



NRXN1-related syndrome





This guide is not meant to take the place of medical advice.

Please consult with your doctor about your genetic results and health care choices. The information in this guide was up to date at the time it was written in 2019. But new information may come to light with new research. You may find it helpful to share this guide with friends and family members or doctors and teachers of the person who has NRXN1-related syndrome.





What is NRXN1-related syndrome?

NRXN1-related syndrome happens when a small section of the NRXN1 gene is missing. This change can keep the gene from working as it should. Even a tiny piece of missing DNA can affect how the gene works.

Key role

The NRXN1 gene plays a key role in the development of communication skills, social skills, and learning skills.

Symptoms

Because the NRXN1 gene is important for development, many people who have NRXN1-related syndrome have:

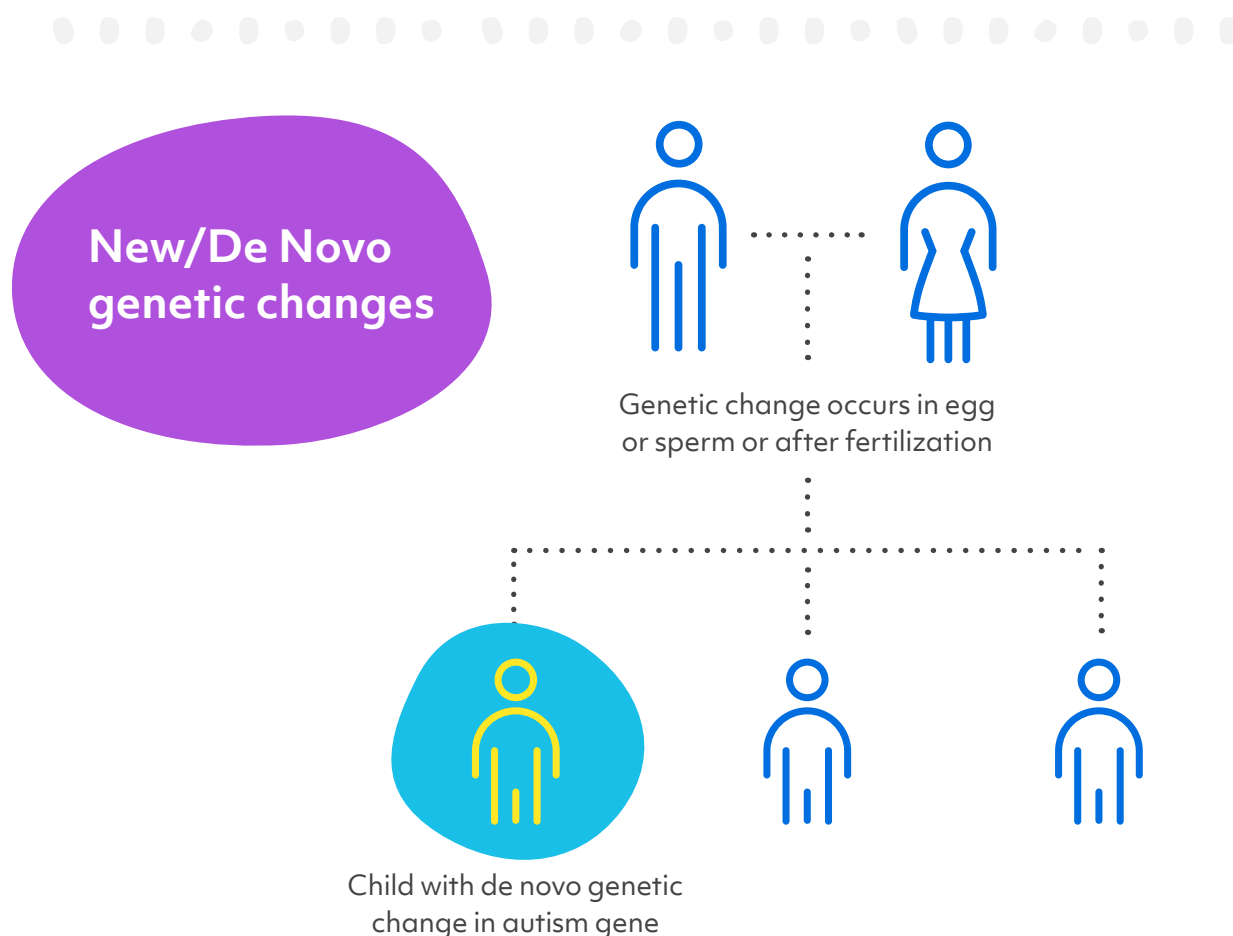
- Developmental delay, or intellectual disability, or both
- Speech and language delay
- Autism spectrum disorder or features of autism
- Other behavior issues, such as attention deficit hyperactivity disorder, also called ADHD

