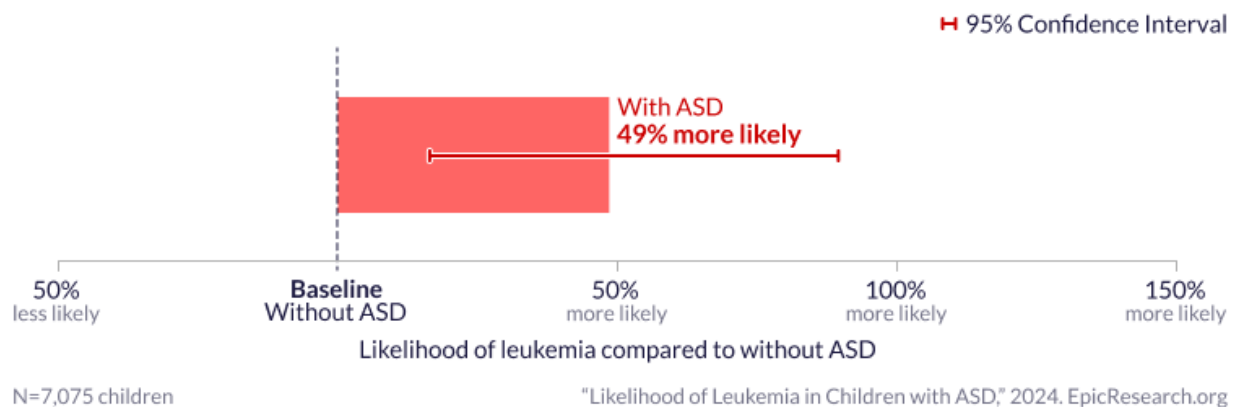


Figure 1. The likelihood of a child being diagnosed with leukemia by whether they are diagnosed with ASD.

Likelihood of Leukemia in Children with a Sibling with ASD

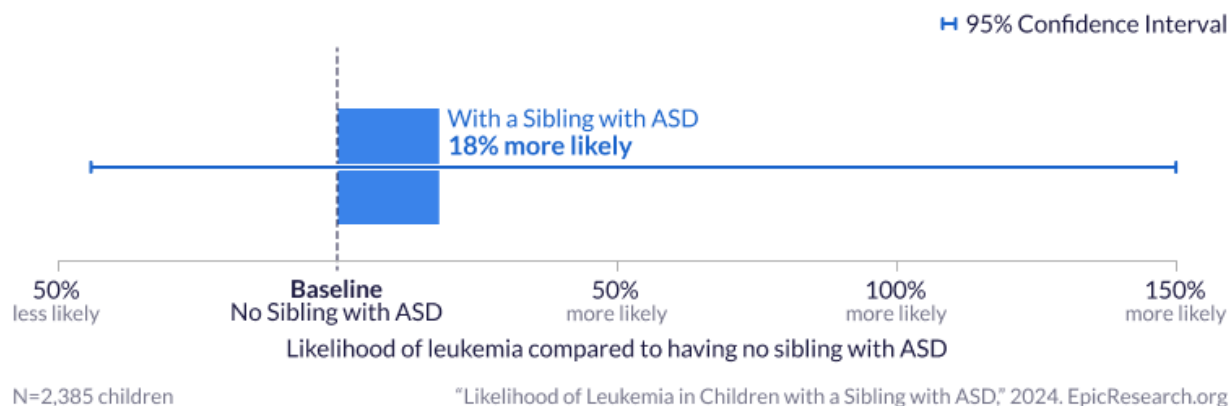


Figure 2. The likelihood of a child being diagnosed with leukemia by whether their sibling is diagnosed with ASD.

These data come from Cosmos, a dataset created in collaboration with a community of Epic health systems representing more than 284 million patient records from 1,600 hospitals and more than 36,000 clinics from all 50 states, Lebanon, and Saudi Arabia. This study was completed by two teams that worked independently, each composed of a clinician and research scientists. The two teams came to similar conclusions. Graphics by Brian Olson.

References

1. Chiang HL, Liu CJ, Hu YW, et al. Risk of cancer in children, adolescents, and young adults with autistic disorder. *J Pediatr.* 2015;166(2):418-23.e1. doi:10.1016/j.jpeds.2014.10.029
2. Kazemzadeh K, Rezaei N. Cancer in patients with autism spectrum disorder: Risk and challenges. In: *Interdisciplinary Cancer Research.* Springer International Publishing; 2023.

Data Definitions

Term	Definition
Study period	Births between 9/30/2006 and 9/30/2018, followed up through 9/30/2024.
Study population	<p>Children that:</p> <ul style="list-style-type: none"> • Have lived to at least age six • Have never had a diagnosis of Rett's syndrome (ICD-10-CM code F84.2) <p>ASD population also required to:</p> <ul style="list-style-type: none"> • Have three face-to-face encounters in a Family Medicine or Pediatrics department, one at each the following ages: <ul style="list-style-type: none"> o [2-4) o [4-6) o 6+ <p>Sibling population also required to:</p> <ul style="list-style-type: none"> • Have a linked mother's chart in Cosmos • Have two face-to-face encounters in Family Medicine or Pediatrics department, one at each of the following ages: <ul style="list-style-type: none"> o After age one, before age six

	o At age six or later
Face-to-face	The following encounter types: Emergency, Hospital Encounter, Office visit, Well Child, Follow-Up, Telemedicine, Urgent care, Walk-In.
Autism	A diagnosis with ICD-10-CM code F84.0* or F84.5*
Leukemia	A diagnosis with ICD-10-CM code C90.1, C91*, C92*, C93*, C94*, or C95*
Model Specifications	<p>Logistic regression adjusting for:</p> <p>Legal sex: F/M</p> <p>Social Vulnerability Index Quintiles</p> <p>RUCA:</p> <ul style="list-style-type: none"> • Metropolitan • Micropolitan • Small Town • Rural <p>Race/ethnicity: Nonexclusive flags for Black and Hispanic/Latino patients</p> <p>For siblings only: Birth order</p> <ul style="list-style-type: none"> • Has siblings, first born • Has siblings, second or later born • Only child
Social Vulnerability Index	The social vulnerability quintile for the ZIP Code of the patient's most recent address
RUCA	Rural-Urban Commuting Area is a classification of geographic areas based on population density, urbanization, and daily commuting. It ranges from 1 to 10, with lower values indicating more urban areas and higher values indicating more rural areas.

Table 1: Likelihood of Leukemia in Children with ASD and Their Siblings

	Odds Ratio	95% CI - Low	95% CI - High	Percent increase
Children with ASD	1.485	1.164	1.895	49% more likely
Children Who have a Sibling with ASD	1.181	0.558	2.499	18% more likely