Connecting the Dots in Behavioral Healthcare: A Practitioners Guide to the Brain

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Webinar provided at:

https://youtu.be/ryzQbmSbAuQ

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Introduction to toolkit

Mental illness and substance use are significant health conditions that interfere with an individual's day to day functioning and contribute to physical, behavioral and emotional challenges. As mental illness and substance use frequently appear during the adolescence years, it is important to acknowledge and understand the biological, social, psychological and environmental factors that contribute to the onset of these conditions. As mental illness and substance use typically results from multiple circumstances, not all attributions to the condition(s) have been considered or addressed during treatment.

An increase in research and the understanding of the brain allows for significant opportunities to intervene before long-term problems begin to manifest. Additionally, research has begun to examine generational relationships of mental health and substance use across families. The conversation of brain development and generational patterns is critical in increasing public knowledge of the likelihood of developing a mental health or substance use disorder across all age ranges. Recognizing the likelihood of developing or having a mental health/substance use disorder can increase one's likelihood to seek help, allow for more understanding of oneself, and enhance the understanding of risks associated with behavior, ultimately aiding in an individual's recovery journey.

The knowledge and promotion of protective factors can reduce the severity of individuals' symptoms, which are heavily incorporated throughout the toolkit. Promotive and risk factors can affect the development, or reduced development, of behavioral health issues. This means that young individuals with multiple risk factors have an increased likelihood of developing these conditions. In comparison, individuals with multiple protective factors are at a decreased likelihood of developing those conditions. These factors are further addressed throughout the toolkit.

Toolkit Purpose

This toolkit serves to address the neurological, biological and environmental events contributing to mental illness and substance use disorders. It can be seen as a conceptual framework that reshapes the perception of mental illness and substance use disorders. This toolkit emphasizes the importance of identifying and discussing **all** components attributing to one's health, with highlights to generational patterns that can show up within family dynamics.

This toolkit also serves a purpose in educating behavioral healthcare practitioners, policy makers, educators and community members over the development of the brain during various life stages. As understanding the brain can help in understanding an individual's behaviors. In turn, this toolkit was designed to help in reducing stigma and stereotyping of individuals with mental illness and substance use disorders, to promote earlier intervention, and to recognize the relationship between the brain and the resulting behaviors.

Chapter I: What is the brain?

Overview of the brain

- The brain is a complex organ which plays a role in our thoughts, memory, emotions, breathing, temperature, and is ultimately the body's control system. The brain allows us to interpret everything we experience, store memories and control movements we make (John Hopkins Medicine, 2023). It also allows for the recognition of senses (sight, smell, sounds, touch, taste), vision & speech and language.

- Each part of the brain performs a specific function and is linked to other parts of the brain. Although each region of the brain has its own primary functions, they all work together to make you, you!

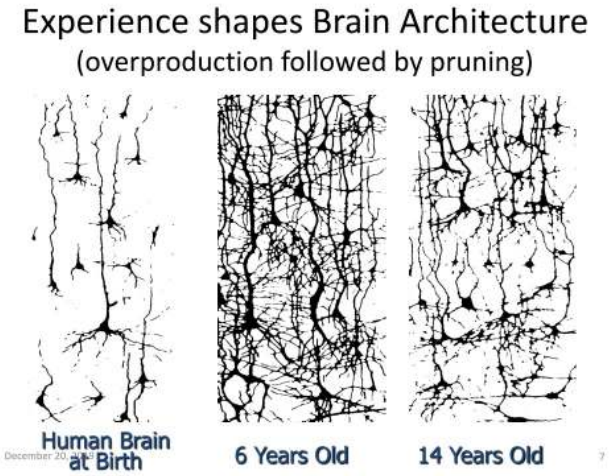
- The brain is built like a house.
    - The building of the brain is similar to that of a house, meaning that the building process follows a specific sequence. The basic foundation comes first, which is needed so that we can build upon the brain. The brain will grow naturally through development as well as through life experiences.
    - The brain develops in a back to front pattern, which begins before birth and continues into adulthood. Simple skills will form first, with more complex skills requiring more time.

- The interactions of genes and experiences shape the development of the brain
    - Genes provide us with a basic blueprint, however the experiences we have help to shape the brain.
    - The quality of our experiences shape our cognitive, emotion and behavior patterns

- How does the brain communicate with the rest of the body?
    - Humans are born with cells in the brain, known as Neurons or nerve cells. Neurons are responsible for sending and receiving information in the brain.
    - When neurons communicate and connect with each other, the pathways become stronger and become your “super highways” or pathways for life. They affect your thinking and learning, careers, productivity, relationships, decision making, problem solving, creativity and the people you feel most comfortable with.
        - How exactly do neurons communicate?
            - Neurons connect to each other like wires, although they are not directly connected. Neurons are connected by synapses, or small gaps and communicate through chemical messengers known as neurotransmitters (ex: serotonin, dopamine, epinephrine)

- Neuroplasticity: The brain's ability to “rewire” itself in response to injury, illness or trauma.
    - Serves as a form of adaptation for the brain, by forming new neural connections
    - Allows for continued opportunities to learn new activities, skills or languages
    - Reinforcement and repetitive behaviors can promote neuroplasticity
    - The brain's capability to change decreases with age, suggesting younger individuals can adapt easier (Center on the Developing Child, 2007)

- Early experiences play a significant role in shaping the brain
    - Experiences and the environment promote which “pathways” between neurons will be used more frequently.
    - As the brain develops the most from ages 0-5, daily experiences during this time play a significant role in development as the child grows older.
    - Positive experiences between children and caregiver(s) promote a “sturdy foundation” for brain development. Positive experiences may include listening to music with your newborn, reading a book together, playing peek-a-boo, etc.
    - Negative experiences, such as neglect or abuse, decrease the chance of developing a “sturdy foundation” for brain development. This can lead to lifelong learning challenges, problems with substance use or mental health difficulties.



Credit: Shonkoff, J. P. (2008)

Table 1.0: *Interpretation of experience shapes brain architecture*

The brain at birth	The brain at age 6	The brain at age 14
- The brain has a large number of neurons (approximately 100-200 billion), which can be compared to the number of stars in the Milky Way. - The neurons in our brain have some connections or “pathways” to one another. - While we do not gain many more neurons after we are born, the neurons gain a lot of connections the first several years of life through our experiences and daily activities.	- By age 6, the neurons increase connections, which accounts for the most connections we will have in our lifetime.	- By age 14, the neurons in our brain have fewer connections than when we were 6 years old. This shows us how experience changes the brain. The connections that get used alot strengthen and stay in place. Whereas the connections that don't get used much, will “prune” away or disappear. This helps to make your brain more efficient and promotes stronger, more connected pathways for the brain to communicate to the body. *Synaptic pruning* → The process when neurons that are unused are “pruned” or eliminated to build more elaborate, stronger connections with other neurons. This results in stronger, more efficient pathways for the brain to send and receive messages.

The brain does not finish developing and maturing until approximately age 25

- The last region to mature is the prefrontal cortex, which is responsible for executive function skills.
- Executive function skills → A set of mental skills that help an individual plan and execute tasks
- If executive function skills are affected, it will show up in language, especially internal language (ie: thinking)

Executive function skills include:

1. Impulse control - think before acting
   Example: Not running in the hallway, speaking when asked a question

2. Task initiation - being able to independently start tasks
   Examples: starting homework, completing chores without being asked

3. Self monitoring - Ability to view and evaluate self
   Examples: cooking multiple items at once, having to get to your next class in 5 minutes

4. Working memory - holding information in mind while working with it
   Examples: Solving math problems, thinking about what someone is saying when they are talking to you,remembering instructions to begin an assignment

5. Planning & prioritizing - developing a well thought out strategy
   Examples: creating a to-do list, deciding what materials to bring to a class, using a calendar to keep track of your schedule

6. Emotional control - Managing emotions and feelings to complete task
   Examples: Using conversations or statements to express feelings, writing out and reflecting on emotions, being able to notice and ask for a break if needed

7. Organization - Ability to develop and use systems to manage materials and information
   Examples: Putting away items in a specific spot, cleaning off workspace, having a method to store homework assignments (bookbag, folder, ect.)

8. Flexible thinking - Adjusting to new or unexpected situations as they arise
   Examples: “going with the flow”, problem solving and trying a new way of doing things

9. Attention - Maintaining focus on a task/person/activity for a period of time
   Examples: Watching teacher lecture and thinking about that information, completing an assignment while avoiding distractions

★ *See chapter V for an executive function handout and for activities to promote/improve executive functioning skills*

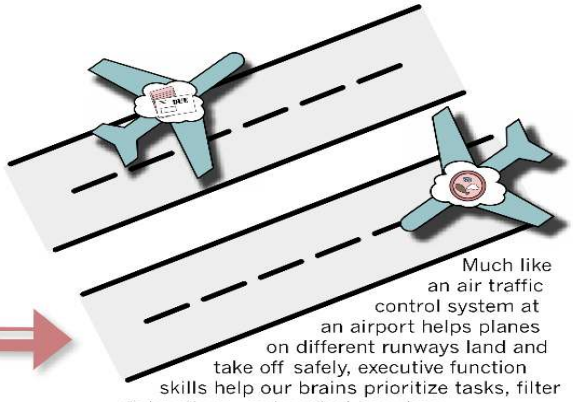
How do executive function skills show up in our day to day lives?

- When we need to maintain attention
- Organizing, planning, and prioritizing tasks
- Starting tasks, being able to finish the task and being able to adapt if changes arise in the original plan
- Understanding different points of view
- Regulating our emotions
- Reaching our goals

WHAT IS EXECUTIVE FUNCTION?

AND HOW DOES IT RELATE TO CHILD DEVELOPMENT?

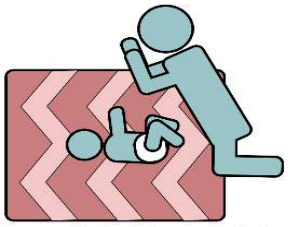
The phrase "executive function" refers to a set of skills. These skills underlie the capacity to plan ahead and meet goals, display self-control, follow multiple-step directions even when interrupted, and stay focused despite distractions, among others.



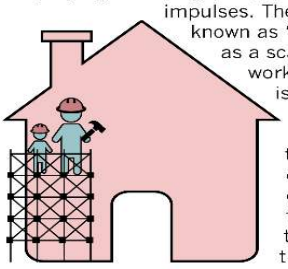
Much like an air traffic control system at an airport helps planes on different runways land and take off safely, executive function skills help our brains prioritize tasks, filter distractions, and control impulses.

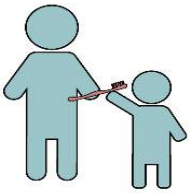
NO ONE IS BORN WITH EXECUTIVE FUNCTION SKILLS, BUT NEARLY EVERYONE CAN LEARN THEM.

Our genes provide the blueprint for learning these skills, but they develop through experiences and practice. The foundation is laid in infancy, when babies first learn to pay attention. Relationships with responsive caregivers are particularly important at this stage. Something as simple as playing a game of peekaboo can help build the early foundations of working memory and self-control as a baby anticipates the surprise.



Adults set up the framework for children to learn and practice these skills over time by establishing routines, breaking big tasks into smaller chunks, and encouraging games that promote imagination, role-playing, following rules, and controlling impulses. These techniques are known as "scaffolding." Just as a scaffold supports workers while a building is being constructed, adults can use these activities to support the emergence of children's executive function skills until they can perform them on their own.

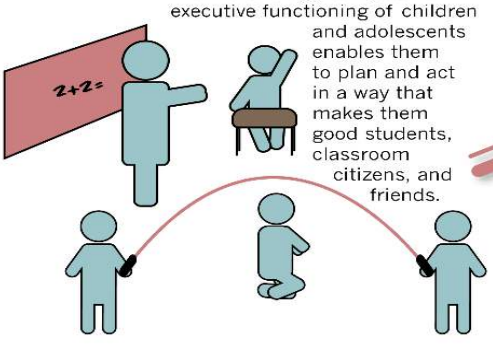


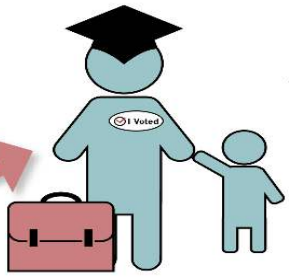


These skills typically develop most rapidly between ages 3-5, followed by another spike in development during the adolescent and early adult years. It takes a long time and a lot of practice to develop them, but, as children's executive function skills grow, adults can gradually allow children to manage more and more aspects of their environment.

BUILDING CHILDREN'S EXECUTIVE FUNCTION SKILLS BENEFITS EVERYONE.

The increasingly competent executive functioning of children and adolescents enables them to plan and act in a way that makes them good students, classroom citizens, and friends.





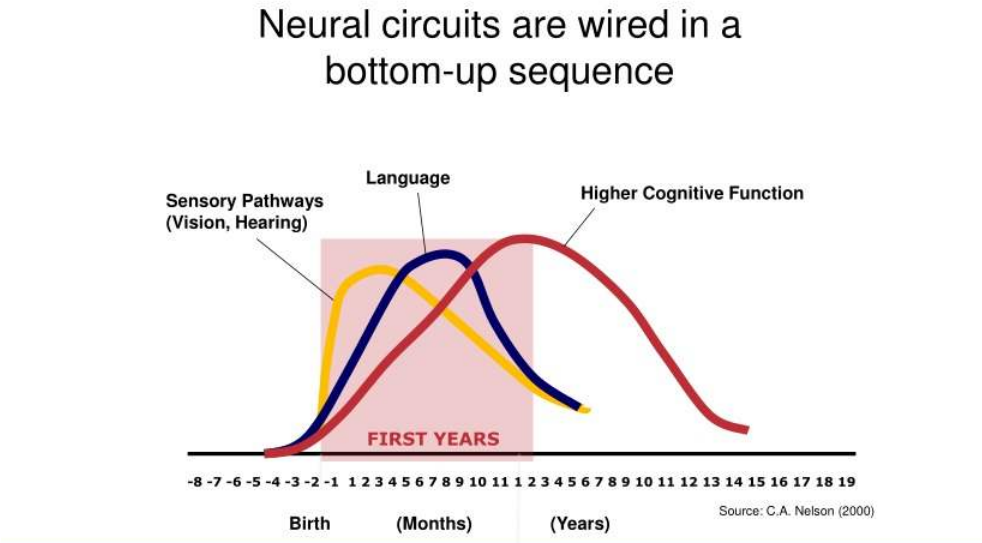
In turn, this helps them grow into adults capable of juggling a multitude of commitments, such as parenting, employment, continuing education, and civic involvement. Even health is affected, as strong executive function helps people stick to healthy habits and reduce stress. The more a society invests in building the executive functioning of its children, the greater dividends it will see in the future.