What causes NRXN1-related syndrome?

Our genes contain the instructions, or code, that tell our cells how to grow, develop, and work. The genes are arranged in long threads called chromosomes. There are thousands of genes in each chromosome and 46 chromosomes in each cell.

Every child gets two copies of the NRXN1 gene: one copy from their mother, from the egg, and one copy from their father, from the sperm. In most cases, parents pass on exact copies of the gene to their child. But the process of copying genes is not perfect. A change in the genetic code can lead to physical issues, developmental issues, or both.

Sometimes a random change happens in the sperm or egg. This change to the genetic code is called a 'de novo', or new, change. The child can be the first in the family to have the gene change.



People who have NRXN1-related syndrome are missing a small piece of one copy of the NRXN1 gene. The missing piece can affect learning and how the body develops. Researchers are still trying to learn more about what the genes in this segment do.

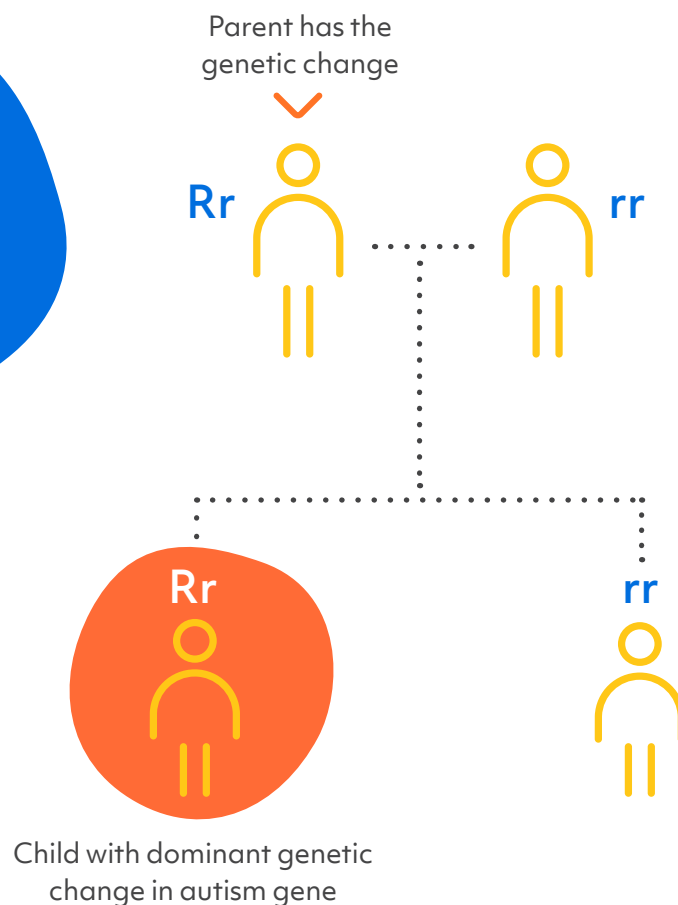
Changes to the NRXN1 gene can be inherited or occur de novo. In a study of 15 families with a child who has a change in the NRXN1 gene, three were de novo changes, six were changes passed down from the mother, and three were changes passed down from the father. Three cases were uncertain because one or both parents were not available to have their genes tested.

