



NATIONAL **FRAGILE X** FOUNDATION
FRAGILE X CLINICAL & RESEARCH CONSORTIUM

Consensus of the Fragile X Clinical & Research Consortium

MEDICATIONS FOR INDIVIDUALS WITH FRAGILE X SYNDROME

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Note - Disclaimer:

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Introduction

Many individuals with Fragile X syndrome (FXS) exhibit delays in development and can also have challenging behaviors, both of which can impact academic and daily functioning. Medications are at times helpful to facilitate the individual's ability to attain optimal life skills and allow for better integration into educational, adult, and social environments.

Psychopharmacological (medication) treatment in FXS is recommended in appropriate individuals, as a treatment to be used in conjunction with therapeutic services, including behavioral intervention, speech and language therapy, occupational therapy, and individualized educational support. It is also important to set up the environment, to the extent possible, for success. Examples might include setting up a routine, using visual schedules, allowing time for transitions, and minimizing sensory stimuli. Note that non-medication Treatment Recommendations are provided at the end of this document.

There are several common symptoms and psychiatric conditions in individuals with FXS which are treated with the same medications used in the general population and in individuals with other developmental disabilities. These medications have been reported to be effective for individuals with FXS in retrospective clinical studies. However, it is important to note that there is limited formal research or clinical trial data to demonstrate the best approach to the use of medication specifically in the FXS population.



Important

It is important to remember that individuals with FXS:

- May be more sensitive to medication effects.
- May respond to smaller doses than the general population.
- May have side effects at dosing lower than expected to cause such effects.

An important general principle with all medication treatment in FXS is to start at low doses and raise the dose gradually and systematically until the desired benefit is achieved or until intolerable side effects occur.

If side effects occur, the medication may need to be discontinued in consultation with the doctor.

The medications below provide possible dosing levels for adults (ages 18 and older) and youth - children/teenagers between the ages of 5 and 18. (Some 3–5-year-olds may take medications under close supervision of their doctor.) Note: Where medication dosage is based on weight, it will be noted. At all times, dosing level should be discussed with the individual's doctor.

Do not make changes to medications or supplements (increasing OR decreasing) without the guidance of the individual's doctor.

If dosing levels are not provided for a medication listed below, it is because the medication is not recommended for use in individuals with FXS. In those instances, medications are only listed in case they are suggested by a doctor.

General Recommendations for Adults:

It is important to avoid adding new medications every time an adult has a crisis, and it is important to make every attempt to avoid adults being over medicated with high dosages and with many medications at once.



The following discussion includes available data wherever possible, but much of the current approach to treatment relies on expert opinion. The core behaviors discussed below are commonly seen in FXS, and individuals with FXS may have one or more than one of the listed behaviors.

The following can be found at the end of this document:

- A Symptom Rating Scale form, in which the caregiver can rank the severity of these symptoms to help prioritize treatment choices.
- Recent research-based articles from the Fragile X Online Registry With Accessible Research Database (FORWARD project).

Note the medications listed below have the following format: Generic Name (Common brand name).

Areas of Concern

The following information on medications is divided by areas of concern, in alphabetical order:

Aggression and Self-Injurious Behavior	Obesity
Agoraphobia	Obsessive Compulsive Disorder (OCD)
Anxiety	Repetitive and Perseverative
Attention Deficit Hyperactivity Disorder (ADHD)	Behaviors
Asthma	Saliva Reduction
Depression	Seizures
Handling Changes and Transitions	Selective Mutism
Hyperarousal	Self-Injurious Behavior (SIB)
Impulsive Behaviors	Sensory Sensitivities
Introverted/Prefers Isolation	Sleep Problems
Irritability	Social Anxiety
Mood Disorders	Speech and Language in Toddlers



Aggression and Self-Injurious Behavior

Aggression and/or self-injurious behavior (SIB) in FXS can present at an early age, often closely associated with intense anxiety and generalized irritability. Features of autonomic arousal including tachycardia (rapid heart rate) and diaphoresis (sweating), may indicate an underlying anxiety or panic attack and can help guide the types of intervention likely to help.

Antipsychotic medications are used in children, adolescents, and adults exhibiting severe behavioral disturbances such as aggression and/or SIB that interfere with daily functioning or pose a significant threat to the affected individual or others.

Antipsychotics

These medications have FDA approval for use in treating irritable and aggressive behaviors in autism spectrum disorder (ASD) in youth aged 5 and up. However, in cases where extreme behavior dysfunction exists, these medications have been used to treat children as young as 3 years of age, though great caution should be exercised in this age group due to variable responses and side effects.

Those frequently used include:

Aripiprazole (Abilify)

It is reported to have response rates of ~70% in FXS. In an open-label prospective study, this medication targeted distractibility, anxiety, mood instability, aggression, and self-injurious behavior.

Some individuals cannot tolerate this medication because it has dopamine agonist activity and its side effects can be similar to those seen with the use of stimulants, including exacerbation of agitation or aggravation of aggressive, irritable, and perseverative behaviors.

Medication Interactions:

- Sertraline (Zoloft) and Fluoxetine (Prozac) can increase the blood levels of aripiprazole.
- In a few individuals with FXS treated with the combination of buspirone and aripiprazole, emergence of tics has been seen so this combination should be used with caution watching for this side effect.



Dosing:

- Adult: Typically dosed in the range of 2mg to 30mg total dose per day with some individuals responding at lower dosing. Dosing normally occurs one or two times per day.
- Youth: Typically dosed from 2mg to 15mg per day with larger adolescents generally following adult dosing guidelines.

Risperidone (Risperdal)

Dosing:

- Adult: Typically dosed in the range of 0.5mg to 8mg total per day with dosing typically divided two to three times daily.
- Youth: Typically dosed from 0.5mg to 4mg per day in divided doses with significant dosing variation from low to high dosing based on size and age within childhood.

This medication can increase prolactin, which often has a calming effect. It's the endogenous neuro hormone that causes milk letdown or lactation in women after they give birth. Very rarely, it can cause lactation in women treated with risperidone, and rarely it can cause breast tissue development in males. It is not seen very often, but it is something that professionals watch for and is treatable.

Olanzapine (Zyprexa)

Dosing:

- Adult: Typically dosed in the range of 5mg to 40mg daily per day total often divided in two to three doses.
- Youth: Typically dosed in the range of 2.5mg to 15mg per day often in divided doses with larger adolescents dosing into the adult dosing range.