Center on the Developing Child HARVARD UNIVERSITY

For more information: https://developingchild.harvard.edu/ef

Critical period in brain development

- Critical periods - Also known as sensitive periods, are phases during development where the brain is more plastic, and receptive to change and experiences.
- Critical period hypothesis - during the critical period, new skills or traits can be formed. If experiences are not available, it becomes more difficult to acquire those skills or traits after the window of opportunity closes.
    - **An example of this can be seen with language development. It is easier for a younger child to learn a language opposed to an individual in their 40's.**



Credit: Center on the Developing Child

**circuits are forming at different times and then being pruned (eliminated).*

Table 1.1: *Interpretation of neural circuits are wired in a bottom-up sequence*

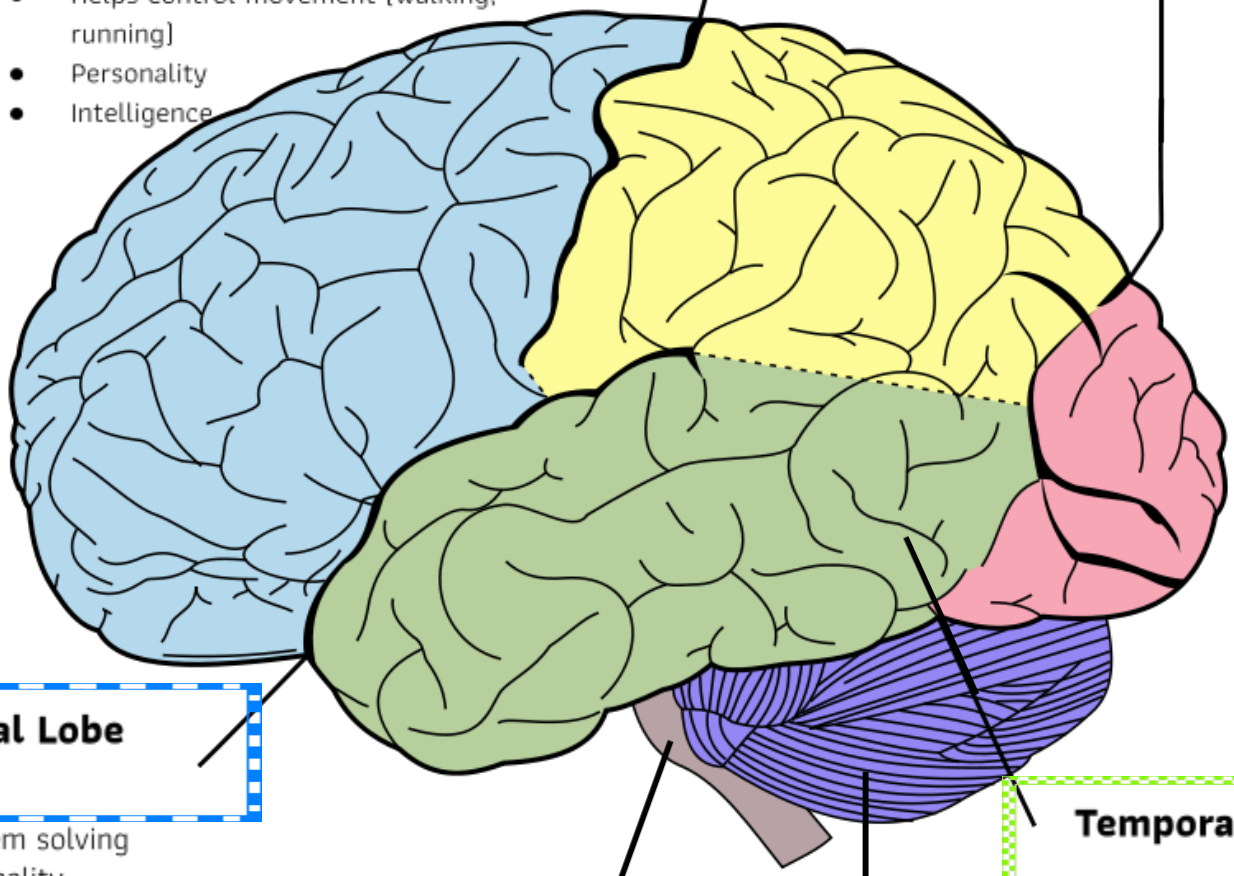
Sensory (vision & hearing)	Language	Higher cognitive function (executive function skills)
Neurons make pathways or connections before birth They then get pruned away or eliminated by age 1. During the first year of development, a child's vision is adapting and developing further. It is important to test a child's hearing/vision within the first year of birth as problems in sensory perception can delay the child's development.	Pathways for language are made in the first few years of life and then become pruned away. It is easier for children to learn languages before the age of 5.	Higher level cognitive function (problem solving, planning, organization, etc.) develops the most slowly and prunes away the most slowly. Cognitive development is significant during adolescence. It is important to remember that these circuits can still be formed later in life, however it will require a lot more effort and be more difficult.

★ *Refer to chapter V for additional informative over the brain in the form of videos*

Brain Anatomy

- Each brain hemisphere is divided into 4 lobes. These lobes collectively make up the cerebrum. The lobes are named after the skull bone that covers them. All of the lobes work together, but have their own specific primary brain and body functions. The main lobes of the brain include: Occipital, parietal, temporal and frontal

1. **Frontal (front)-** This is the largest lobe of the brain, that is responsible for reasoning and abstract thinking, planning, problem solving, behavioral control, voluntary movement and impulse control
    a. Contains the motor cortex → planning and coordinating movement
    b. Contains the prefrontal cortex → higher level cognitive functions such as memory, attention and decision making skills, develops fully at age 25
    c. Contains the Broca's Area → helps us produce language
    Damage to this lobe can result in changes in socialization, attention, sexual habits and can increase risk taking
2. **Parietal (middle) -** This is the middle section of the brain, responsible for sensory awareness, language, abstract reasoning (such as math), body awareness, perception, spelling, and object classification
    a. Contains the somatosensory cortex → receives and processes sensory information. This means that the body can pinpoint the specific area that a sensation is felt.
    Damage to this lobe can result in difficulty with spatial relations, processing senses (pain, temperature, etc.), speech and proprioception. Mental health conditions that result in hallucinations, such as schizophrenia, can affect this area. (Cleveland Clinic, 2023a)
3. **Temporal (sides) -** memory, understanding, facial recognition, hearing, vision, speech, and some emotional control
    a. Contains the Wernicke's Area → helps us comprehend language
    Damage to this lobe can result in problems with memory, speech perception and language skills. Common conditions that affect this area include mental health conditions that cause fear/panic, such as anxiety disorders and PTSD (Cleveland Clinic, 2023b)
4. **Occipital (back) -** processes visual stimuli, color identification
Damage to this lobe can result in visual difficulties (difficulty identifying objects/colors, difficulty recognizing words)



Parietal Lobe

- Ability to problem solve, plan & focus
- Behavior/impulse control
- Helps us put our thoughts into words
- Helps control movement [walking, running]
- Personality
- Intelligence

Occipital Lobe

- Process and interprets what we see [vision]

Frontal Lobe

- Problem solving
- Personality
- Memory
- Motor control [movement]
- Speech production

Temporal Lobe

- Behavior & emotions
- Hearing
- Helps us understand language
- Storage of memories

Brainstem

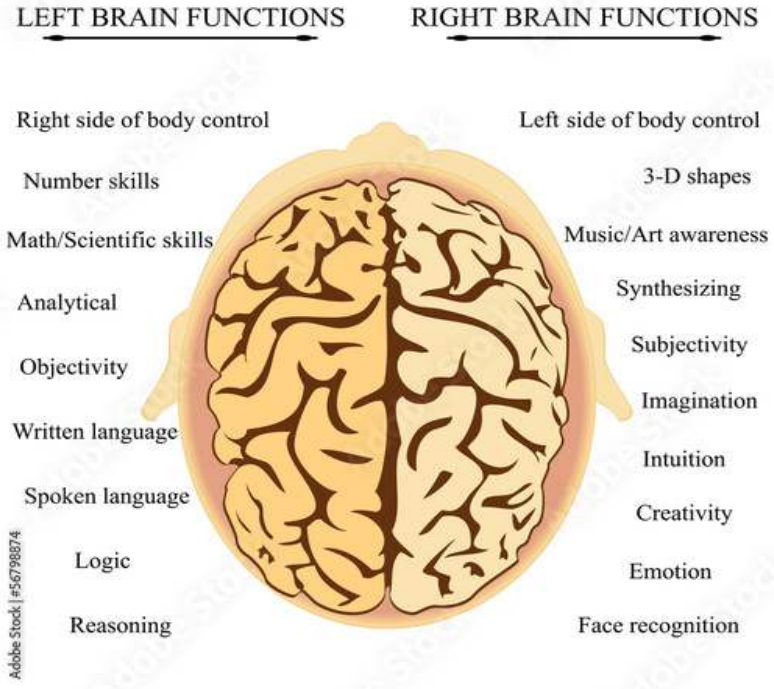
- Regulates automatic functions [heart rate, breathing, etc.]
- "Brain's secretary" as it sends messages between brain and body

Cerebellum

- Helps with balance, coordination and posture

Image of brain: (Brain png, 2019)

- The cerebrum of the brain is divided into 2 hemispheres: the right and left. The brain's hemispheres are connected by nerve fibers called the corpus callosum relaying messages to each other.
- The left hemisphere controls the right side of the body and the right hemisphere controls the left side of the body. Both hemispheres are responsible for different functions (*as seen in the image below*).



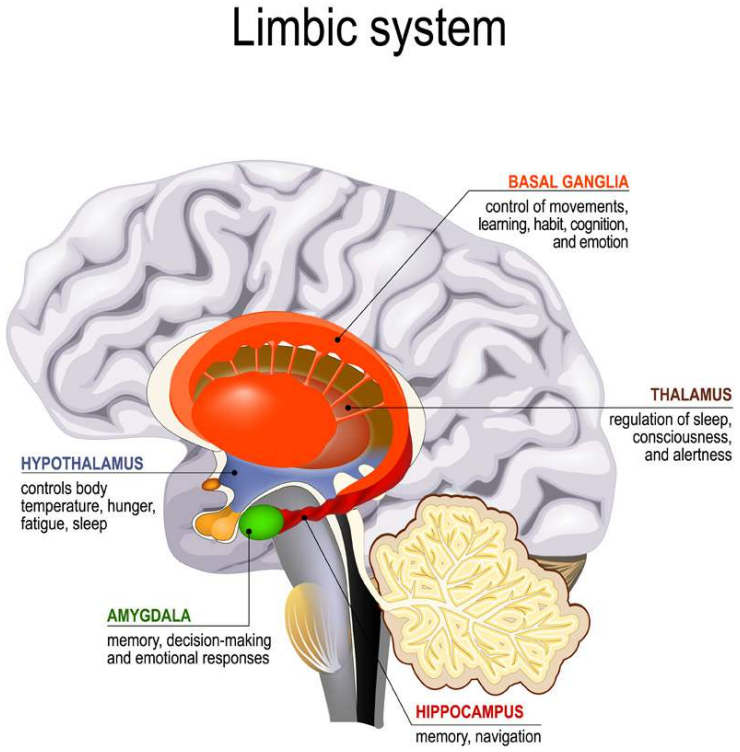
- **Cerebrum** - largest portion of the brain, consisting of the cerebral cortex. It is also composed of the left and right cerebral hemispheres (the left and right parts of the brain). Plays a role in complex mental tasks and sensory processing. The cerebrum is also responsible for much of the brain's "conscious" actions. (Cleveland Clinic, 2022a).
    - Helps to solve math problems, figure out a video game, draw a picture

- **Cerebellum**- Referred to as the "little brain" which is located behind the cerebrum and on top of the brain stem near the back of your head. Plays a role in the development of muscle memory, coordination and balance.
    - Riding a bike, surfing a wave, picking up an object accurately

- **Brainstem** - Located at the base of the brain, connecting the brain to the spinal cord. The brain stem serves as a "relay station" and passes messages back and forth between different areas of the body and the cerebral cortex.
  * The brains secretary * → sorts and sends messages
    - The brainstem is composed of the midbrain, pons and medulla oblongata
    - The primary functions controlled here include automatic functions, such as breathing, heart rate, sleeping, and body temperature
    - **Corpus callosum-** connects the left and right hemisphere of the brain

Our "Emotional Center"

- **Limbic system-** Involved in the brain's behavioral and emotional responses. This part of our brain has functions of motivation, emotion, learning and long term memory. The limbic system also contains the brain's reward system, which contributes to the feeling of pleasure. The 4 main regions make up the limbic system includes:
    - Hypothalamus - helps regulate our bodies basic functions. These are the things we do without even thinking about it. The hypothalamus regulates thirst, blood pressure, sleep, sexual behavior, heart rate, & body temperature
        - Ex: The hypothalamus helps keep us from being too warm/cold
        - Ex: The hypothalamus helps keep us from feeling hungry or feeling overfed
    - Amygdala - responsible for emotions (such as anxiety, sadness, fear, anger, happiness) and plays a role in our flight vs fight response
        - Research has shown amygdala differences in individuals with Autism Spectrum Disorder (ASD), depression, and schizophrenia (Grogans et al., 2022; Ho et al., 2019; NIH, 2022)
    - Thalamus - sensory relay station, and plays a role in thinking and memory
        - All of your senses except for smell are processed here then they are sent to a different area of the brain for interpretation
        - Involved in the processing and regulating of emotions, formation and storage of memories and learning (Cleveland Clinic, 2022b)
    - Hippocampus - helps us form long term memories by attaching emotions and/or senses to memories
        - Ex: The smell of flowers makes you happy, the smell of cookies reminds you of Christmas