In the nine cases where the change in NRXN1 was passed down from a parent, nearly 90 percent of parents that carried the gene change had learning difficulties or intellectual disability. Nearly one-half had psychiatric conditions, including depression and anxiety. Two of the nine had an autism diagnosis, and one had epilepsy. One parent had no previously known psychiatric conditions or learning difficulties.



Dominant inheritance


Children have a 50% chance of inheriting the genetic change



Why does my child have a change in the NRXN1 gene?

No parent causes their child's NRXN1-related syndrome. We know this because no parent has any control over the gene changes that they do or do not pass on to their children. Please keep in mind that nothing a parent does before or during the pregnancy causes this to happen. The gene change takes place on its own and cannot be predicted or stopped.





What are the chances that other family members or future children will have NRXN1-related syndrome?

Each family is different. A geneticist or genetic counselor can give you advice on the chance that this will happen again in your family.

The risk of having another child who has NRXN1-related syndrome depends on the genes of both birth parents.

- If neither birth parent has the same gene change found in their child, the chance of having another child who has the syndrome is on average 1 percent. This 1 percent chance is higher than the chance of the general population. The increase in risk is due to the very unlikely chance that more of the mother's egg cells or the father's sperm cells carry the same change in the gene.
- If one birth parent has the same gene change found in their child, the chance of having another child who has the syndrome is 50 percent.

For a symptom-free sibling, a brother or sister, of someone who has NRXN1-related syndrome, the risk of having a child who has NRXN1-related syndrome depends on the symptom-free sibling's genes and their parents' genes.

- If neither parent has the same gene change found in the child who has the syndrome, the symptom-free sibling has a nearly 0 percent chance of having a child who has NRXN1-related syndrome.
- If one birth parent has the same gene change found in their child who has the syndrome, the symptom-free sibling has a small chance of also having the same gene change. If the symptom-free sibling has the same gene change as their sibling who has the syndrome, the symptom-free sibling's chance of having a child who has NRXN1-related syndrome is 50 percent.

For a person who has NRXN1-related syndrome, the risk of having a child who has the syndrome is about 50 percent.

Do all people who have NRXN1-related syndrome have symptoms?

Most but not all people who have a deletion in the NRXN1 gene have symptoms. Some people do not discover that they have this gene change until it is found in their children.

If multiple people in a family have a change in the NRXN1 gene, will they be affected in the same way?

No, not necessarily. Family members that have the same gene change can have different symptoms.

How many people have NRXN1-related syndrome?

As of 2018, about 100 people in the world with changes in the NRXN1 gene had been described in medical research. The first case of NRXN1-related syndrome was described in 2008. Scientists expect to find more people who have the syndrome as access to genetic testing improves.

Do people who have NRXN1-related syndrome look different?

People who have NRXN1-related syndrome generally do not look different.





How is NRXN1-related syndrome treated?

Scientists and doctors have only just begun to study NRXN1-related syndrome. At this point, there are no medicines designed to treat the syndrome. A genetic diagnosis can help people decide on the best way to track the condition and manage therapies. Doctors can refer people to specialists for:

- Physical exams and brain studies.
- Genetics consults.
- Development and behavior studies.
- Other issues, as needed.

A developmental pediatrician, neurologist, or psychologist can follow progress over time and can help:

- Suggest the right therapies. This can include physical, occupational, speech, or behavioral therapy.
- Guide individualized education plans (IEPs).

Specialists advise that therapies for NRXN1-related syndrome should begin as early as possible, ideally before a child begins school.

If seizures happen, consult a neurologist. There are many types of seizures, and not all types are easy to spot. To learn more, you can refer to resources such as the Epilepsy Foundation's website: www.epilepsy.com/learn/types-seizures.