Side Effects of Antipsychotic Medications

At any age, antipsychotic medications can cause significant side effects including:

- When first starting the medication – within days to 1-2 weeks at any specific dose: Akathisia (restlessness), extrapyramidal movement disorders (i.e., upper extremity stiffness within several weeks unless the dosage continues to be increased), oculogyric reaction (spasm movement of the eyeball) or spasm of the mouth or neck is rare but can occur within days of initiation of the treatment,
- After having been on a medication for an extended period of time, side effects can sometimes occur. Tardive dyskinesia (stiff, jerky movements of the face and body that the person cannot control, and that do not remit when the offending drug is stopped).



Metabolic issues such as weight gain can develop within weeks, especially with aripiprazole (Abilify), risperidone (Risperdal), and olanzapine (Zyprexa). These medications can potentially cause glucose intolerance due to increased insulin resistance. Other side effects are lethargy and worsening of coordination.

Long term use of aripiprazole (Abilify), risperidone (Risperdal), and olanzapine (Zyprexa)

A concern regarding aripiprazole, risperidone, and olanzapine is weight gain. If an individual gains a lot of weight, there can be issues with a higher diabetes risk (Type 2), high blood pressure, and high cholesterol. There is also a small risk of extrapyramidal movements developing (abnormal movements that are repetitive and involuntary); caregivers should watch for abnormal movements. It is important to monitor for these movements as they (rarely) can become permanent (tardive dyskinesia) if not addressed. They can potentially occur after years of use and can happen out of nowhere.

Careful clinical monitoring is required consisting of blood tests as indicated for glucose, liver function, electrolytes, and lipid profiles, particularly in individuals with substantial weight gain.

Antipsychotics least likely to cause tardive dyskinesia

If the individual with FXS is having abnormal movements, the following can be considered:

Quetiapine (Seroquel)

Lower rates of weight gain and abnormal movements are seen with this medication, though some risk of abnormal movements does exist.

Dosing:

- Adult: Typically dosed in the range of 50mg to 1000mg daily per day total often divided in two to three doses.
- Youth: Typically dosed in the range of 50mg to 400mg per day often in divided doses with larger adolescents dosing into the adult dosing range.

Pimavanserin (NUPLAZID®)

For individuals who have had a lot of movement issues in adolescents and adults, this is a new medication that's FDA approved for psychosis associated with Parkinson's disease. The drug often requires prior authorization due to its expense.



Dosing:

- Adult: Typically dosed in the range of 17mg to 34mg per day.
- Youth: No dosing use information available.

Clozapine

This is one anti-psychotic medication that does not cause tardive dyskinesia. However, it is associated with significant weight gain, lowers the seizure threshold resulting in appearance or increases in seizures in some individuals, and rarely, can cause white blood cell count to drop to zero, requiring blood counts every week for six months, then every other week, and then monthly. Given these requirements, clozapine use remains limited in FXS.

Other Antipsychotics

Quetiapine (Seroquel)

For those where weight gain is an issue.

Dosing:

- Adult: 20mg to 80mg per dose given twice daily.
- Youth: Start at 20mg in the evening then 20mg twice daily, may go up slowly over time to a maximum of 80mg twice daily depending on age and size.

Lurasidone (Latuda)

A newer generation anti-psychotic. It has not been specifically studied for its use in FXS. There has been a negative study for its use in treating aggression and irritability in autism.

Brexpiprazole (Rexulti)

Rexulti is a new form of Abilify for people who have Abilify tolerability issues. No systematic data has been generated to date describing Rexulti use in FXS.

Other Medications Used in the Treatment of Aggressive Behavior

Selective Serotonin Reuptake Inhibitors (SSRIs)

If aggressive or self-injury behavior is the result of the individual's anxiety, treatment using a medication for anxiety, such as a selective serotonin reuptake inhibitors (SSRIs) medication, can be effective. SSRIs have been used in children with FXS as young as 3 years of age.

Dosing: See the Anxiety section.

Anticonvulsants

Used to target mood instability; medications such as valproic acid (Depakote), carbamazepine (Tegretol), and lamotrigine (Lamictal) can occasionally be effective for aggressive behavior/SIB, and thus should be considered as an additional option for therapy if SSRI medications or the atypical antipsychotic medications are not tolerated or effective.

Valproic acid (Depakote)

Dosing:

- Adult and Youth: Depakote dosing is based on following blood levels with a goal blood level between 50 and 125 units of Depakote. Therefore, flexibly dosed, and blood levels should be closely monitored. Typically, this is started at 10 mg/kg/day divided twice or three times a day and titrated up to as much as 40 mg /kg/day monitoring liver functions, CBC for platelets, and the level.

Carbamazepine (Tegretol)

Dosing:

- Adult: starting dose would be about 400 mg twice a day with titration up to as much as 1200 mg twice a day (can be divided into three doses a day)
- Youth: Starting dose 10 mg/kg/day divided twice a day.

Carbamazepine can cause the blood counts to drop and blood testing for a CBC and liver functions should be done initially after 4 weeks on the medication and then every 6 months. It can sometimes be activating and increase impulsive behavior and hyperactivity.

Lamotrigine (Lamictal)

Dosing:

- Adult and Youth: Lamotrigine has to be started slowly and titrated up gradually to avoid allergic rashes. The dose is based on weight and the other medications the patient is on and specific guidelines are available for lamotrigine titration. It is typically dosed twice a day after titration.

Lamotrigine can aggravate sleep problems and if it seems to be causing sleep difficulties the second dose can be moved to afternoon and this will in some cases resolve the sleep problems.



Aggression - Quick Acting Medications

Risperdal M-tab.

Risperidone has a Risperdal M-tab, which dissolves in the mouth. It is also available in a liquid, which is easy and quick to take, and the dosage can be more easily adjusted.

Dosing:

- Adult: Typically dosed in the range of 0.5mg to 2mg per dose used as needed and as directed.
- Youth: Typically dosed in the range of 0.25mg to 1mg based on age and size.

Zyprexa Zydis (Olanzapine)

A rapidly dissolving melt in the mouth anti-psychotic which can be used as needed to treat severe behaviors.

Dosing:

- Adult: Typically dosed in the range of 5mg or 10mg per as needed or as directed.
- Youth: Typically dosed starting as low as 2.5mg or even 1.25mg, based on age and size.

Other Medication

There is also a dissolving form of Abilify, but it is used less often than the other medications noted above.