Credit: BrainFacts, 2020

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Chapter II: How the brain develops

Stages of Development

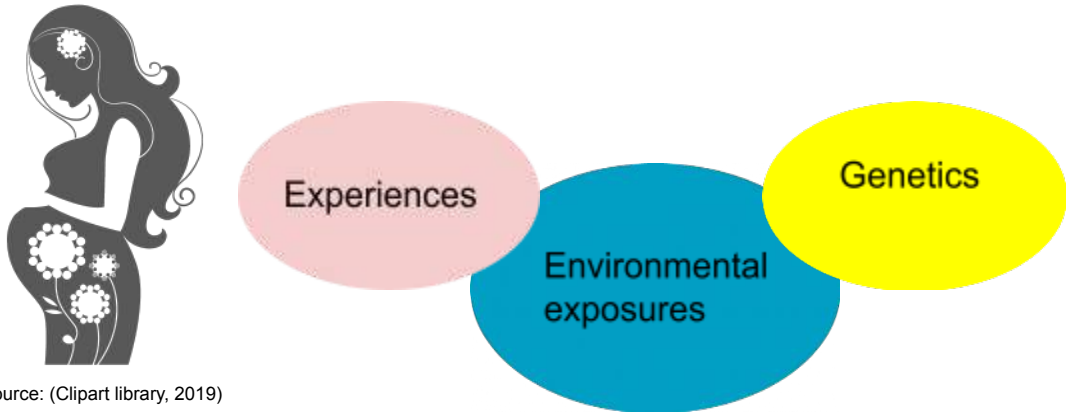
Prenatal period

Prenatal development is the period from the conception of the zygote (fertilized egg) to the baby's birth. During the prenatal phase, the baby develops from a fertilized egg to a fully formed human. Prenatal development is important because it is the crucial period when babies develop important cells, structures, and parts of their bodies that they will continue to use for the entirety of their lives. Prenatal development is a significant period for growth and change in the brain that sets the stage for future physiological development.

The process of prenatal development typically lasts between 38-40 weeks and is divided into 3 stages which includes:

1. Germinal stage (fertilization - 2 weeks) - the zygote begins to divide and grow during the first 2 weeks following conception
2. Embryonic stage (2 weeks - 8 weeks) - The organism is attached to mothers uterus and begins to develop major organs and basic anatomy. This includes 3 layers as follows:
   Ectoderm: This makes up skin, hair, teeth, brain, and spinal cord
   Endoderm: This makes up the digestive system, liver, pancreas, and respiratory system
   Mesoderm: This includes muscles, bones, blood and circulatory system
3. Fetal stage (8 weeks - birth) - Differentiation of organs, the brain's hemispheres grow tremendously in this stage and the neurons become coated with myelin - which helps speed up messages from the brain to the body and vise versa

While the brain forms within the first month of the baby's development, it continues to grow throughout pregnancy. Genetics give the brain a basic “blueprint”, however the brain can also be shaped by experiences and environmental exposures as well. In this stage, it is important to note that stress during fetal development can have a long lasting effect on the child's brain.



Source: (Clipart library, 2019)

Table 2.1: *Prenatal chart of monthly development during pregnancy*

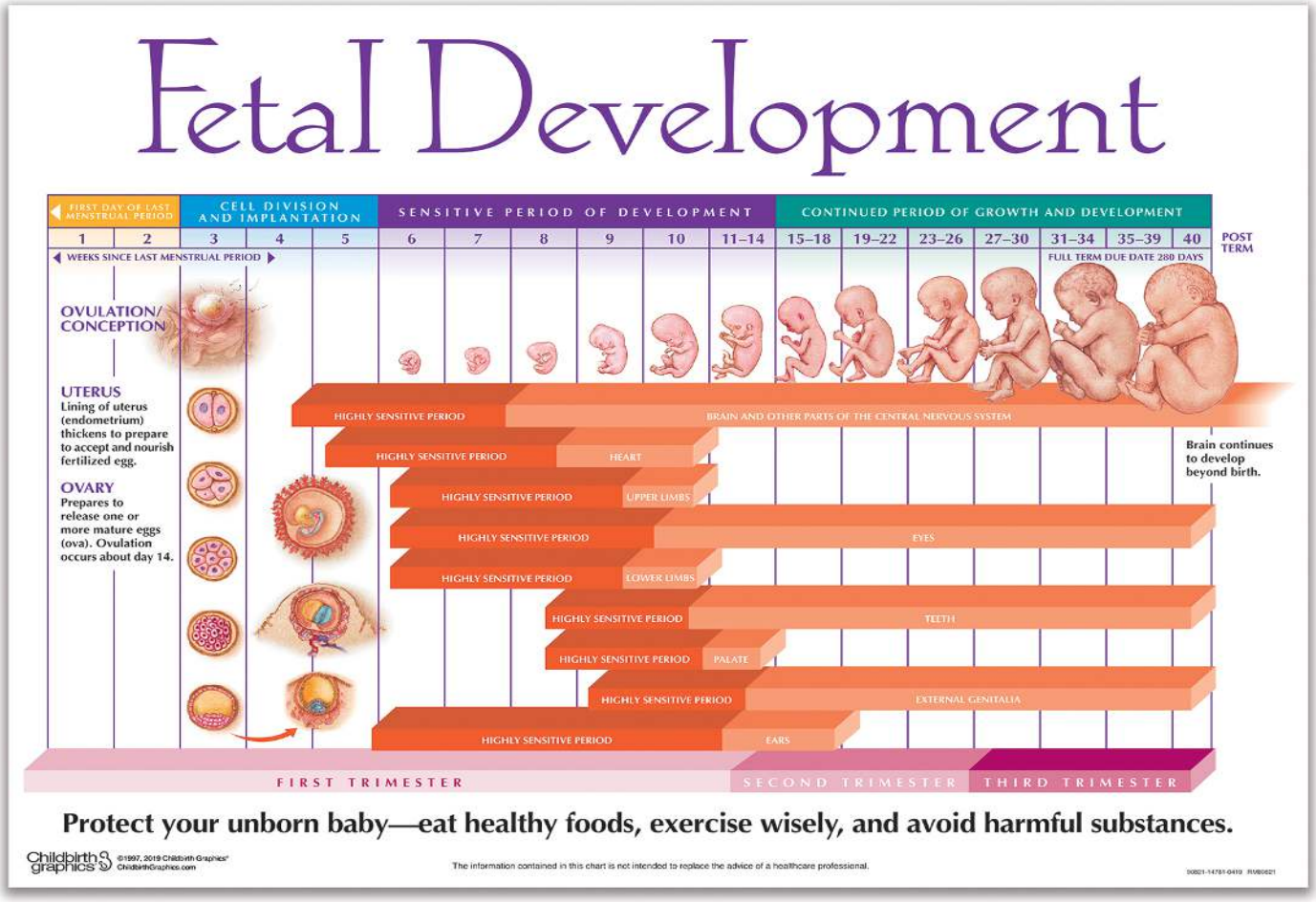
First Trimester	Growth & Development	Make Healthy Choices
During the first month 	• Fertilized egg attaches to the lining of the uterus. • The mouth, lower jaw and throat are developing. • Face and eyes begin to form. • Gender determined at conception. • At the end of month one, the baby is smaller than a grain of rice.	• Good health affects the development of your baby. • Alcohol and other substances can affect the development/growth of baby. • Discuss Vitamin B with doctor. • Drink plenty of water throughout pregnancy.
During the second month 	• Baby's face continues to develop. • Baby's head develops. • Eyes, ears, and nose are forming. • Digestive tract and sensory organs develop. • The heart is beating at around week 6. • Hands, feet and toes take shape. • Fingerprints have developed.	• Try to reduce stress as stress can release hormones that are not good for you or the baby. • Introduce yourself to your baby. • Assure the baby that you will provide love and protection. • Check with your doctor before taking any medications. • Stay active. • Eat healthy foods, drink plenty of fluids, and get lots of rest.
During the third month 	• The head is the largest part of the body. • The arms, hands, fingers and feet are fully developed. • Fingernails and toenails are forming. • External ears and teeth begin to form. • Baby begins to explore the environment. • Bones and muscles are growing. • External genitals are formed. • By the end of month three, the baby is fully formed and will continue to develop organs and limbs throughout pregnancy.	• Take prenatal vitamins. • Use deep breathing and walking to rock your baby. • Always wear your seat belt. • Read and ask questions about how your baby is growing. • Envision your baby floating safely in your womb. When you are safe, your baby is safe. • The bond between you and baby will form when you begin communicating. *Chance of miscarriage significantly reduces after three months as the most critical developments have taken place.

Second Trimester	Growth & Development	Make Healthy Choices
During the fourth month 	• Baby's heartbeat can be heard through a doppler instrument. • Eyelids, eyebrows, eyelashes, nails and hair are formed. • Teeth and bones strengthen. • Sex organs are distinct (can see the sex of the baby on ultrasound). • Baby begins to make urine from the kidneys. • Baby's skin is still thin and transparent. • Baby can frown, yawn, hiccup, suck thumb, open mouth, and curl toes.	• Avoid wearing tight clothes if possible. Tight clothes can result in more pain, decrease blood circulation or cause yeast infections. • Get active. • Stroke and pat your baby. • Read and sing to your baby. • Depression and distress produce chemicals which may cross the placenta and affect your baby.
During the fifth month 	• Mother starts to feel the baby move around. • Baby drinks and tastes amniotic fluid. • Developing muscles (begins moving more). • Hair grows on the head. • Skin is covered with whitish coating, vernix. This protects the skin and is shed once the baby is born. • Fine hair called lanugo covers the body. This is to help protect the baby, and sheds once they are born.	• Your center of gravity changes as the uterus grows. • Check home for hazards that might increase risk of fall (rugs, cords, etc.). • Actions affect a baby's physical development, and feelings can affect emotional development. • Try to stay in calm and pleasant surroundings to reduce stressful environments.
During the sixth month 	• Baby continues to explore the environment. • Moves and manipulates fingers. • Fingerprints and toe prints become well developed. • Eyelids begin to part, eyes open. • Baby responds to sounds.	• Mothers voice has a calming effect on the baby, and can decrease the baby's heart rate. • Strenuous exercise or bathing in hot water can cause the baby's heart rate and temperature to go up.
During the seventh month 	• Baby continues to grow and develop organs and systems. • A layer of fat is stored. • Hearing becomes fully developed. • Baby begins to move more, depending on stimuli (sound, light, pain).	• Poor nutrition can impair brain and organ growth. • Loud noises may cause the baby's heart rate to increase and body to tremble. • Start preparing for the baby's birth and homecoming. • Accurate information about labor and delivery will reduce fears or anxiety. • Talk to the baby about your movements and daily activities.. they can hear you!

Third Trimester	Growth & development	Make Healthy Choices
During the eighth month 	• Baby continues to develop and mature body fat. • Brain is rapidly developing at this time. • Most internal organs are developed. • Lungs are the last organ to develop, and may still be immature at the time.	• Braxton Hicks contractions exercise your uterus. This can be viewed as “practice contractions”. • Begin to think of feeding options, bottle or breast feeding. • Eat regular meals. • Walking is an excellent form of exercise. Even 10-15 minutes! • A lukewarm bath or shower is a great way to relax.
During the ninth month 	• The lungs are close to fully developed. • Baby develops reflexes (allowing them to blink, turn head, grasp, respond to stimuli) • Baby begins to reposition self in a head down position for birth.	• Weekly prenatal visits increase your chances of having a healthy baby. • Your emotions will peak as your body gets ready to give birth. • Expect to feel excited, anxious, impatient, irritable. These are all normal feelings. • Review signs of labor. • Count your baby’s movements for one hour several times a day. • Relax and enjoy this time. Let your baby know they are loved.

Resources: Cleveland Clinic. (16, April 2020). *Fetal development: stages of growth.* https://my.clevelandclinic.org/health/articles/7247-fetal-development-stages-of-growth
American Pregnancy Association. (n.d). *Baby development month by month.* https://americanpregnancy.org/healthy-pregnancy/week-by-week/baby-development-month-by-month/
Formtemplate. (2017). *Download prenatal chart for free.* [Images]. https://www.formtemplate.org/screenshot/prenatal-chart/page-2.html

The chart below shows the typical development process and the most sensitive periods for organ development during pregnancy. In general, the first trimester is a sensitive and crucial point for fetal development and can result in major defects to the body and internal organ systems.



Credit: (childbirth graphics, n.d)

Table 2.0: *Overview of prenatal development*

First trimester	- Rapid brain growth making up nearly half of the fetuses weight - The brain grows millions of neurons at this time, which help with the baby's movement and growth - Body structure and organ systems begin developing such as Brain, spine, inner ear, fingernails, liver, pancreas, kidneys - Reflexes begin to emerge
Second trimester	- Sucking and swallowing begins in which the fetus can swallow amniotic fluid - The baby will begin movements (kicking, stretching) which are directed by the fetuses cerebellum - The baby can begin to detect sounds as their middle ear begins to develop - Brain is very active at this stage - Baby will begin to sleep at this stage
Third trimester	- Rapid development of neurons, resulting in the brain tripling in size - All organs are developed (lungs are the last to develop) - Cerebrum develops, which controls motor control (wiggle fingers, stretching, kicking, etc.) and may be why the baby feels as if they are moving more - Baby will reposition self to a head-down position to get ready for conception

Stages of Development

Early childhood

- The early years of a child's life are very important for later health and development.
- Starting from birth, children develop brain connections through everyday experiences.
- Positive and negative experiences add up to shape the child's development and can lead to lifetime effects. The basic structures that are developed in early childhood lay a foundation for more complex structures as we get older.
    - For instance… a house needs a wall and roof to have a sturdy foundation. Similarly, the brain needs a good base to support future brain development.
- Infants are born with 100-200 billion neurons in their body. The majority of the neurons multiplied when the baby was in the mothers uterus.
    - When a baby is born, they have the majority of neurons that they will have for the entirety of their lives. New connections between neurons arise every second at this age, making it more than any other point in our human lifes.
    - The newborn's brain develops the most from birth to age 5 (First Things First, n.d). Thus, it is important to give children the opportunities to explore their environment, provide them with a healthy diet, adequate sleep and plenty of exercise.
- How well the brain develops is based on several factors, including genes, and the child's experiences with other people and the world.
    - What is considered an experience?
        - An experience can be either positive or negative. Some examples of a positive experience can be as simple as playing with a toy car, trying new foods, going to a playground, or playing games together. Examples of negative experiences may include neglect, emotional abuse, physical abuse, or traumatic incidents.
- During a child's first year of life, they begin to focus on their vision, movement, exploration, and learning about their environment. As the child begins to learn a new language, they experience cognitive or brain development. This process helps them learn language(s) as they age, and promotes thinking, reasoning and memory as they age (CDC, 2022).