NRXN1-related syndrome is very rare. Doctors and scientists have just recently begun to study it. As of 2018, studies described around 100 people who have NRXN1-related syndrome.

This section includes a summary of information from major published articles. It highlights how many people have different symptoms. To learn more about the articles, see the [Sources and references](#) section of this guide.

Behavior and development concerns linked to NRXN1-related syndrome

Learning

Most people who have NRXN1-related syndrome have some degree of intellectual disability. This can range from mild to moderate. Children need a lot of learning support and may need to go to a special school where the right support is available. Adults who have the syndrome may need supervision.



A study of 15 people who have the syndrome found that more than **90%** had **intellectual disability**.

Speech

Most people who have NRXN1-related syndrome have problems with communication. They have trouble speaking and getting their message across to others. They have less trouble understanding words and sentences. People who have the syndrome often start talking late, with their first words usually spoken around age 2.



A study of 12 people found that **75%** had **language difficulties**.

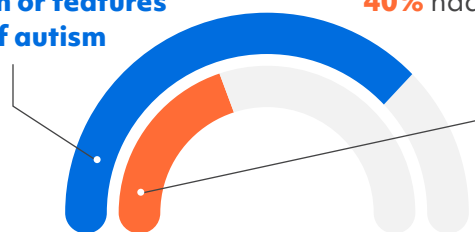
Behavior

People who have NRXN1-related syndrome can have autism or features of autism. They can also have other behavior issues, such as attention deficit hyperactivity disorder, also called ADHD.

A study of 17 people found that

about **70%** had **autism or features of autism**

and about **40%** had **ADHD**.



Medical and physical concerns linked to NRXN1-related syndrome

Brain

Some people who have NRXN1-related syndrome have seizures. A study of 17 people found that about 25 percent had seizures. This can include both absence seizures, which are seizures with brief staring spells, and generalized tonic-clonic seizures, which are seizures that involve the entire body.

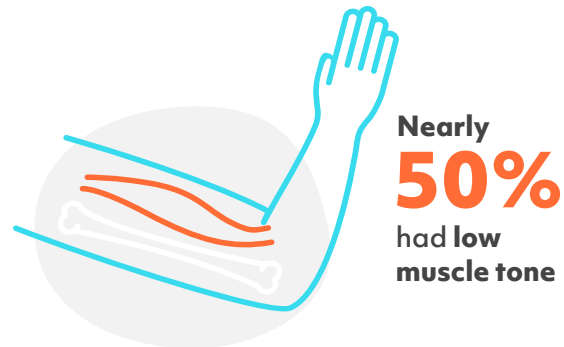


Sitting and walking

Children usually start **sitting and walking late**. Most start walking on their own around 18 months of age.

Muscle tone

Some people have low muscle tone. This can cause delays in rolling over, sitting, crawling, and walking. Low muscle tone may also cause feeding problems.





Where can I find support and resources?

Simons Searchlight is another research program sponsored and run by the Simons Foundation Autism Research Initiative, also known as SFARI. As part of the next step in your research journey, Simons Searchlight offers you the opportunity to partner with scientists and other families who have the same gene change. Simons Searchlight is a registry for more than 200 genetic changes that are associated with neurodevelopmental conditions, including autism spectrum disorder. Simons Searchlight makes it easier for researchers to access the information they need to advance research on a condition.

To register for Simons Searchlight, go to the Simons Searchlight website at www.simonssearchlight.org and click “Join Us Today”.

- **Learn more about Simons Searchlight**
www.simonssearchlight.org/frequently-asked-questions
- **Simons Searchlight webpage with more information on NRXN1**
www.simonssearchlight.org/research/what-we-study/nrxn1
- **Simons Searchlight NRXN1 Facebook community**
www.facebook.com/groups/598626690667270

Sources and References

The content in this guide comes from published studies about NRXN1-related syndrome. Below you can find details about each study, as well as links to summaries or, in some cases, the full article.

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