Agoraphobia

Agoraphobia is an anxiety disorder which can cause intense fear in situations where the person feels escape may be difficult or help hard to access. For some people with FXS, agoraphobia can cause the individual to not want to leave their house. See the Anxiety section.

If agoraphobia leads to, for example, aggression when trying to get the individual with FXS to leave the house or leave their room, and/or results in them starting to hurt themselves, hurting other people, or breaking and throwing things, then medicines for anxiety (SSRI medications) may help. If symptoms persist, medications for aggression are added, such as aripiprazole (Abilify) or risperidone (Risperdal). For many agoraphobia challenges, behavioral supports can also be helpful.

Anxiety

Many patients with FXS begin to show signs of anxiety at a very early age, often by 2-4 years. Serotonin is one of the most important neurotransmitters in the brain involved in regulating mood and affect. The selective serotonin reuptake inhibitors (SSRIs) can be very effective in treating symptoms of anxiety and depression.

SSRIs work by increasing levels of serotonin within the brain; serotonin is a hormone that is a mood stabilizer. SSRIs have been used on an empirical basis in affected patients with FXS as young as those in toddlerhood.

Classes of Medications Covered in this Section:

Selective Serotonin Reuptake Inhibitors (SSRIs)

Serotonin and norepinephrine reuptake inhibitors (SNRIs)

Antipsychotics

Serotonin Receptor Antagonists and Reuptake Inhibitors (SARIs)

Norepinephrine-Dopamine Reuptake Inhibitors (NDRIs)

Antianxiety Agents, Anxiolytics, Nonbenzodiazepines

Benzodiazepines

Beta Blockers

Tricyclic Antidepressants (TCAs)

Alpha-2 Agonists

Selective Serotonin Reuptake Inhibitors (SSRIs)

SSRIs increase levels of serotonin in the brain. Serotonin helps regulate mood.

The most commonly used SSRIs in the treatment of FXS are:

Sertraline (Zoloft)

Dosing:

- Adult: Typically dosed in the range of 12.5mg up to 200mg per day.
- Youth: Typically dosed as low as 5mg per day, with larger adolescents dosing into the adult dosing range.

Citalopram (Celexa)

Dosing:

- Adult: Typically dosed in the range of 10mg to 40mg per day.
- Youth: Typically dosed as low as 5mg per day, with larger adolescents dosing into the adult dosing range.



Escitalopram (Lexapro)

Dosing:

- Adult: Typically dosed in the range of 5mg to 20mg per day.
- Youth: Typically dosed as low as 2.5mg per day, with larger adolescents dosing into the adult dosing range.

The best data on the use of sertraline in FXS is the result of the work of Dr. Randi Hagerman who has published on the potential for the drug to facilitate communication in young children, including young children ages 2-6 years old. This study demonstrated improvements in non-verbal cognition, fine motor skills and in visual perception compared to placebo but improvements in expressive language only occurred in those who had ASD. Sertraline is also available in a liquid formulation.

A Randomized, Double-Blind, Placebo-Controlled Trial of Low-Dose Sertraline in Young Children with Fragile X Syndrome

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5039060/>

Once children get to school age, there is more use of escitalopram (Lexapro) and citalopram (Celexa) which have limited drug-drug interactions and are generally used interchangeably compared to sertraline use.

Side effects of SSRIs

Behavioral activation, which can include sleep difficulties, is an increase in activity level that generally does not include any real change in mood, impulse control, or a change in the child's demeanor or other behaviors. It can be managed by dose reduction or medication discontinuation. At times, the activation can be more significant and results in agitation, though this is a rare side effect. However, at times it is difficult to get the dose low enough to actually get rid of the activation and keep the clinical benefit. Additional side effects may include nausea, diarrhea, and dizziness.

Long term use of SSRIs

There is a small risk of disinhibition, more so in people with autism who do not have FXS, manifested as getting overly energized and/or increasingly agitated. SSRIs are considered safe with no known long-term organ toxicity.

Which SSRI do I start with?

The most commonly used in FXS are Sertraline (Zoloft), Citalopram (Celexa), and Escitalopram (Lexapro). Check if other family members have taken one and had tolerability issues. This is a discussion to best have with the individual's child's doctor.

Serotonin and norepinephrine reuptake inhibitors (SNRIs)

SNRIs increase levels of serotonin and norepinephrine in the brain. Serotonin helps regulate mood and norepinephrine helps improve energy and attentiveness. The SNRIs are the next choice if the SSRIs are not effective. Usually, after trying at least two SSRIs the doctor may move to:

Duloxetine (Cymbalta)

Dosing:

- Adult: Typically dosed in the range of 30mg to 120mg per day.
- Youth: Similar dosing to adults used in children based on age and size, with maximum dosing in youth, typically at 60mg per day.

Duloxetine (Cymbalta) is used most often. The most common side effect is upset stomach, which is relatively rare. As a side condition, it treats neuropathic pain, and also has an indication in treating fibromyalgia.

Venlafaxine (Effexor)

Dosing:

- Adult: Typically dosed in the range of 37.5mg to 300mg per day
- Youth: Half of adult dosing level, with maximum dosing of 150mg in youth, with the exception of some adolescents who may move towards full adult dosing levels.

Desvenlafaxine (Pristiq)

Newer version of Venlafaxine (Effexor), sometimes better tolerated.

Dosing:

- Adult: Typically dosed in the range of 25mg to 100mg per day.
- Youth: No significant experience in youth to establish dosing.

Antipsychotics

Data from the FORWARD project notes that some caregivers report antipsychotics being used for anxiety. These tend to be more for adolescent age where anxiety, aggression and self-injury may be present. See Aggression section.

Note: These should not be the first-choice drugs in treating anxiety.



Other classes of antidepressants may be considered in instances in which SSRIs are not clinically effective or are not tolerated due to side effects such as when there is behavioral activation that could not be managed by dose reduction.

Serotonin Receptor Antagonists and Reuptake Inhibitors (SARIs)

Duloxetine (Cymbalta)

Typically used at bedtime for insomnia, though use in individuals with FXS has found they are not becoming sedated when taking it during the day.

Dosing:

- Adult: Typically dosed starting at 25mg per dose with 2 to 4 doses a day, increase over time by 25mg per dose, with a maximum total daily dose of 300mg per day.
- Youth: Similar dosing guidelines in youth using up to 150 mg, with older and larger youth moving up to maximum adult dosing levels.

Side effects can include tiredness, and rarely, persistent erections, and it is important to be aware of the possibility of this side effect so as not to be upset if this happens.