The chart below indicates common developmental milestones and approximate months they should appear. Developmental milestones are things that most children can do by a certain age. Children will reach milestones in how they learn, speak, play, behave and move. However, it is important to remember each child will develop and grow at their own pace, and to talk to a doctor if you are concerned about your child's development. This chart contains some of the primary milestones to watch out for in your developing child from one month to twenty-four months. The milestones are broken down into motor, language/cognitive, feeding and when to act early.

Remember to watch for progress, not deadlines.

Table 2.2: *Newborn Milestones, ages 1 month to 24 months*

	Motor (movements)	**Language / cognitive**	**Feeding**	**Act early if..**
1- 3 months	Moves head from side to side when on stomach Begin to lift head when lying on stomach Can bring hands to mouth Strong grip/ tight fists	Stares Communicate through crying Coos Smiles Makes eye contact Turns head toward sound Can recognize parent(s) voice	Latches onto nipple or bottle Tongue moves in forward to back motion	Difficulty lifting head Stiff legs Fisted hands with little movement Does not follow items with eyes Resists being held Blank affect (blank expression of emotions) Unable to latch when feeding or if they are losing food out of sides of mouth
4-6 months	Rolls from back to tummy and tummy to back Begin standing with support Reaches for nearby toys Uses hands to support self in sitting up Enjoys playful interactions (Peek a boo, etc)	Reacts to noises / sounds Uses babbling (“da,da”, “ma, ma”) Makes different kinds of sounds	Opens mouth when spoon is near mouth Begins eating cereals and pureed foods (carrots, apples, pears, sweet potato, etc.)	Unable to lift head Difficulty reaching for items Irritable for no reason Does not follow items with their eyes Not making vowel sounds Does not hold own bottle when feeding
7-9 months	Sits without support Sits and reaches for toys Moves from tummy or back into sitting position Picks up head and pushes through elbows during tummy time Picking up items with thumbs and fingers	Interested in playing with others (peek a boo) Participates in two-way communication Uses simple gestures (ex: shaking head for no) Recognizes sound of name Imitates sounds	Begins eating thicker and mashed food tables Look and reaches for nearby foods Enjoys teethers	Uses one hand predominantly Rounded back while sitting Difficulty with crawling Uses only one side of body to move Does not transfer item from one hand to another Not interested in playing with textured toys, musical toys or colorful toys

	Begins moving with alternative leg and arm movement (ex: crawling) Uses both hands equally to play			Does not explore environment when on floor Does not babble Not interested in interacting with others Unresponsive to sounds/voices
10-12 months	Pulls to stand Stands alone, takes steps Claps hands Uses thumb and pointer finger to pick up items Explores toys with hands, fingers, mouth Crawling	Meaningfully using “mama” or “dada” Responds to simple directions (Ex: come here) Says 1-2 words Imitates sounds Enjoys listening to songs Begins using hand movements to communicate wants and needs (Ex: reaches to be picked up)	Finger feeds self Eating variety of foods Begin using an open cup Enjoys variety of smells and tastes Ready to try soft cooked vegetables, soft fruits and finger foods	Difficulty getting to stand Strongly flexed arms Poor head control when sitting Extreme reactions to touch or new textures Does not acknowledge when you say their name Rejecting solid foods Not using fingertips to pick up small foods
13-18 months	Walks independently Squat to pick up item/toy Stacks 2 objects/blocks Turns head while standing with no loss of balance Raises hands to be picked up Crawls or walks to desired item Uses both hands equally to play and explore toys (children will choose dominant hand around age 2-3)	May use 5-10 words Imitates simple words Shows interest in pictures Understands 50 words Eagerly explores environment Points to objects of interest	Eats increasing variety of foods (chopped table foods) Holds and drinks from cup	Does not babble Does not maintain eye contact Does not respond to name Does not try to communicate
19-24 months	Jumps Runs Climb on low furniture Can go up/down stairs with support Stands on tiptoes Stacks 5+ blocks/toys	Uses at least 50 words Enjoys listening to stories Understands simple pronouns (me, you) Imitates new words Takes toys apart, puts back together Sorts shapes and colors	By this age, the baby should be able to eat most of the same foods as adults and more easily use utensils	Any of the above problems are continuing

Resource: adapted from Pathways. (2019). *Early Developmental Milestones | Child Development.* https://pathways.org/all-ages/milestones/

During the newborn's first year of life, they have primitive reflexes they are born with. Reflexes are involuntary actions that occur in response to stimuli. For example, when the doctor hits your knee with a light hammer, your leg will automatically kick outward in response, which is known as a reflex.

Babies will have several reflexes, however it is important to talk to your doctor if you notice these reflexes are not going away as that can indicate a developmental problem. Reflexes to be aware of and to look out for at this stage include:

Table 2.3: *Primitive reflexes in newborns*

Moro Reflex **(startle reflex)**	This is a reaction to being startled or feeling unsupported. The baby will throw their head back, throw out their arms and legs and typically cry. This reflex should only last 4-6 months before disappearing.	(Lecturio, 2021) 
Rooting Reflex	After touching the corner of the baby's mouth, they will turn their head to the direction of touch. They will open their mouth and "root" in that direction, which serves a purpose in feeding, as it helps the baby locate the bottle or breast. This reflex also works together with the sucking reflex. This reflex should only last 4-5 months before disappearing.	(Lecturio, 2020a) 
Sucking Reflex	The baby's head will turn in the direction of touch, open their mouth, and automatically suck. This reflex is important as it aids in the coordination of sucking, breathing and swallowing. This reflex develops before the child is born. This reflex typically lasts 4-6 months before disappearing.	(Lecturio, 2017) 
Asymmetrical Tonic Neck Reflex (ATNR) **(Fencing Reflex)**	The baby is lying on their back and turns their head to either the left or right. The adjacent arm stretches and the other arm bends right next to their head which looks like a fencing position. This reflex should disappear after 5-7 months.	(Blogspot, 2020) 
Palmar Grasp Reflex	After placing an object/item in the hands of an infant, they will grasp the object by curling their fingers in toward the palm. This reflex should disappear after 3-6 months of age as the infant will begin to intentionally reach and grasp items.	(Lecturio, 2020b) 

Resources: Dole, R. and Chafetz, R. (2010). *Peds Rehab Notes: evaluation and intervention pocket guide.* F.A. Davis.
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Highlights of early child development

Early experiences in life shape the brains architecture	The basic architecture of the brain is constructed before birth, and continues to develop into adulthood. The brain can be compared to a house, meaning that a foundation must be present to build upon it. The experiences in early childhood play a significant role in the way the brain is built. A strong, sturdy foundation increases the likelihood of positive outcomes in later life.
Children benefit from a "serve and return" model	In relationships, serve and return interactions help shape the brain's architecture. This can be viewed like a tennis match, where one person "serves" and the other person "returns" it. This interaction helps to create connections in the brain that support emotional and cognitive skills that they will use later in life. Serve and return examples can look like: The baby babbles, the parent makes facial expressions in response, playing peek-a-boo with child, the baby plays with toys and the parents begin to play with them
"Toxic stress" or trauma can be damaging to child development	Toxic stress can show up in children when their needs are not being met. Other examples that may create toxic stress include abuse, neglect, caregiver mental illness or substance use, violence, and economic hardships/instability. This can lead to long term effects on the child surrounding their learning, behavior, physical and mental health.
Neuroplasticity and the ability to change behavior decreases as we get older	Brain plasticity, also known as neuroplasticity, is the concept that refers to the brain's ability to "re-wire" itself to enhance learning or to recover from injury. As individuals get older, it becomes more difficult to change the brain. Repetition of skills have been proven to alter the brain's "wiring".
Experiences can aid in turning off genes or turning genes on	This concept is known as epigenetics. Recent research suggests that early experiences can determine if genes should be on or off. The experiences that children are exposed to is crucial to the development of the brain.

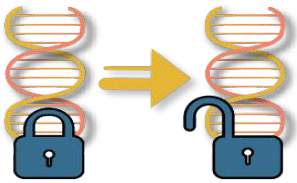
The CDC has a mobile app to better support your child's development during this period. The app is suitable for iPhones and Androids and is available in the English or Spanish language. After downloading the app, the caregiver will be prompted to fill out minimal personal information. The mobile app breaks down developmental periods for children ages 2 months to 5 years old. Milestones are categorized into social, language, cognitive, movement and when to act early.

The name of the mobile app is **CDC's Milestone Tracker.**

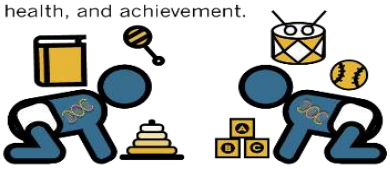
WHAT IS EPIGENETICS?

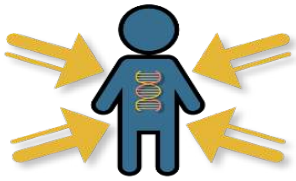
AND HOW DOES IT RELATE TO CHILD DEVELOPMENT?

"Epigenetics" is an emerging area of scientific research that shows how environmental influences—children's experiences—actually affect the expression of their genes.



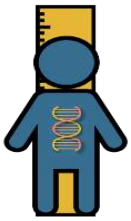
During development, the DNA that makes up our genes accumulates chemical marks that determine how much or little of the genes is expressed. This collection of chemical marks is known as the "epigenome." The different experiences children have rearrange those chemical marks. This explains why genetically identical twins can exhibit different behaviors, skills, health, and achievement.



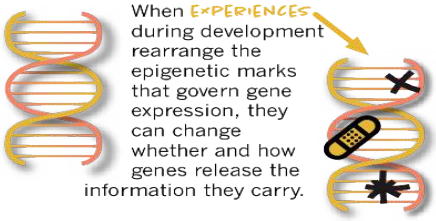


This means the old idea that genes are "set in stone" has been disproven. Nature vs. Nurture is no longer a debate. It's nearly always both!

EPIGENETICS EXPLAINS HOW EARLY EXPERIENCES CAN HAVE LIFELONG IMPACTS.

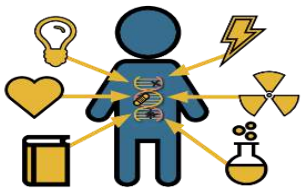


The genes children inherit from their biological parents provide information that guides their development. For example, how tall they could eventually become or the kind of temperament they could have.



When EXPERIENCES during development rearrange the epigenetic marks that govern gene expression, they can change whether and how genes release the information they carry.

Thus, the epigenome can be affected by positive experiences, such as supportive relationships and opportunities for learning...

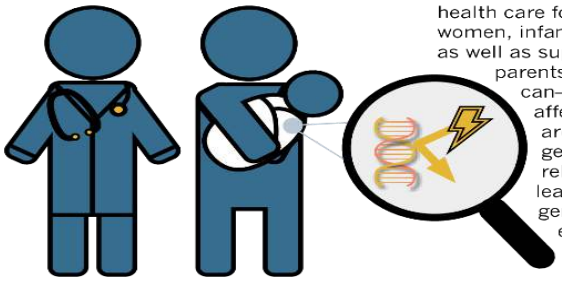


... or negative influences, such as environmental toxins or stressful life circumstances ...

... which leave a unique epigenetic "signature" on the genes. These signatures can be temporary or permanent and both types affect how easily the genes are switched on or off. Recent research demonstrates that there may be ways to reverse certain negative changes and restore healthy functioning. But the very best strategy is to support responsive relationships and reduce stress to build strong brains from the beginning.

YOUNG BRAINS ARE PARTICULARLY SENSITIVE TO EPIGENETIC CHANGES.

Experiences very early in life, when the brain is developing most rapidly, cause epigenetic adaptations that influence whether, when, and how genes release their instructions for building future capacity for health, skills, and resilience. That's why it's crucial to provide supportive and nurturing experiences for young children in the earliest years.



Services such as high-quality health care for all pregnant women, infants, and toddlers, as well as support for new parents and caregivers can—quite literally—affect the chemistry around children's genes. Supportive relationships and rich learning experiences generate positive epigenetic signatures that *activate* genetic potential.

Center on the Developing Child HARVARD UNIVERSITY

For more information: https://developingchild.harvard.edu/epigenetics

Stages of Development

Adolescence

Adolescence is a transitional period between childhood and adulthood. Adolescence occurs between the ages of 10 to 19 (WHO, 2022). Children and teenagers in this age group will begin to expand their complex thinking, which is known as "formal logical operations" (University of Rochester Medical Center, n.d). This includes the ability to:

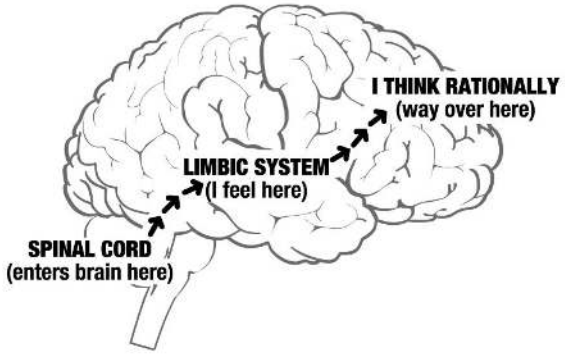
- Do abstract thinking - This includes developing morals, thinking about possibilities, and engaging in higher math concepts.
- Reason from known principles - This means forming new ideas and questions.
- Consider many points of view -This means to compare ideas/opinions and look at things in a new way.
- Identify and establish satisfying relationships - This means creating new connections with others.
- Think about the process of thinking - This process is called meta-cognition and means being aware of the act of thinking.