Norepinephrine-Dopamine Reuptake Inhibitors (NDRIs)

Duloxetine (Cymbalta)

Bupropion can lower the seizure threshold and *should not be used when there is an active seizure disorder*. Bupropion also is a better treatment for depression than it is for anxiety and therefore its general use in FXS is more limited, although it can be helpful for attention in patients who cannot tolerate stimulants.

Dosing:

- Adult: Typically dosed in the range of 75mg to 450mg daily with immediate release formulation given multiple times a day versus extended-release versions given one time daily.
- Youth: Dosing variable based upon the age and size of the individual but usually starting at 25 mg for young children and at 50 mg for those ages 10 and up.

Antianxiety Agents, Anxiolytics, Nonbenzodiazepines

Buspirone (Buspar)

Buspirone may, in some cases, reduce anxiety either alone or in combination with an SSRI. Buspirone is also generally well tolerated.

Dosing:

- Adult: Typically dosed in the range of 15mg up to 90mg daily, given in three divided doses.
- Youth: Dosing generally follows adult dosing guidelines with higher dosing levels reached for larger adolescents.

Benzodiazepines

Benzodiazepines are a type of medication known as tranquilizers. Familiar names include Valium and Xanax. Benzodiazepines may be used in an emotional crisis accompanied by high level of anxiety/anxiety attacks but should be avoided for long-term treatment as they can interfere with memory, increase confusion and/or cause paradoxical excitation (the opposite effect) with a significant increase in hyperactivity and disinhibition. They can also be addictive, meaning they can be difficult to be weaned off. There is also an issue of induced tolerance where increasing doses are needed to attain the desired effects. Therefore, they must not be discontinued abruptly after a long-term use due to the risk of withdrawal seizure.

However, benzodiazepines may be used in single doses to assess for paradoxical excitation (the opposite effect of what is expected), and if absent, may be used on an as-needed basis to help with high-stress situations such as dental visits or airplane trips.

The most often used benzodiazepines in FXS are:

Clonazepam (Klonopin)

Dosing:

- Adult: Typically dosed in the range of 0.25mg to 1mg per dose.
- Youth: Dosing starting as low as 0.125mg with larger and older adolescents reaching adult dosing levels.

Clonazepam is one of the more sedating benzodiazepines and it can cause increased drooling.

Lorazepam (Ativan)

Dosing:

- Adult: Typically dosed in the range of 0.5mg to 2mg per dose.
- Youth: Dosing starting as low as 0.25mg with larger and older adolescents reaching adult dosing levels.

Beta Blockers

Propranolol (Inderal)

Propranolol is a beta blocker, a high blood pressure (BP) medicine. It can have some anxiety benefit, though the aggression benefit is less impressive. If other traditional anxiety medicines are not helping, it is a secondary option. It is also a relatively inexpensive medication.



Propranolol is relatively benign, but it requires blood pressure and pulse monitoring. It decreases the BP in those with high BP but doesn't do much for those with normal BP. Bradycardia (slower than normal heart rate) can be an issue but is rarely seen.

Propranolol has shown to be good for aggression in autism spectrum disorder (ASD).

Dosing:

- Adult: Typically dosed in the range of up to a few hundred milligrams a day in adults but should be gradually adjusted. There is a broad dosing range for this medicine from 20mg to 240mg with dosing adjusted over time while being careful to not provoke low pressure periods with dose increases. The drug is also already in a time release form that enables daily versus divided two or three times per day dosing.
- Youth: Limited dosing information established in younger children, with adolescents, and in particular larger adolescents, reaching established adult dosing guidelines.

When using propranolol, adjust dosing slowly over time, and follow pulse and blood pressures to be sure they are not dropping. As long as they are not dropping, use may be continued. Watch for headaches or dizziness; dizziness in individuals with FXS is sometimes hard to appreciate, but one way is to look for differences in how an individual is walking. One should not stop propranolol suddenly as this might cause problems with high blood pressure and withdrawal symptoms.

Propranolol is contraindicated (should not be used) in individuals with asthma or Chronic Obstructive Pulmonary Disease (COPD).

Alpha-2 Agonists

Clonidine (Catapres) and guanfacine (Tenex) have also been used to treat anxiety-like symptoms, particularly the ones related to hypersensitivity to environmental sensory stimuli, but they are probably not meaningfully effective for other forms of anxiety. Guanfacine has more of a calming effect for hyperarousal, and clonidine can help with treatment of insomnia. See Non-Stimulant Treatments in the ADHD section.

The following medications are not recommended without the guidance of a doctor who specializes in Fragile X syndrome. Contact the NFXF for assistance with locating a Fragile X specialist.

Tricyclic Antidepressants (TCAs)

For severe anxiety, tricyclic antidepressants may be considered to treat anxiety that is resistant to SSRI or SNRI therapy. They include: Imipramine (Tofranil), Clomipramine (Anafranil), and Nortriptyline (Pamelor).

The tricyclic drugs *have overall worse tolerability* than SSRIs and SNRIs and may require periodic EKGs for safety monitoring.

Attention-Deficit/Hyperactivity Disorder (ADHD)

Attention-deficit and hyperactivity symptoms are among the most prevalent behaviors in individuals with FXS. Individuals with FXS, especially males, have challenges in shifting and sustaining attention. Attention difficulties and response inhibition deficiencies such as impulsivity are thought to be mediated by reduced dopamine activity in frontal cortical regions. The mainstay of treatment for these problems is stimulant medication (methylphenidate and mixed amphetamine salts classes of medication).

It is preferable to start most patients on short-acting forms of stimulant medication to fully understand an individual's therapeutic window at which the drug works best, and to get a sense of how long the drug works. However, long-acting modified-release stimulant preparations may be preferable in the end as they tend to minimize "peaks and valleys" in blood levels of the medications which can potentially aggravate mood lability in sensitive FXS individuals. Long-acting preparations also may alleviate the disruption to the school day associated with a visit to the nurse's office for a midday dose.

Stimulant Medications

Stimulants work well for many individuals with FXS. Many doctors report that a majority of people with FXS who receive stimulants for ADHD or impulsive behavior show improvement. Once the individual with FXS reaches adulthood, especially as they move into middle age, stimulant medications may no longer be needed.

Central Nervous System (CNS) Stimulants

Methylphenidate (Ritalin, Concerta)

Methylphenidate comes in long acting and immediate release (short acting) forms and comes in liquid, tablet, capsule with time release beads, transdermal patch, chewable and oral disintegrating tablet forms.

Dosing:

- Adult and Youth: Typically dosed up to a general maximum of 2mg per kilogram (2.2 pounds) of body weight per day.



Research Note (2021): Quillivant and Quillivant ER – long-acting methylphenidate derivative. Dr. David Hessel, at University of California in Davis, has received funding from the US National Institutes of Health to conduct a study of Quillivant across neurodevelopmental disorders, including FXS.

Dexmethylphenidate (Focalin, Focalin XR)

Dexmethylphenidate is a similar compound to methylphenidate, but it may have less appetite suppression and less effect on tics or sleep if these are issues with methylphenidate. It also comes in short acting and long-acting forms.

Focalin

Dosing:

- Adult and Youth: Typically dosed in the range of 5mg to 20mg daily, divided in two doses.

Focalin XR

Dosing:

- Adult: Typically dosed in the range of 10mg to 40mg per day.
- Youth: Typically dosed in the range of 10mg to 30mg per day.

Mixed Amphetamine Salts (Dextroamphetamine/Amphetamine)

Adderall

Dosing:

- Adult and Youth: Typically dosed up to a general maximum of 1mg per kilogram (2.2 pounds) of body weight per day.

Adderall XR

Dosing:

- Adult and Youth: Typically dosed up to a general maximum of 1mg per kilogram (2.2 pounds) of body weight per day.

Mydayis

A newer medication for use in individuals 13 years of age to adult. Mydayis lasts up to 16 hours.

Dosing:

- Adult and Youth: Typically dosed up to a general maximum of 1mg per kilogram (2.2 pounds) of body weight per day.



Amphetamine Salt

Lisdexamfetamine (Vyvanse)

A long-acting amphetamine salt. It comes as a capsule that can be opened and sprinkled in food or liquid and lasts about 8-10 hours. It also comes as a chewable tablet.

Dosing:

- Adult and Youth: Typically dosed up to a general maximum of 1mg per kilogram (2.2 pounds) of body weight per day.

Amphetamines

Adzenys (Adzenys XR-ODT)

Dosing:

- Adult and Youth: Typically dosed in the range of 3.1mg to 18.8mg per day.

Dyanavel XR - liquid

Dosing:

- Adult and Youth: typically dosed in the range of 2.5mg to 20mg daily.

Side Effects of Stimulant Medications

Individuals may experience appetite reduction (sometimes a desirable side effect) or sleep disruption, if a stimulant medication is taken too late in the day. Some patients cannot tolerate stimulants at all due to aggravation of irritability, aggression, or perseveration, or even induction of a depressive withdrawn state.

Induction of irritability and other behavioral problems by stimulants has been seen, and it can occur at any age.

Non-Stimulant Treatments for ADHD

Alpha-2 Agonists

If stimulants for ADHD are not tolerated for the individual with FXS, alpha-2 agonists such as clonidine (Catapres) and guanfacine (Tenex) can be considered. These are FDA approved ADHD medicines that are not stimulants and are often used if stimulants are not working well.

AClonidine (Catapres)

Clonidine is also used at bedtime for sleep, but it can be used during the day for ADHD.

Dosing:

- Adult and Youth: Typically dosed in the range of 0.05mg to 0.4 mg per day often given in two to three divided doses per day.



Guanfacine (Tenex)

Guanfacine is less sedating than clonidine.

Dosing:

- Adult and Youth: Typically dosed in the range of 0.5mg to 6mg per day, based on patient age and size, with the drug given in two to three divided doses per day.

Focalin XR

Dosing:

- Adult: Typically dosed in the range of 10mg to 40mg per day.
- Youth: Typically dosed in the range of 10mg to 30mg per day.

Clonidine and guanfacine also come in extended-release forms.

The extended-release forms are tablets that must be swallowed whole and include:

Clonidine HCL (Kapvay) - extended-release (ER) clonidine

Dosing:

- Adult and Youth: Typically dosed in the range of 0.1mg to 0.4mg per day. Lasts 12 hours/dose.

Guanfacine ER (Intuniv) – extended-release (ER) guanfacine

Dosing:

- Adult: Typically dosed in the range of 2mg to 4mg per day. Lasts throughout the day.
- Youth: Typically dosed in the range of 1mg to 4mg per day. Lasts throughout the day.

Mydayis

A newer medication for use in individuals 13 years of age to adult. Mydayis lasts up to 16 hours.

Dosing:

- Adult and Youth: Typically dosed up to a general maximum of 1mg per kilogram (2.2 pounds) of body weight per day.

Selective Norepinephrine Reuptake Inhibitors (SNRIs)

Atomoxetine (Strattera)

Can cause substantial aggravation of irritable behavior and aggression in FXS and must be monitored carefully and discontinued if these side effects start to occur. Unlike the other medications for ADHD, it can take 4-6 weeks to take effect. This medication needs to be swallowed whole.

Dosing:

- Adult and Youth: Typically dosed up to 1.4mg per kilogram (2.2 pounds) of body weight with an overall maximum dose of 100mg per day.

Asthma & FXS

People with Fragile X can take traditional asthma medicines, whether it is an albuterol inhaler or a steroid inhaler or oral meds. It is important to note that albuterol tends to make one's pulse faster and may cause the user to become more hyper, but asthma should be treated similarly to how it is treated in typically developing persons.

Sometimes propranolol, which is a beta blocker, is used to treat anxiety, however this should not be taken by people with asthma as it can cause bronchospasm.

Depression

Depression can be difficult to diagnose and/or treat in individuals with developmental issues. It is especially challenging to understand in individuals with communication challenges, but it can certainly happen, and it is something to think about if some of the following symptoms appear. If the individual with FXS is having a pattern in their behavior that's changing, for example, they are not doing activities like they used to, or their sleep is different, or they are eating more or less, or they are having crying spells and are, in general, acting differently and out of their norm, it is possible they are experiencing depression. Depression is treated with SSRIs and SNRIs. See the Anxiety section.

Handling Changes and Transitions

Even with planning, preparing, using a visual schedule, and allowing plenty of time, individuals with FXS can have difficulty with changes and transitions. Such difficulties can include behavior or other mental health challenges such as significant anxiety and/or agitation/aggression/self-injurious behavior. If either anxiety or agitation becomes interfering, refer to medication approaches for anxiety or agitation/aggression for guidance on possible medication management to address these situations. See the Aggression section and Anxiety section.