In early childhood, children formed connections in the brain that will later be removed in adolescence. This is because we get rid of the connections that we do not use as much and strengthen the ones that we use more regularly. The prefrontal cortex, which is responsible for higher executive function skills (planning, judgment, impulse control, etc.) is still developing at this time and does not fully mature until mid to late 20's. The limbic system, which can be viewed as the emotion center of the brain, matures at a quicker rate compared to the prefrontal cortex. Research also suggests that adolescents have increased activity in their limbic system during this time period (Konrad, at el 2013). Since the limbic system matures quicker than the prefrontal cortex region of the brain, this can explain why adolescents are more likely to engage in risky behavior, as they are more likely to act on their emotions or be influenced by their environment/peers.

What is happening in the brain during adolescence?

- There is an area of the brain called the Striatum, also known as the brain's "reward system". This becomes activated when we experience something rewarding. During adolescence, children have a heightened reward system and may not consider all risks before acting on their emotions (Abrams, 2022).

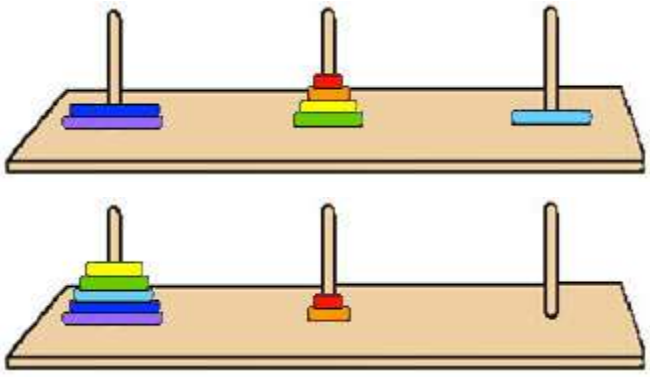
- Adolescents appear to be more sensitive to neurotransmitters or "messengers" in the brain. The hormone, Dopamine, which is known to produce a feel good effect, generally peaks during adolescence. This may be another reason adolescents are more vulnerable to impulsive decision making, especially if the reward of the decision appears substantial.
    - Ex: A child may be more likely to engage in risky behavior if they are being pressured or watched by their peers. The reward in this scenario would be social status.



The brain grows and strengthens itself during adolescence by:

- Producing a significant amount of new cells during this time period, which allows for increased information storage. This is why adolescents are able to learn new skills so quickly (U.S Department of Health & Human Services [HHS], n.d).
- Rewiring neural connections, known as pruning. This process involves strengthening connections that are used more frequently and weakening or removing others. This process helps to make the brain more efficient (HHS, n.d).
- Developing new gaps between nerve cells, which enhance learning and make it easier to pick up on information (HHS, n.d).

Cognitive development during adolescence



Credit: (Yates, 2010)

During adolescence, children are experiencing maturation of the prefrontal cortex. An example of the cognitive changes that adolescents are experiencing can be seen in this executive functioning task shown above, known as the Tower of Hanoi. This task is much more challenging for children compared to adolescence. This is because it requires a degree of skills in critical thinking, problem solving, metacognition (thinking about thinking), and working memory that is not fully developed.

Why is this task harder for children compared to adolescents/adults?

This task is more difficult for younger persons as the task requires use of executive functioning skills, which are located in the prefrontal cortex region of the brain. Since this region is still developing and does not mature until age 25, the task will be more difficult to problem solve and reason through. As children age into adolescence, this task will become easier as their executive function skills are developing and maturing.

Table 2.4: *Adolescent development*

Domain	Characteristics	Possible presentation
Physical	• Rapid gain in height and weight • Hormonal changes • Continued brain development • Secondary sex characteristics	• May require more sleep/rest • May be uncomfortable with emerging sex characteristics
Cognitive	• Developing advanced reasoning and problem solving skills • Developing abstract thinking • Ability to think about thinking (meta cognition) • Developing coping skills • Can retain sufficient information	• Increased level of consciousness • Feeling that their emotions are unique • Uses belief system(s) to guide decision making • Experiencing mood changes
Psychosocial	• Aim to establish an identity • Consider intimate relationships • Self awareness to sexuality • Build and sustain relationships • Seek achievements • Background and experiences affect development	• Increased time with friends and family • Better understanding of emotions • Evolving relationship with parents • Takes on new roles • Can apply new skills to resolve conflicts
Identity	• Develop independent identity regarding gender, sexuality, ethnicity, family/origin, etc. • Explore and express gender identity • Plan for future • New relationships	• Try new roles • May be influenced by environment • May need additional supports

Adapted from: Marrow, M., Benamati, J., Decker, K., Griffin, D., and Lott, D. A. (2012). *Think trauma: A training for staff in juvenile justice residential settings*. Los Angeles, CA, and Durham, NC: National Center for Child Traumatic Stress.
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Chapter III: Intervening variables to brain development

Heritability

Heritability is a term that refers to the quality of a characteristic being transmitted from parent to child. The way a characteristic is inherited can be influenced by multiple genes, as well as the environmental factors. In other words, traits such as eye color, intelligence and height vary in the population, but genes predicting these traits can be passed down from biological parent to child. Heritability measures how much of a trait is passed genetically versus stemming from the environment. High heritability means there is more genetic influence on a trait than environmental, and vice versa for low heritability.

Research has shown that there is a genetic link to mental health conditions and substance use in families. It is important to note that environmental factors, such as trauma or neglect, can also strongly influence the likelihood of developing a particular condition.

How is heritability studied?

Heritability is commonly studied through the use of family or twin studies. Family studies involve looking at the prevalence of a condition amongst relatives within a family. While twin studies compare the rates of a condition among identical and fraternal twins.

Heritability and Health Conditions

Various health conditions, such as anxiety, schizophrenia, and bipolar disorder have heritable components associated with the illnesses. This means that the health conditions are not necessarily directly hereditary, rather children can inherit a combination of parents' genes, making them more susceptible to developing the illness.

See below one model for assessing how someone may develop a mental illness and/or substance use disorder.

Diathesis- stress model

This model explains behavior as a result of biological and genetic heritability, as well as stress from life experiences. While there are predisposition factors that can contribute to one's health status, according to this model, stressful situations can increase vulnerability to mental health disorders (Cherry, 2022). The Diathesis- stress model is beneficial as it explains behavior as an interaction between both biological (nature) and life experiences (nurture). In conclusion, genetic risk and environmental risk work hand in hand to contribute to an individuals mental health.

Heritable predisposition of mental illness

Due to the established hereditary component of many mental health conditions, the transmission of mental illness across generations can act as a health disparity passed down from generation to generation. A person's predisposition to developing a mental health condition varies depending on the mental health diagnosis. Several mental illnesses are heritable, meaning they can be passed down from the parent to the child[ren]. The chance of an individual having a specific mental health disorder is higher if other family members have that same disorder (Hancock et al., 2013; Johnson et al., 2018; Landstedt & Almquist, 2019; Wolicki et al., 2021). Environmental factors can also increase or decrease the risk of developing a mental illness. Both positive and negative life experiences play a role in the likelihood of developing a mental illness.

Specific mental health conditions:

Recent research has looked at different health conditions and the role genetics plays on an individual. As the research is relatively new and emerging, more research is still needed to look at the genetic risks of developing specific disorders.

Below contains selective mental health diagnoses which have been most commonly studied by researchers thus far.

Bipolar disorder →

- Research estimates that around 60-85% of all cases are attributed to genetic factors (Fabbri, 2021).
- Some research indicates change of brain structure with individuals diagnosed with bipolar disorder.
    - Resulting in alterations to the frontal cortex region when experiencing mania or depression (Qi et al., 2022).
- Additional research suggests certain genes or alteration in genes can result in an increased risk of developing bipolar disorder.
    - Specific genetic mutations are seen in bipolar disorder. A combination of genes are involved in bipolar disorder, not just a single gene.
    - Bipolar I disorder shows a stronger genetic correlation with schizophrenia. Whereas bipolar II disorder shows a stronger genetic correlation with major depression (Mullins et al., 2021).
    - The largest genome-wide association study to date of bipolar disorder suggests a correlation between other psychiatric disorders, including schizophrenia, major depression, and child onset attention-deficit hyperactivity disorder (ADHD). They also found that bipolar disorder was correlated with several traits, both alcohol and smoking, and some aspects of sleep (ex: insomnia) (NIMH, 2021).

Schizophrenia →

- Research suggests that schizophrenia has a heritable risk of up to 79%, indiciating genetics has a significant role in its cause (Hilker et al., 2018).
- Some research suggests certain genes or alteration in genes can cause an individual increased risk of developing schizophrenia. Studies have also shown that people with schizophrenia have *de novo* (new) genetic mutations. These altercations in the gene's DNA sequence occur spontaneously, meaning their family and close relatives do not have this gene (NIH, 2013).
    - Specific genetic mutations are seen in schizophrenia (with genetic disruptions to *LAMA*2, *SETD1A*, *DPYD*, *TRRAP, TAF13, ARC* & *VPS39*). (Gulsuner et al., 2013).
- Research suggests that there is not a single gene that causes schizophrenia, rather many genes contribute to causing an effect.
- Research suggests that the chronic misuse of substances, such as alcohol, cocaine, marijuana, and amphetamines can also increase the risk of developing substance-induced psychosis and schizophrenia (Tandon & Shariff, 2019).
- Some research indicates change of brain structures with individuals diagnosed with schizophrenia.

Anxiety →

- Research estimates that 20-60% is attributed to genetic factors. (Purves et al., 2020; Ask et al., 2021).
- Anxiety disorders are amongst the most frequent occurring mental health disorders in adulthood and adolescence (Ask et al., 2021).
- Differences in brain structure, function and connectivity have been demonstrated in research, but it is still unclear of the extent and the clarity of the findings.

Depression →

- Scientists estimate that around 30% - 50% is attributed to genetic factors. Whereas, the remaining is attributed to environmental and other factors (U.S Department of Veteran Affairs, 2021; Kendall et al., 2021).
- Depression shares genetic risks with anxiety disorders and PTSD (U.S Department of Veteran Affairs, 2021).
- Altercations in the brain have been shown in individuals with major depressive disorder.

Current Research: *Mental Health*

Mental illness can begin at any age, from childhood to later adult years. However, most mental illnesses show signs/symptoms earlier in life. In a large-scale study, researchers reviewed 192 studies to determine the average peak age of onset for varying mental illnesses and determined that the average age of onset for any mental illness is 14.5 years old (Solmi et al., 2022). Average peak ages of specific mental illnesses are as follows:

- Anxiety and fear related disorders - 5.5 years
- Obsessive compulsive disorders - 14.5 years
- Feeding or eating disorders - 15.5 years
- Trauma related disorders - 15.5 years
- Disorders due to substance use or addictive behaviors - 19.5 years
- Schizophrenia spectrum and primary psychotic disorders - 20.5 years
- Personality disorders - 20.5 years
- Mood disorders - 20.5 years

- 20 %, or 1 in 5 children and adolescents have a diagnosable mental, emotional, or behavioral disorder
    - While 10%, or 1 in 10 of children and adolescents have a serious emotional disturbance (SED)
- In studies of children ages 13 to 18, diagnosed with a mental disorder, rates of a co-occurring substance use disorder have ranged from 61% - 88% (Alozai & Sharma, 2022). The higher rates were seen in conditions of major depressive disorder, bipolar disorder, anxiety disorder, PTSD, schizophrenia, ADHD, and conduct disorder.
- Children of parents with mental illness are at a significantly increased risk of multiple psychosocial challenges (Hancock et al., 2013).
- Having a family member with mental illness doubles the offspring's chance of developing a mental illness themselves. The highest rates of distress in children were exhibited when the primary caregiver had a more severe diagnosis, such as bipolar, addiction, or psychotic disorder as well as comorbid conditions (Johnson et al., 2018).
- Children whose parents have mental health problems were twice as likely to present with mental health problems as adults. Whereas participants who had parents without mental health problems had the lowest odds of having mental health problems themselves (Landstedt & Almquist, 2019).
- Wolicki et al. (2021), suggested children with any caregiver with poor mental health were four times as likely to have poor general health and twice as likely to have a history of one or more mental, behavioral, or developmental disorders compared to children with caregivers who had good mental health.

Heritable predisposition of substance use disorder

One in seven Americans aged 12 or older have reported experiencing a substance use disorder (CDC, 2022b). Substance use disorder is a treatable, chronic condition that is characterized by problematic behavior of substance use, resulting in impairments to one's health, social abilities, and control over substance use.

There is between a 39-72% risk that substance use disorders will be passed from parent to child. Children are then 4-7 times more likely to develop a substance use disorder compared to children whose parents do not have a substance use disorder (White et al., 2019). A person's predisposition to developing a substance use disorder varies depending on the individual's genetic makeup, substance(s) used and when the substance was first used. A family history of substance use disorder has been shown to be a risk factor for developing a substance use disorder. Heritability has estimated ranges of 50-70% for alcohol use disorder, 34-78% for cannabis use disorder, 42-79% for cocaine use disorder and 23-54% for opioid use disorder (Alozai & Sharma, 2022).