Hyperarousal

Hyperarousal in individuals with FXS is hard to measure, but through the use of EEGs, it has been found that the brain at rest in individuals with FXS has increased high frequency electrical activity. There are currently studies underway to evaluate this, but at this point, treatment recommendations include the use of relaxation and calming strategies, along with the use of SSRIs and SNRIs. See the Anxiety section.



Alpha-agonists have been used if SSRIs and SNRIs are activating. See Non-Stimulant Treatments in the ADHD section.

Impulsive Behaviors

See the ADHD section.

Introverted/Prefers Isolation

Some individuals like to stay in their room, and they will not come out when people come over to visit. Again, relaxation related techniques and other therapeutic approaches are incredibly helpful for caregivers and affected individuals, together and individually. Use of these techniques, in conjunction with anxiety medications, is often helpful. See the Anxiety section.

Irritability

Irritability is frequently seen in individuals with FXS, and the cause can be difficult to determine. Irritability is defined by the FDA as aggression, self-injurious behavior, and severe tantrums. Irritability also can represent oppositional interactions that may not adhere to the FDA use of this term.

SSRI's can be helpful in managing these irritable symptoms in higher functioning individuals with FXS if they appear to relate mostly to social anxiety, rigid behaviors, obsessions or to some extent perseverative behaviors. A go-very-slow approach is associated with the fewest side effects, especially in lower functioning individuals.

If SSRIs are not helpful, or irritable behavior does not seem specifically related to anxiety or perseverative behavior, antipsychotics such as aripiprazole (Abilify) or risperidone (Risperdal) can work well thus targeting the FDA defined nature of irritability. See the Anxiety section and Aggression section.

Mood Disorders

Examples of mood disorders include up and down behaviors such as crying, upset and sad, then happy, and then back to being sad. Typically, mood stabilizers are used to treat mood disorders in individuals without FXS. Atypical antipsychotics such as risperidone or aripiprazole may be used as mood stabilizers. See the Aggression section.

Lithium

Lithium works well in individuals with FXS; however, a potential problem is the narrow therapeutic dosing range and associated toxicity profile. It can cause thyroid dysfunction and long-term use can cause kidney dysfunction. It can cause some issues with hydration status, and it can sometimes cause tremors.

It is not necessarily the safest or easiest medicine to use, however there are people with FXS who do not tolerate other medications and who take lithium and do really well.

Dosing:

- Adult and Youth: Lithium is dosed to a certain level in the blood where response can be expected and below the blood levels typically associated with toxicity. Often a lithium level in the blood in the 0.6 to 1.2 range (that is in milliequivalents per litre (mEq/L)) is a common goal of treatment, often dosed two to three times per day.

Other Medications

There is less success – in treating behavior issues – with the other category of mood stabilizers such as the anti-epileptic drugs, including valproic acid (Depakote) or oxcarbazepine (Trileptal), or lamotrigine (Lamictal). Those are mood stabilizers that also treat seizures and bipolar disorder and are sometimes used in people with FXS for behavior, but, overall, the general consensus is that there has not been a strong positive response in the majority of patients.

Obesity/To Avoid Weight Gain

Metformin

Metformin appears to be helpful in addressing weight gain associated with other drugs whose use increases weight and is, therefore, used in instances where an individual is gaining a lot of weight or has out of control eating. Metformin also lessens type 2 diabetes risk. In summary, it may allow the individual with FXS to stay on a medicine that is really helping their behavior, but that was resulting in serious weight gain.

Dosing – Careful consideration must be given to dosing with using Metformin. Typically, the dose is twice a day, at breakfast and dinner, unless someone is taking extended-release metformin and that can be taken one time daily.

- Adult and Adolescents: Typically, dose is up to 1000mg twice a day, or 2000mg a day.
- Younger children: Usually started on doses as low as 125-250mg per day.

Metformin may take some time to be associated with positive effects and it may cause an upset stomach or diarrhea (see below). Sometimes adverse effects including gastrointestinal symptoms improve with a dose reduction or may improve over time.

Metformin Clinical Trials

Metformin: There is some evidence Metformin helps Fragile X brain connectivity in lab animal models. There is currently a clinical trial ongoing that is scheduled to end May 2022. Results will follow. See published articles below.



Metformin Recalls

The recalls to date have been specific to specific manufacturers, meaning there was a bad batch. There is nothing inherent in Metformin - the molecule - that has been found to be bad. So again, the recent Metformin recalls are associated with specific manufacturers and not the drug.

Metformin and Diarrhea

Diarrhea or loose bowel movements occurs in 20 - 25% of people treated with Metformin. Diarrhea is by far the most common treatment limiting side effect. Dosing adjustments, or giving it a little bit of time, may solve this issue. Therefore, it is recommended to start low and go slow with the dosing. If the diarrhea does not improve with dose adjustments, it may need to be stopped.

If the individual with FXS is prone to be constipated, and is taking medicine for constipation, and there is then breakthrough diarrhea on Metformin, it is recommended to remove the medicine for constipation. Otherwise, Metformin is typically well tolerated and general laboratory monitoring is usually not required. Metformin has been around a long time and has been used over the last 10 years with good results on decreasing excessive weight gain.

Additional Information:

Metformin as targeted treatment in fragile X syndrome

<https://pubmed.ncbi.nlm.nih.gov/28436599/>

Metformin treatment in young children with fragile X syndrome

<https://pubmed.ncbi.nlm.nih.gov/31520524/>

Options to consider as alternatives to Metformin to limit weight gain associated with other medications:

Amphetamine Salt

Lisdexamphetamine (Vyvanse)

An extended-release amphetamine salts approved for binge eating disorder.

Dosing:

- Adult and Youth: Typically dosed up to 1mg per kilogram (2.2 pounds) of body weight up to a cap of 70mg.

Anticonvulsants

Topiramate (Topamax)

A seizure medicine that lowers weight in many people. It can also help with headaches. It rarely causes kidney stones. It sometimes can make people tired.

Dosing: Wide dose range based on age and size and intended use of the drug, speak with the prescriber for direction.

Anorexiant (Appetite Suppressants)

Naltrexone/Bupropion (Contrave)

Contrave is an FDA medication approved for weight management; it is a combination of naltrexone and bupropion. It is an expensive medication that may be hard to get insurance approval.

An alternative is to use a combination of bupropion low dose and naltrexone low dose. Dosing:

- Adult: Typically dosed in the range of 8mg Naltrexone/90mg Bupropion, one to four tablets per day use as directed.
- Youth: No information available.

Obsessive-Compulsive Disorder (OCD)

OCD is usually characterized by repetitive behavior and is one of the anxiety disorders. It can be treated with medications used for other anxiety disorders, but often requires higher dosing than needed for other anxiety disorders. Medications often used for OCD include:

Selective Serotonin Reuptake Inhibitors (SSRIs)

Sertraline (Zoloft)

Dosing: See the Anxiety section.

Escitalopram (Lexapro)

Dosing: See the Anxiety section.

Citalopram (Celexa)

Dosing: See the Anxiety section.

Repetitive and Perseverative Behaviors

Perseverative speech and actions, ritualistic behavior, constant chewing of clothing or other objects, hair-pulling, and a general love of routine and repetition are frequently seen in patients with FXS.



Although obsessive-compulsive behaviors may be mediated predominantly by the serotonin system, perseverative repetitive behaviors and stereotypies may be more closely linked to dopamine systems. Thus, either SSRI's or antipsychotics (especially if associated with irritable behaviors) may be helpful for this category of behaviors. However, perseverative behaviors and stereotypies can be difficult to eliminate and there are no medications yet that target them well. See the Anxiety and Aggression sections.

Saliva Reduction

Benzotropine

If drooling, associated with other needed medications such as antipsychotics, is a problem, Benzotropine can be used. When treating excessive salivation from antipsychotics, it also reduces abnormal movement risk in the short term (but not the long term as is the case with tardive dyskinesia).

Dosing:

- Adult: Typically dosed in the range of 1mg to 3mg per day, divided two to three times a day.
- Youth: Typically, half the adult dosing: 0.5mg to 1.5mg per day, divided two to three times a day.

Seizures

Individuals with FXS who experience seizures should be seen and treated by a neurologist who specializes in seizures. Seizures are generally quite treatable by FDA approved agents, and a lot of times they go away over time.

See the Treatment Recommendation on Seizures in FXS (currently being updated): <https://fragilex.org/wp-content/uploads/2012/08/Seizures-in-Fragile-X-Syndrome2012-Oct.pdf>

Selective Mutism

Selective mutism is an anxiety disorder in which the individual with FXS does not speak in situations that are unfamiliar or uncomfortable, or with people the individual does not know very well. The individual often has better communication in a familiar setting or with family members. It is often treated with medications for anxiety. See the Anxiety section.

Also:

Fluoxetine (Prozac)

Can be quite helpful in girls with this because it is activating. This may be the most helpful SSRI for selective mutism and for girls with substantial social withdrawal.

Dosing:

- Adult: 20 to 80mg per day
- Youth: Start at 10mg per day and may increase gradually after a minimum of one month to evaluate effect up to a max of 60-80mg per day based on age and size.

Self-Injurious Behavior (SIB)

Many individuals with FXS engage in self-injurious behaviors, the most common of which is hand biting and finger chewing, though head banging is also seen. Behavioral assessment and treatment are the mainstays for these behaviors though sometimes medication is used as well. It is usually treated similarly to treatments for aggression (see the Aggression section), with use of antipsychotic medications, unless it is felt to be due to anxiety (see the Anxiety section).

Antipsychotics used may include:

Aripiprazole (Abilify)

Dosing:

- Adult and Youth: Typically dosed in the range of 2mg to 30mg per day.

Risperidone (Risperdal)

Dosing:

- Adult and Youth: Typically dosed in the range of 0.5mg to 6-8mg per day, divided twice or three times daily.

Quetiapine (Seroquel)

Dosing:

- Adult: Typically dosed in the range of 200mg to 1000mg daily per day total often divided in two to three doses.
- Youth: Typically dosed in the range of 50mg to 400mg per day often in divided doses with larger adolescents dosing into the adult dosing range.

Ziprasidone (Geodon)

Ziprasidone does not cause weight gain, and it can help with self-injury, aggression, and severe tantrums. It is in a capsule form and individuals are supposed to swallow it, however there are reports of caregivers who sprinkle it on food, in cases where the individual with FXS is unable to swallow the capsule.

Dosing:

- Adult: Typically dosed in the range of 20mg to 80mg, twice daily.
- Youth: Typically dosed up to adult dosing based on size and age of the youth.



Sensory Sensitivities

In addition to behavioral and occupational therapies, anxiety medicines, for example, SSRIs, tend to help in some individuals with sensory sensitivities. The SSRIs may reduce anxiety and the individual with FXS may be less hypervigilant and hyperresponsive without being too sleepy. See the Anxiety section.

These medications should be used in conjunction with an OT, the child's school staff (for a school-aged child), and a behavioral psychologist.

Sleep Problems

Sleep problems are a frequent complication of FXS and are most commonly caused by hyperarousal and inability to settle down either when trying to fall asleep in the evening or after awakening in the middle of the night.

The first step in managing sleep problems should be *implementation of behavioral strategies* such as consistent bedtimes and sleep schedules, bedtime routines, and calming strategies for bedtime and middle night awakenings, however these strategies may be insufficient and may need to be combined with medication treatment.

It is also important to *be sure there is not a medical problem* causing night awakenings such as obstructive sleep apnea. If the individual has loud snoring, has pauses in breathing or is very restless in sleep, discuss with a health care provider.

Here is a sleep algorithm:

Melatonin

Melatonin is the first medication recommended. Melatonin comes in short acting and long-acting forms. If the individual wakes too early with the short acting form, the long-acting form may be helpful.

Long term use of melatonin is okay. The general recommendation is to take 30 or 45 minutes, or up to an hour or two, prior to desired sleep time.

Dosing:

- Adult and Youth: 3mg to 8 (some take up to 10mg) at night.

Note: Benadryl and Hydroxyzine, below, are suggested for short-term use; it is advised to go to clonidine if melatonin does not work.

Diphenhydramine (Benadryl)

If melatonin is ineffective, diphenhydramine (Benadryl) can be tried. Note that a small percentage of people may become hyperactive on diphenhydramine.

Dosing:

- Adult and Youth: Suggest to 25-50mg at bedtime, following directions on label of diphenhydramine packaging.

Hydroxyzine

It can be used for both potentially sleep and anxiety throughout the day.

Dosing:

- Adult and Youth: Suggest 25mg-50mg per dose given up to every 4-6 hours, lower dosing generally in youth depending on age on size.

Prescription Medicines

The most commonly used prescription medications for insomnia include:

Clonidine (Catapres)

A rapid acting traditional blood pressure medicine that is also good for sleep.