Current Research: *Substance Use*

- Some research suggests that the brain changes during addiction and the changes can persist after substance use stops. It is still unknown if the changes in the brain can be reversed.
- When substance use behavior is repeated, the brain can change circuitry. The use of substances will begin to impact your brain's reward system. The chemicals in the body, such as dopamine or serotonin, that you once received naturally, (from getting a good grade, going on a walk, listening to your favorite song, etc.) become disrupted and weakened. This can cause you to lose your ability to feel pleasure naturally and begin to rely on the "chemicals" from the substance.
    - The "rewarding effects" positively reinforce substance use behavior
- Individuals using substances learn to connect stimuli, such as people, places, and moods with the rewarding effects of the substance use.
    - This is why individuals may become triggered when exposed to certain situations, people, environments, etc. as the substance holds a connection to those things.
- Approximately 5% of adolescents in the United States meet the criteria for a diagnosable substance use disorder (Tarter, 2002).
- Well-supported evidence suggests that adolescence is a significant "at-risk period" for substance use and addiction. Since the adolescent brain is still developing, addictive substances have harmful effects on the brain and the body.

Substance use and the brain

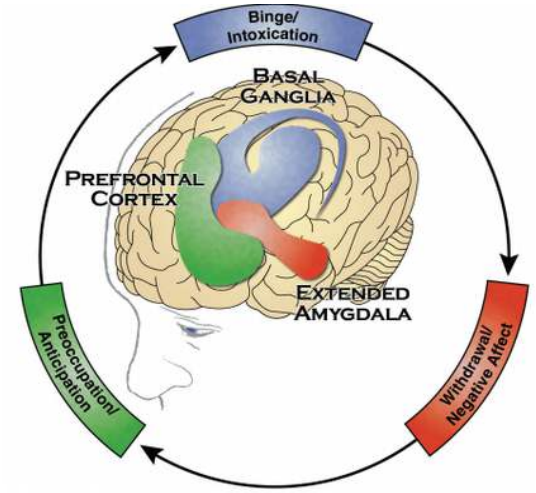
How do substances affect the brain?

- Well-supported scientific evidence indicates that addiction to alcohol and other substances is a chronic brain disease that has the capacity for recurrence and recovery
- Well-supported scientific evidence also shows alterations in specific regions of the brain including the basal ganglia, extended amygdala, and the prefrontal cortex.
    - Basal ganglia - controls the rewarding/pleasurable effects of substance use
    - Extended amygdala - involved in stress and feelings of anxiety
    - Prefrontal cortex - involved in executive function skills (organize and plan tasks, memory, decision making, emotional control)
- Since these areas of the brain are impacted, it:
    - Enables substance associated cues to increase substance seeking behavior
    - Reduces the sensitivity of the brain's reward system and increases stress systems in the brain
    - Decreases the executive functioning system in the brain, which impacts an individual's ability to make plans, prioritize tasks, manage time, and make decisions

The cycle of addiction

Addiction can be viewed as a revolving cycle broken down into three stages. Each stage has a connection to each region of the brain impact by substance use **(**basal ganglia, extended amygdala, and the prefrontal cortex). The three stages include:

1. **Binge/intoxication -** Consuming the substance and is experiencing the pleasurable effects
2. **Withdrawal/negative affect -** Experiencing a negative emotional reaction when substances are not being used
3. **Preoccupation/anticipation** - Seeking the substance after a period of abstinence



Credit: (U.S. Department of Health Services [HHS], 2016).

1. **Binge/intoxication stage: <u>Basal ganglia</u>**
    - Addictive substances produce feelings of pleasure and take over the brain's reward system.
      Alters the way an individual responds to stimuli surrounding that stimuli
    - Long term use can activate the dopamine system on their own and trigger urges for the use of that substance.
    - Habit formation begins to form as neurotransmitters (dopamine & glutamate), or the body's natural chemicals change and result in increased substance seeking behavior, contributing to compulsive usage.

2. **Withdrawal/negative affect stage: <u>Extended amygdala</u>**

- The negative feelings associated with withdrawal are due to a decrease in activity in the brain's reward system and increase in stress neurotransmitters (norepinephrine, dynorphin).
- During withdrawal, the brain experiences a decrease in dopamine.
- A decrease in dopamine to the brain may suggest why individuals often do not receive the same level of pleasure from once pleasurable activities, or compulsive feelings to use the substance again for the pleasurable feelings they once got.

3. **Preoccupation/anticipation stage: <u>Prefrontal cortex</u>**

An analogy of this stage can be viewed by dividing the prefrontal cortex regions into a “go system” and a “stop system”.

- The Go system plays a role in planning, motivation and decision making. The Go system contributes to the habits we form and is associated with impulsive substance seeking.
- The Stop system controls habit responses and the brain's stress and emotional systems. Specific neurotransmitters become released during stage 2, increasing feelings of stress and increasing substance seeking behavior.

In turn, the combination of the binge/intoxication, withdrawal/negative affect, and preoccupation/anticipation stages drive substance seeking behaviors. These three stages are linked to one another, but generate changes throughout different regions of the brain. Over time, addiction can lead to changes in the brain's reward system, executive functioning skills, and increase feelings of stress. Progression through these three stages can occur over months, weeks or daily. However, this addiction cycle tends to intensify as an individual continues to engage with that substance, resulting in increased physical and psychological harm (HHS, 2016).

Substances & neurotransmitters

Neurotransmitters are our body's chemical messengers. They carry messages all throughout the brain and body. Different substances cause interruptions in the brain's processing of these neurotransmitters. Interfering with these processes can lead to substance tolerance and addiction as the substance changes the "wiring" in the brain. Below contains a list of significant neurotransmitters, their primary function and how they can become impacted during substance use.

- **Dopamine** - This is a neurotransmitter that helps regulate mood, enhances pleasure and is involved with reward and reinforcement. Dopamine plays a significant role in the brain's reward system.
    - Drugs that can impact dopamine levels: Marijuana, opioids, heroin, stimulants, PCP & ecstacy (American Addictions Centers, 2022)
    - Oversupply of dopamine may be linked to schizophrenia symptoms
    - Undersupply of dopamine is linked to depression and addiction
    - Many highly addictive substances (cocaine, methamphetamines, amphetamines) act directly on the dopamine system

- **Serotonin** - This is a neurotransmitter that helps us regulate our emotions and mood
    - Drugs that can impact serotonin levels: Hallucinogens & ecstasy (American Addictions Centers, 2022)
    - Undersupply of serotonin is linked to depression
      * Some antidepressant drugs can increase serotonin levels and result in Serotonin Syndrome. This overproduction of serotonin can be life-threatening.

- **Norepinephrine** - This is a neurotransmitter that is similar to adrenaline. This acts as a stress response which speeds up heart rate, blood pressure, respiration, moods, etc.
    - Drugs that can impact norepinephrine levels: Opioids & ecstasy (American Addictions Centers, 2022)
    - Oversupply of norepinephrine is linked to depressed mood

- **GABA** - This is a neurotransmitter that helps us "calm down" by slowing down functions of the brain and spinal cord
    - Drugs that can impact GABA levels: Benzodiazaphines, alcohol (American Addictions Centers, 2022)
        - Increased GABA is linked to insomnia

- **Acetylcholine** - This neurotransmitter is involved in movement, memory function, learning, motivation and sleep
    - Drugs that can impact acetylcholine levels: Marijuana, alcohol, benzodiazepines (American Addictions Centers, 2022)

Risks of early substance use - Substances & adolescence

Experimenting with or using substances is prominent during the adolescent years. Adolescents do not have to necessarily get the substances "off of the street", they can also obtain it from peers or family members. Adolescents may also only use the substances in certain environments. During the adolescent period, children are experiencing changes in all areas of development, including physical, emotional, social and cognitive. The brain is going through significant changes during this time period, making adolescents more vulnerable to substance use. According to the CDC, substance use during adolescence can affect brain development, increase the likelihood of engagement in risky behaviors, increase the risk of developing substance use disorder later in life and increase the risk of long term health problems, such as heart disease and hypertension (high blood pressure).

Substances have also changed drastically over the years. Though the majority of the substances have remained the same, the potency has increased and synthetic substances have been introduced. There are now electronic cigarettes, and very high amounts of THC in marijuana. Substances such as heroin and cocaine have drastically increased purity as well. The potency and purity of substances increasing means it may be more difficult to resist the urge to use it again.

According to Monitoring the Future (MTF), more than **40 percent** of youth in the United states have tried illicit drugs at least once within the past 12 months (Miech et al., 2023). MTF has been conducting surveys since 1975 with secondary school students to bring awareness to substance use amongst youth. The most common substances used amongst adolescents were nicotine (in the form of vaping), marijuana, and alcohol. In addition, the percentage of adolescents using substances increased as they progressed through school.

The table below depicts key findings for various substances in the United States during grades eighth, tenth and twelfth.

Table 3.0: *Substance use in adolescence*

Grade level	
8th grade	In 2022, 23.1% used alcohol In 2022, 11% used marijuana In 2022, 8.8% used nicotine (not in vaping form) In 2022, 0.8% used cocaine In 2022, 3% used vicodin In 2022, 17% used any illicit drug
10th grade	In 2022, 41.4% used alcohol In 2022, 24% used marijuana In 2022, 4.2% used nicotine (not in vaping form) In 2022, 0.8% used cocaine In 2022, 8% used vicodin In 2022, 28% used any illicit drug
12th grade	In 2022, 61.6% used alcohol In 2022, 38% used marijuana In 2022, 2.7% used nicotine (not in vaping form) In 2022, 2.4% used cocaine In 2022, 11% used vicodin In 2022, 41% used any illicit drug In 2022, 9.3% used any prescription drug

Resource adapted from: Miech, R. A., Johnston, L. D., Patrick, M. E., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2023). Monitoring the Future National Survey Results on Drug Use, 1975–2022: Secondary School Students. Ann Arbor: Institute for Social Research, The University of Michigan. Available at http://monitoringthefuture.org/results/publications/monographs

General signs and symptoms of substance use

Signs and symptoms of substance use vary drastically from person to person. While it may not always be obvious, it is important to note any changes in the individuals physical appearance, psychological state or behavior. Recognizing the signs and symptoms of substance use can be the first step towards seeking help and treatment. General signs and symptoms of substance use include:

Physical changes:

- Unusual body odors
- Pupils larger or smaller than usual
- Glazed/red eyes
- Abrupt weight changes
- Neglected appearance
- Decreased coordination
- Runny nose, nose bleeds
- Small marks on arms/legs

Behavioral changes:

- Increased irritability
- Changes in personality/attitude
- Changes in habits
- Changes in appetite
- Involvement in criminal activities
- Trouble with school or work
- Spending more money than usual
- Speech problems
- Stops engaging in previously enjoyable activities

Physiological changes:

- Depression and anxiety
- Feeling fatigued
- Challenges with memory
- Changes in mood
- Lack of energy
- Lack of motivation

Risks of substance use during pregnancy

Any harmful substance that the mother uses during pregnancy goes through the blood, the placenta, the umbilical cord, and to the baby. Substances can also be transferred through breast milk to the baby. Thus, mothers who use drugs while pregnant or breastfeeding put their babies at an increased risk of being born dependent on the same substance. Effects of substances can lead to long term complications and be possibly fatal to the infant including the following health conditions:

- **Sudden Infant Death Syndrome (SIDS)** → Sudden, unexplained death of infant
    - If the pregnant parent drank alcohol and smoked after the first trimester of pregnancy, infants are 12x more likely to die of SIDS
- **Neonatal Abstinence Syndrome (NAS)** → Newborn experiences withdrawal symptoms such as high pitch crying or body shakes, following exposure to substances in the womb (commonly opioids)
- **Stillborn** → Death of baby before or during delivery
- **Fetal Alcohol Syndrome Disorder (FASD)** → Lifetime effects of FASD include vision and hearing impairment, abnormal facial features, intellectual disabilities, behavioral challenges, and/or poor cognitive functions
    - Also linked to increased risk of developing alcohol or other substance related problems, increased risk for adult substance use disorders, mood disorders, and neurocognitive impairments (Grant et al., 2013)

The effects of substance use can be broken down into physical, mental/cognitive, special considerations and long term complications. While this list does not contain all possible health effects, both short term and long term effects of substance use were considered. In addition, some or none of these symptoms will be prevalent depending on the amount of time the substance has been used, when the substance use began and method of substance use (orally, injection, etc.). Possible effects are as follows:

Substance	**Physical**	**Mental / cognitive**	**Special considerations- Pregnancy & baby**	**Long term complications**
Alcohol	• Hangover • Weight changes (typically weight gain) • Tremors • Slurred speech • Ulcers or internal sore **Severe complications:** • Heart damage and diseases • Stroke • Liver damage • Digestive issues • Cancer • Yellow skin tone (Jaundice) • Immune system weakens	• Increased emotional reactivity • Cognitive challenges • Less coordinated • Abnormal sleep patterns • Difficulty with executive function skills (problem solving, planning, impulse control, etc.)	There is no safe amount of alcohol to consume while pregnant, including in early pregnancy. **Effects on pregnancy**: • Increased risk of miscarriage and stillbirth **Effects on baby**: • Sudden Infant Death Syndrome (SIDS) • Premature baby • Low birth weight • Tremors • High pitched scream • Smaller head circumference • Excessive sucking at birth • Limb does not form properly, birth defects • Heart diseases at birth • Cleft palate	**Potential long lasting effects on child:** • Deficits in self regulation and attention in school aged children exposed during pregnancy • Alcohol-related neurodevelopmental disorder (ARND) - difficulty with learning and behavioral problems • Alcohol-related birth defects (ARBD), which can affect the heart, kidneys, bones, hearing or combination of all of the above. • Fetal Alcohol Spectrum Disorder (FASD)