Dosing:

Dosing usually occurs at bedtime.

- Adult: Typically dosed in the range of 0.1mg to as high as 0.3mg or 0.4mg. 0.4mg is pretty high.
- Youth: Typically, half the dosing of adult. The range of 0.05mg to 0.15mg. Dose will also depend on the age/size of the individual.

Trazodone (Desyrel)

An old anti-depressant that is good for sleep. It has been shown to be better at keeping people asleep.

Dosing: See dosing in the Anxiety section.

If clonidine and trazodone do not work, the following may be considered:

Mirtazapine (Remeron)

Used to treat symptoms of depression. Sometimes mirtazapine can increase appetite and should be monitored.

Dosing:

- Adult and Youth: Low dose. 7.5mg at bedtime, but it increases appetite so that is a secondary negative for a lot of patients.



If mirtazapine does not work,

Benzodiazepine Derivatives can be considered. Note: They are technically a controlled substance.

Zolpidem (Ambien)

Dosing:

- Adult: Typically dosed in the range of 5mg to 10mg at bedtime.
- Youth: Limited data exists describing dosing in youth, with youth dosing up to adult dose levels based on age and size of the child.

Temazepam (Restoril)

Dosing:

- Adult: Typically dosed in the range of 7.5mg to 30mg at bedtime.
- Youth: Limited data exists describing dosing in youth, with youth dosing up to adult dose levels based on age and size of the child.

If other sleep medicines fail:

Quetiapine (Seroquel)

Can be used at bedtime for insomnia.

Dosing:

- Adult and Youth: Typically dosed in the range of 12.5mg to 100mg range, depending on age, at bedtime.

Finally –

Suvorexant (Belsomra)

A new medicine for people with terrible sleep. It is a good, FDA approved sleep aid, however, it is expensive and requires insurance prior-authorizations every time, but it has been reported to be very effective for people with poor sleep.

Dosing:

- Adult: Typically dosed in the range of 5mg to 20mg at bedtime.
- Youth: No data available.

Caregivers should keep in mind that if the individual has a lot of anxiety, their sleep is not going to be great. So, treating underlying anxiety, while also potentially taking a medicine as a sleep aid, is probably going to be the most helpful. See the Anxiety section.

Additional Information:

See the Treatment Recommendation on Sleep in Children with FXS

<https://fragilex.org/wp-content/uploads/2012/08/Sleep-in-Children-with-Fragile-X-Syndrome2012-Oct.pdf>

Social Anxiety

Social anxiety is present to some extent in the vast majority of individuals with FXS. This can range from shyness to a clinical diagnosis of social anxiety disorder. When evaluating social responsiveness, individuals with FXS are often motivated to be social, but become overwhelmed by the intensity of the social interaction and expectations, which causes a negative or avoidant reaction.

Some triggers for social anxiety include being put on the spot, forced eye contact, standing up in front of people, making phone calls, attending a party or large gathering and meeting new people. In utilizing medications, social anxiety is treated similarly to generalized anxiety.

Fluoxetine (Prozac) may be used for girls with severe social anxiety and shyness. See the Anxiety section and the Selective Mutism section.

Speech and Language in Toddlers

If a toddler is very anxious, and the anxiety is treated, improved communication may result.

If a toddler is exceptionally hyperactive and impulsive, or really anxious, or has a lot of sleep issues, it is recommended that those issues be treated aggressively because it will help them developmentally, especially in the communication area.

Sertraline (Zoloft)

There is some published data on the use of sertraline, but it is not uniformly used with toddlers. An ongoing clinical trial, scheduled for completion in 2021, should provide helpful information.



FAQs

When should medication be considered and at what age?

Medication can potentially be part of overall treatment, when combined with non-medication therapies, and should be considered when behavioral symptoms significantly interfere in the individual's ability to participate in daily activities including, therapy, school, or family life, or are causing some kind of risk to the individual with FXS or to other people around them.

Caregivers should ask:

What is the behavior? How is it causing a problem? Is it a tangible issue? If treated using medication, would it improve quality of life and open up opportunities?

In the FXS field, medication has been utilized with children who are kindergarten, first, or second grade age and either showing anxiety or the beginnings of ADHD symptoms. On rare occasions, medications have been utilized to treat severe anxiety and sometimes severe ADHD in preschool and toddler age children.

Lastly, it should be emphasized that every individual is different, and that medication should not be utilized in isolation of other interventions.

Can you use two medications for two different symptoms simultaneously? For example, anxiety and ADHD?

The short answer is yes. There are many individuals who may, for example, take an SSRI for anxiety and may take a stimulant for ADHD, and they do quite well. The key is - What are you treating with each medicine and are you seeing benefit? Do not start both these classes of medicines at the same time; Do them one at a time to get a sense of what's doing what, but they are totally compatible, potentially, together.

How long does it take before I can tell if the medicine is working?

With each medication class, there is a different time frame that is needed to see if it is going to have an effect. For an antipsychotic, effects should be seen in about a week. For an SSRI or an SNRI, effects may not be seen for about a month. For a stimulant, it only takes two or three days. Different medication classes take different amounts of time to evaluate them at any one dose.

Symptom Rating Scale

Target Symptoms	Not a Problem	Is a Problem
Aggression and Self-Injurious Behavior		
Agoraphobia		
Anxiety		
Attention Deficit Hyperactivity Disorder (ADHD)		
Asthma		
Handling Changes and Transitions		
Impulsive Behaviors		
Irritability		
Mood Stabilizers Mood Disorders and Mania		
Obesity		
Obsessive Compulsive Disorder (OCD)		
Repeated Repetitive and Perseverative Behaviors		
Saliva Reduction		
Seizures		
Selective Mutism		
Self-Injurious Behavior (SIB)		
Sensory Sensitivities		
Sleep Problems		
Social Anxiety		
Speech and Language in Toddlers		

Which symptom(s) is/are the biggest problem for your child/young adult/adult/family:



Resources

1. Treatment Recommendations

All Treatment Recommendations: <https://fragilex.org/our-research/treatment-guidelines/>

2. FORWARD Published Articles

All FORWARD publications: <http://forwardfx.org/journal-publications/>

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The Fragile X Clinical & Research Consortium was founded in 2006 and exists to improve the delivery of clinical services to families impacted by any Fragile X-associated Disorder and to develop a research infrastructure for advancing the development and implementation of new and improved treatments. Please contact the National Fragile X Foundation for more information. (800-688-8765 or fragilex.org)