Substance	**Physical**	**Mental / cognitive**	**Special considerations- Pregnancy & baby**	**Long term complications**
Benzodiazepine	• Lowered blood pressure • Slowed breathing • Vision difficulty • Appetite loss	• Drowsiness / dizziness • Slurred speech • Poor concentration • Relaxation • Confusion • Problems with movement • Impaired memory	**Effects on baby:** • Preterm birth • Low birth weight • Withdrawal • Seizures • Cleft lip and palate • Breathing problems • Decreased muscle tone (muscles that look floppy) • Three times more likely for newborn to need ventilation support	**Potential long lasting effects on child** • Recent research suggests children exposed to this substance during pregnancy may be at an increased risk for ADHD and Autism Spectrum Disorder (ASD)
Cocaine	• Abdominal pain and nausea • Insomnia • Enlarge pupils • Heart rhythm problems • Heart attack • Stroke • Seizure • Coma • Increase body temp & heart rate • Loss of sense of smell • Poor nutrition / weight loss	• Euphoria • Increased energy • Alertness • Insomnia • Anxiety, panic attacks • Paranoia • Psychosis	**Effects on pregnant persons:** • Migraines and seizures • "Water" or amniotic sac breaks early • High blood pressure • Miscarriage • Early labor and delivery challenges **Effects on baby:** • Premature baby • Low birth weight • Child experiencing attention difficulties and difficulty with self regulation as they become older	**Potential long lasting effects on child:** • Trouble with school performance • Behavioral challenges, including ADHD and ODD • Memory challenges and executive function challenges (problem solving, organization, impulse control) • Challenges in language development • Twice as likely to develop their own substance use disorder

Substance	**Physical**	**Mental / cognitive**	**Special considerations- Pregnancy & baby**	**Long term complications**
Marijuana	• Increase heart rate • Cough • Respiratory difficulties • Lung illnesses (with THC vapes)	• Euphoria and enhanced sensory experience, followed by drowsiness/relaxation • Slowed reaction time • Increased anxiety • Difficulty with executive function skills **Severe complications:** • Apathy or amotivational syndrome	**Effects on baby:** • 2.3x greater risk of stillbirth • Lower birth weight • Preterm birth • Brain and behavioral problems • Can affect the baby's overall development	**Potential long lasting effects on child:** • Future developmental challenges and hyperactivity with children • Research suggests that a child is more likely to use marijuana themselves later in life if exposed to it during pregnancy • Breastfeeding while using marijuana may negatively impact brain development • More research is needed in this area for conclusive information
Heroin	• Dry mouth • Itching • Nausea, vomiting • Slowed breathing & heart rate • Muscle/joint pain **Severe complications:** • Liver, heart or kidney damage • Blood clots • Lung/heart infection • Stroke • Overdose • Infectious diseases	• Euphoria • In and out of consciousness • Mood swings	**Effects on pregnant persons:** • Increased risk of miscarriage • Maternal death • Placenta abruption **Effects on baby:** • Low birth weight • Preterm birth • Neonatal Abstinence Syndrome (NAS) • Neonatal Opioid Withdrawal Syndrome (NOWS) • Breathing difficulties • Hypoglycemia (low blood sugar)	**Potential long lasting effects on child:** • Opioid use in general is linked to problems with attention, memory and behaviors (including hyperactivity)

Substance	**Physical**	**Mental / cognitive**	**Special considerations- Pregnancy & baby**	**Long term complications**
MDMA [Ecstasy, Molly]	• Nausea • Increased heart rate • Increased blood pressure • Chills • Sweating • Fainting **Severe complications:** • Kidney failure • Death	• Euphoria • Lowered inhibitions (less self-conscious) • More aware of senses • Confusion • Depression, anxiety • Impulsive behaviors • Sleep issues • Hallucinations • Difficulty with executive function skills (problem solving, planning, impulse control, etc.)	**Effects on baby:** • Motor/movement delays for up to 2 years • Preterm birth • Low birth weight • Potential learning and memory challenges • Heart problems	* If combined with alcohol, MDMA effects can be more toxic and severe **Potential long lasting effects on child:** • Breastfeeding while using MDMA may negatively impact the child's development
Meth	• Increased breathing, heart rate, blood pressure and temperature • Dental problems • Intense itching (skin sores) • Irregular heartbeat	• Increased wakefulness • Anxiety, confusion • Mood problems • hallucinations/delusions • Difficulty with executive function skills (problem solving, planning, impulse control, etc.)	**Effects on pregnant persons:** • Separation of placenta from uterus **Effects on baby:** • Low birth weight • Heart and brain problems • Fatigue • Fetal hypoxia	**Potential long lasting effects on child:** • Increased risk for neurodevelopmental problems • Research suggests infants that were exposed to meth during pregnancy were more likely to experience decreased arousal, increase in stress and poor quality of movements. • Research showed children experienced significant attention impairments and were more likely to have cognitive and behavioral issues in school as they aged

Substance	**Physical**	**Mental / cognitive**	**Special considerations- Pregnancy & baby**	**Long term complications**
Tobacco	• Increased breathing, heart rate, blood pressure • Cough **Severe complications:** • Addiction • COPD • Pulmonary diseases • Cancer • Cardiovascular diseases • Dental problems	• Impaired attention • Increase feelings of stress	**Effects on the baby:** • Premature birth • Miscarriage • Low birth weight • 3x more likely to be affected by Sudden Infant Death Syndrome (SIDS) • 1.8-2.8x greater risk of stillbirth • Tissue damage to baby's brain and/or lungs • Studies suggest a link between smoking and cleft lip **Effects of secondary smoke on the newborn:** • 2.1x greater risk of stillbirth if passive exposure to tobacco • Increased risk for Sudden Infant Death Syndrome (SIDS) • Respiratory illnesses • Ear infections • Cavities • Increased medical visits and hospitalization	**Potential long lasting effects on child:** • Smoking more than one pack per day doubles the risk of a child becoming addicted to smoking themselves • Smoke exposure in pregnancy is linked to weaker lungs and visual difficulties in the child, increasing the risk for future health problems • May be associated with learning and behavior problems

Substance	**Physical**	**Mental / cognitive**	**Special considerations- Pregnancy & baby**	**Long term complications**
Opioids	• Nausea, vomiting • Constipation • Physical dependence • Respiratory distress • Constricted pupils • Needle marks (if injected) • Slowed/shallow breathing **Severe complications:** • Increase risk for overdose and death • Chronic constipation • Sleep-disordered breathing (SDB)	• Euphoria, feelings of relaxation and calmness • Drowsiness • Having difficulty staying awake • Mood swings • Impaired judgment	**Effects on the baby:** • Approximately 50% of babies develop NAS when exposed to opioids during pregnancy • Preterm birth • Still birth • Birth defects such as congenital heart defects, glaucoma, and hydrocephalus • Neonatal Abstinence Syndrome (NAS) • Neonatal Opioid Withdrawal Syndrome (NOWS) **Effects on pregnant persons:** • Maternal death • Increases risk of placenta abruption by 2.6 x • Preeclampsia (high blood pressure that can lead to serious or fatal complications) • Cesarean delivery	**Potential long lasting effects on child:** • Research looked at preschoolers exposed to opioids during pregnancy and those children were more likely to exhibit conduct disorder and emotional disturbance • Research looked at school aged children and those children were more likely to have ADHD

References: (American Addictions Centers, 2022a; American Addictions Centers, 2022b; American Addictions Centers, 2022c; American Addictions Centers, 2022d; American Pregnancy Association, n.d; CDC, 2020; John Hopkins Medicine, n.d; Kaliszewski, 2021; Lac & Luk, 2018; MGH Center for Women's Mental Health, 2019; MGH Center for Women's Mental Health, 2022; MotherToBaby, 2022; NIAAA, 2020; NIDA, 2017; NIDA, 2020; NIDA, 2016; NIDA, 2022a; NIDA, 2019; NIDA, 2022b; Samaritan Health Services, 2020; Singer et al., 2016)

Trauma

1 in 4 children and adolescents in the United states experience at least 1 traumatic event before the age of 16 (The National Child Traumatic Stress Network [NCTSN], 2008). Trauma is an emotional response to an intense event that causes harm or threatens an individual. Potential traumatic events include: emotional, physical or sexual abuse. It can also be family violence, neglect, parental separation or death, bullying, effects of poverty, natural disasters and any additional event that can impair a child's safety and security. Trauma can result in emotional, cognitive and/or physical symptoms and often show up as a result of the environment.

When we experience any form of trauma, our bodies and brain can change.

- Research suggests that children who experienced or witnessed violence, trauma and/or neglect, experience cognitive challenges in different regions of their brain compared to children who have not experienced those events. (Mccrory et al., 2011; McLaughlin et al., 2014).
- Researchers also propose that memory can become affected by trauma. It has been noted that adults who have a history of trauma and/or abuse have a smaller hippocampus region - which is associated with memory (McLaughlin et al., 2014).
- Literature has also pointed out that children who have experienced emotional neglect may have less efficient brain activity during a certain task, as it is harder to regulate themselves (Mueller et al., 2010; McLaughlin at el., 2014).
- Evidence suggests that children who experience abuse have over-responsive amygdalas when presented with an emotional stimuli (Mccrory et al., 2011; McLaughlin et al., 2014). This can affect the child's ability to regulate their own emotions in stressful situations.
- Numerous studies have found that substance use disorder precedes as a result of trauma (NCTSN, 2008).
- Trauma can lead to reduced brain size, increased likelihood of mental illness and increased likeliness of experiencing social difficulties (DeGregorio, 2013).
- Experiencing childhood trauma makes an adolescent more likely to engage in risk - taking behaviors (Kerig, 2019).

Signs/Symptoms of Trauma

Trauma shows up in an individual's emotional responses or behavior. While trauma is unique to each person, there are some symptoms to look out for that may be a sign of trauma. Below contains a list of symptoms, but is not comprehensive, and should not be used to form a diagnosis.

Poor concentration	Sleep disturbances	Flashbacks to traumatic events
Unwillingness to discuss trauma	Irritability, anger, mood swings or other negative emotions	Feelings of depression and loneliness
Isolation / avoidance of others	Substance or alcohol use	Self destructive behavior

Table 1.5: *Trauma's impact on the Brain*

Domain	Characteristics	Presentation
Physical	• Rapid gain in height and weight • Hormonal changes • Continued brain development • Secondary sex characteristics	• Body changes may serve as traumatic reminders (development of secondary sex characteristics) • Somatic complaints • Feeling out of control (self harm, substance use, maladaptive eating, etc) • Negative body image
Cognitive	• Developing advanced reasoning and problem solving skills • Developing abstract thinking • Ability to think about thinking (meta cognition) • Developing coping skills • Can retain sufficient information	• Difficulty regulating attention • Memory difficulty • Hyperarousal • High stress affecting recall abilities • Uneven application of skills • Can result in varying degrees of cognitive impairment and emotional dysregulation that can lead to a difficulty with attention and focus, learning disabilities, low self-esteem, impaired social skills, and sleep disturbances (Nemeroff, 2016).
Psychosocial	• Aim to establish an identity • Consider intimate relationships • Self awareness to sexuality • Build and sustain relationships • Seek achievements • Background and experiences affect development	• Isolation and withdrawal • Distrust of others • Expects to be treated poorly • Difficulty taking other perspectives • Difficulty establishing healthy relationships • May see violence as “normal” • May experience maladaptive/unhealthy relationships
Identity Development	• Develop independent identity regarding gender, sexuality, ethnicity, family/origin, etc. • Explore and express gender identity • Plan for future • New relationships	• Spend a lot of time and energy getting through the day • Experiences negative self-talk, self perception and self esteem • Disconnection from friends and/or family

Adapted from: Marrow, M., Benamati, J., Decker, K., Griffin, D., and Lott, D. A. (2012). *Think trauma: A training for staff in juvenile justice residential settings*. Los Angeles, CA, and Durham, NC: National Center for Child Traumatic Stress.
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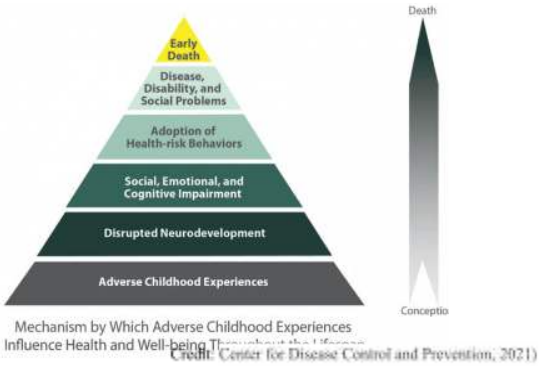
Adverse Childhood Experiences or ACEs



Mechanism by Which Adverse Childhood Experiences Influence Health and Well-being Th
Credit: Center for Disease Control and Prevention, 2021)

Adverse Childhood Experiences or ACEs indicate the level of trauma an individual has experienced before the age of 18. It is important to remember that trauma does not have to be only physical, and can show up in many forms. These experiences can include things like physical and emotional abuse, neglect, caregiver mental illness, and household violence. Researchers found that the more ACEs adults reported from their childhoods, the worse their physical, mental and behavioral health outcomes (Hunt et al., 2017; Thompson et al., 2019). For instance, if an individual is in a constant state of fear or stress, the brain may 'adapt' to survive within the environment, leading to impairments in areas of the brain's prefrontal cortex, limbic system and hippocampus (National Center for Mental Health, 2019). This can show up later in life as having difficulties regulating emotions, making decisions and handling stress. There is also sufficient evidence that suggests a relationship between the number of ACEs and the likelihood of developing a substance use disorder.

- Specifically in Hancock County, 14% of adults reported they had experienced 4 or more ACEs throughout their lifespan (Be Healthy Now, 2021). The most common ACEs experienced in Hancock County were divorce/separation of parents, verbal abuse, physical abuse, sexual abuse, and living with someone who has an addiction or mental illness.

Refer to the table below for more specific information about how the amount of ACEs plays a role in adult behavior within Hancock County.

Behaviors of Hancock County Adults

Adult Behaviors	Experienced ≥ 4 ACEs	Experienced 0 ACEs
Current drinker	67%	9%
Been depressed (in the past 12 months)	65%	44%
Binge Drinker males= 5+ drinks females= 4+ drinks	53%	22%
Classified as overweight or obese by BMI	46%	29%
Used recreational drugs (in the past 6 months)	29%	3%
Current smoker	25%	7%
Contemplated suicide (in the past 12 months)	18%	0%

Source: Hancock County Health assessment, 2021

Up to 1.9 million cases of heart disease and 21 million cases of depression could have been potentially avoided by preventing ACEs (CDC, 2021).

Implications for practitioners:

[Preventing Adverse Childhood Experiences | VetoViolence (cdc.gov)]

- Free ACEs training (60 - 90 minutes)
- Continuing education credits offered
- 4 modules offered for different professions: mental health provider, pediatric medical provider, educator, and religious communities module

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Chapter IV: Protective and promotive factors

How to combat the risk of mental illness and substance use:

Protective & Risk factors

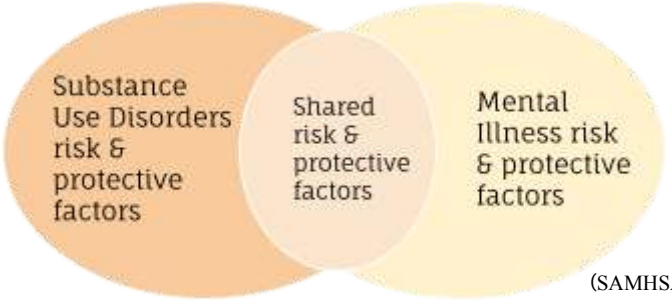
Protective factors: Characteristics associated with lowering the likelihood of negative outcomes or that reduce the impact of risk factor(s). Protective factors counteract effects of stressors and can prevent the severity or ultimately the onset of a mental health or substance use disorder.

- Resilience - Managing stress and functioning well when stressors, challenges or adversity presents itself.
- Social connections - Having healthy, sustained relationships with individuals, groups or organizations.
- Knowledge of child and adolescent development - Understanding the unique aspects of development (brain development, traumas effect on brain, ect.).
- Concrete support in times of need - Having accessibility to assistance and services that are needed, understanding when to ask for help.
- Cognitive and social-emotional competence - Ability to manage and understand emotions, make proper decisions.

Risk factors: Characteristics at the biological, psychological, family, community, or cultural level that precede and are associated with a higher likelihood of negative outcomes. Risk factors, or factors which increase the likelihood of developing mental illness or substance use disorder include:

- Genetic predispositions
- Epigenetic influences
- Brain region involvement
- Environmental influences
- Stress
- Socioeconomic difficulties
- Adverse Childhood Experiences (ACEs) / Trauma
- Mental health difficulties
- Age of first substance use

Some protective and risk factors are set, meaning that they do not change over time.
Whereas, other protective and risk factors are inconsistent, suggesting that they can change over time. Specifically in instances where there is opportunity for change, the identification and recognition of current factors (both promotive and risk) put in place can promote an individual's recovery and resilience.



(SAMHSA, 2019)

Protective factors

Table 3.0: *Protective factors- Implications for healthcare practitioners*

Protective Factor	Questions to ask / consider	Potential Intervention(s)
Resilience	● How do you handle stress? What helps you cope? ● What worries you on a day to day basis? ● How does your partner/friends/family support you? ● What is most helpful to you when feeling overwhelmed?	- Self care strategies - Practice mindfulness techniques - Create plan in advance to help deal with stressful situations - Encourage individual to explore personal experiences that may have an impact on the present -Protective factors rating scale - Create and discuss ecomap
Social connections	● Do you have friends/family/support who help you? ● Are you a member of any group/organization? ● What helps you to feel connected ● What kind of social support is most beneficial to you? ● Do you find it easy or challenging to meet people? Why?	- Create ecomap to visualize individuals sources of support - Create genogram to depict family relationships - Role play to practice different social skills - Social skills training -Protective factors rating scale - Hobby development EX: Attending free workout class, crafts, cooking, gardening, ect.
Knowledge of child and adolescent development	● How have you learned about parenting skills? ● How do you continue to learn about child development? ● Are there things that concern you regarding your child's behavior or development? ● What has helped you learn about yourself as a parent?	- Create genogram to depict family relationships and identify trends/patterns in family dynamics - Education over brain development and importance of positive experiences in shaping the brain -Protective factors rating scale
Concrete support in times of need	● What do you need to _____? (maintain housing, pay bills, maintain employment, etc.) ● Are there any community services you have used in the past? ● Are there barriers in place that have made it harder for you to receive access to those services? If so, how do these issues impact parenting?	- Create list of possible local and national supports that can assist in times of need - Create genogram to identify positive relationships - Create ecomap to visualize individuals sources of support -Protective factors rating scale - Encourage the individual to discuss their families socioeconomic status and potential gaps in knowledge (budgeting, spotting a scam, emotional intelligence, social skills, etc.)
Cognitive and social-emotional competence	● How is the emotional relationship between the child and guardian? ● How do you express love and affection? ● How do you help your child express their emotions? ● In what situations is it difficult to deal with your child's emotions?	- Utilize effective environmental arrangements to encourage social interactions - Prompting, reinforcement and praise - Promote identification of feelings and labeling of emotions - Model appropriate conversation skills - Create and have a plan already in place to assist in dealing with difficult emotions (anger, sadness, fear, guilt, etc) - Protective factors rating scale (see next page)

Resource adapted from: Center for the Study of Social Policy. (n.d) *Protective factors: action sheets.*
https://cssp.org/wp-content/uploads/2018/08/ProtectiveFactorsActionSheets.pdf

Protective factors rating scale

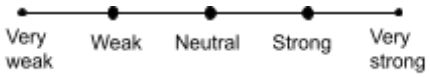
Factors that protect against mental illness and substance use

1. Youth resilience
2. Social connections
3. Knowledge of adolescent development
4. Concrete support in times of need
5. Cognitive and social-emotional competence

Instructions: Review each of the following protective factors and mark the scales to indicate how well you feel you are performing in each area.This handout is intended for individuals to use as a tool to rate the degree of how well they feel, or how strong each protective factor is in their life. This handout can be used to strengthen and track an individual's protective factors.

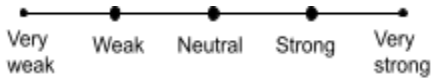
Youth resilience

- Manage stressors of daily lives
- Manage emotions (sadness, anxiety, anger, etc.)
- Having a positive attitude about life
- Believing one's life is important and meaningful
- Working with purpose to achieve goals
- Having faith; optimism; hopeful
- Seek help when needed



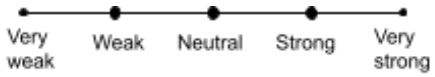
Social connections

- Building trustworthy relationship with at least 1 caring adult
- Engaged in social institutions (ex: school, sports, religious events, etc.)
- Building trustworthy relationships with peers
- Sense of “connectedness” making you feel loved and secure



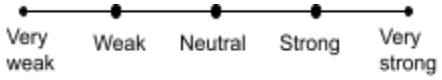
Knowledge of adolescent development

- Encouraging adults and youths to increase knowledge and understanding of adolescent development
- Seeking, acquiring, and using accurate information regarding adolescent brain development, one's culture, personal developmental history, physical and emotional changes occurring at puberty
- Developing abstract thinking, a belief system and sense of morality



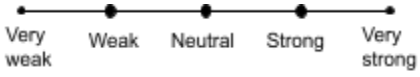
Concrete Support in Times of Need

- Identify, find and receive basic necessities that everyone deserves, as well as specialized services (medical, mental health, educational, etc.)
- Being resourceful
- Seeking help when needed
- Understanding ones right in accessing eligible services



Cognitive and Social-Emotional Competence

- Develop executive functioning skills (problem solving, judgment, planning, impulse control, etc.)
- Engaging in self regulating behaviors
- Developing characteristic strengths
- Experiencing positive emotions
- Developing self awareness, self-esteem, self-compassion and self-efficacy



Risk Factors

Risk factors for mental illness and substance use share many of the same risk factors. The table below breaks down risk factors for mental illness and substance use at both an individual/family level and a community level.

Table 3.1: *Risk factors for mental illness and substance use disorders*

Individual / family level	**Community level**
● Families experiencing caregiving challenges related to children with special needs (for example, disabilities, mental health issues, chronic physical illnesses) ● Children and youth who don't feel close to their caregivers, or feel as if they cannot talk to them about their feelings ● Youth who start dating early or engaging in sexual activity early ● Poor grades in school, lack of commitment to school ● Children/youth with a lack of friends or are friends with children who engage in aggressive or delinquent behavior ● Families in which caregivers have a decreased understanding of children's needs and development ● Families that have caregivers who were abused or neglected when they were children ● Families with young caregivers or single parents ● Family management problems (lack of clear parental expectations, lack of supervision, excessively harsh or inconsistent punishment) ● Families with low socioeconomic status (SES) ● Families who experience high conflict and have negative communication styles ● Family history of mental illness or substance use ● Rebelliousness	● Communities with high rates of violence, crime, poverty and limited educational and economic opportunities ● Communities with high unemployment rates ● Communities with easy access to drugs and alcohol ● Communities where neighbors don't know or look out for each other and there is low community involvement among residents ● Communities with only a limited amount of community activities for young people ● Communities with unstable housing ● Communities where food insecurity is prominent

Resource: adapted from Center for Disease Control and Prevention. (2021, January 5). Risk and protective factors. https://www.cdc.gov/violenceprevention/aces/riskprotectivefactors.html

Family and Social Services Administration. (n.d) *Risk and protective factors for substance use.* *https://www.in.gov/fssa/dmha/substance-misuse-prevention-and-mental-health-promotion/risk-and-protective-factors-for-substance-use/*

Sloboda, Z., Glantz, M. D., & Tarter, R. E. (2012). Revisiting the concepts of risk and protective factors for understanding the etiology and development of substance use and substance use disorders: implications for prevention. *Substance use & misuse*, *47*(8-9), 944–962. https://doi.org/10.3109/10826084.2012.663280

Risk factors Continued

In addition, mental illness can contribute to substance use, and substance use can contribute to mental illness (Sloboda et al., 2012). The table below shows the relationship between varying mental health conditions and the likelihood of substance use. The numbers which are highlighted indicate an elevated risk of substance use.

Mental health disorder	Increased risk of alcohol dependency	Increased risk of nicotine dependency	Increased risk of illicit drug dependency
Dysthymia	1.3	4.1	2.7
Major Depressive Disorder (MDD)	1.4	1.6	1.6
Bipolar Disorder	3.1	3.6	5.1
Any mood disorder	1.8	1.8	2.1
Panic Disorder	1.2	3.2	1.1
Social phobia	1.4	3.3	2.8
Generalized Anxiety Disorder (GAD)	1.0	1.6	1.2
Post-Traumatic Stress Disorder (PTSD)	1.6	3.2	3.9
Any anxiety disorder	1.5	3.2	3.5
Intermittent Explosive Disorder (IED)	1.5	6.0	6.3
Attention Deficit Hyperactivity Disorder (ADHD)	1.8	1.8	5.2
Antisocial Personality Disorder (APD)	2.0	2.4	3.8
Oppositional Defiant Disorder (ODD)	2.2	3.9	3.9
Any disruptive behavior disorder	3.5	1.7	4.6

Resource: Swendsen, J., Conway, K. P., Degenhardt, L., Glantz, M., Jin, R., Merikangas, K. R., Sampson, N., & Kessler, R. C. (2010). Mental disorders as risk factors for substance use, abuse and dependence: results from the 10-year follow-up of the National Comorbidity Survey. *Addiction (Abingdon, England)*, *105*(6), 1117–1128. https://doi.org/10.1111/j.1360-0443.2010.02902.x

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Center of Diseases Control and Prevention (CDC). (2011). *Youth Risk Behavior Survey.* *https://www.cdc.gov/healthyyouth/data/yrbs/pdf/YRBS_Data-Summary-Trends_Report2023_508.pdf*

Center for the Study of Social Policy. (n.d) *Protective factors: action sheets.* https://cssp.org/wp-content/uploads/2018/08/ProtectiveFactorsActionSheets.pdf

Family and Social Services Administration. (n.d) *Risk and protective factors for substance use.* *https://www.in.gov/fssa/dmha/substance-misuse-prevention-and-mental-health-promotion/risk-and-protective-factors-for-substance-use/*

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Sloboda, Z., Glantz, M. D., & Tarter, R. E. (2012). Revisiting the concepts of risk and protective factors for understanding the etiology and development of substance use and substance use disorders: implications for prevention. *Substance use & misuse*, *47*(8-9), 944–962. https://doi.org/10.3109/10826084.2012.663280

Substance Abuse and Mental Health Services Administration (SAMHSA). (2019). *Risk and Protective Factors*. https://www.samhsa.gov/sites/default/files/20190718-samhsa-risk-protective-factors.pdf

Swendsen, J., Conway, K. P., Degenhardt, L., Glantz, M., Jin, R., Merikangas, K. R., Sampson, N., & Kessler, R. C. (2010). Mental disorders as risk factors for substance use, abuse and dependence: results from the 10-year follow-up of the National Comorbidity Survey. *Addiction (Abingdon, England)*, *105*(6), 1117–1128. https://doi.org/10.1111/j.1360-0443.2010.02902.

Chapter V: Tools - how to promote healthy brain development

Genograms

What is a genogram?

A genogram is a visual representation that displays detailed data at an individual and a family level. A genogram uses special symbols to depict information pertaining to relationships, major events, illnesses/diseases, behaviors and family dynamics over generations. A genogram provides more in-depth information on an individual's life and can be a valuable tool for behavioral health.
Genograms can be used for a variety of reasons, including:

- Providing a visual for individuals to see generational relationships and encourages the individual to “draw it out” opposed to directly speaking about difficult topics
- Understand family dynamics that influence an individual's actions and behaviors
- Highlighting individual patterns of behaviors
- Highlighting family patterns of behavior
- Identify which relationships or events support, trigger or hinder recovery
- Depict recognition of supportive relationships within family dynamic
- To discuss the risk and protective factors that are supporting or hindering individual/family recovery
- Identify and track medical conditions
- Open up conversation of family history and future generations’ health

General guidelines to follow when creating a genogram:

While these guidelines can be helpful in structuring the genogram, the most important people to understand the genogram are the ones making it and interpreting it.

- Mark the individuals symbol with a star to keep track of the person of interest
- Male parent gets placed on left, female parent on the right
- Children are placed below family line and are organized from oldest to youngest, from left to right
- Spouse is always closer to their first partner, then second partner, and so on (if more than one)

Information that can be added to genogram:

- Mental / physical illness
- Substance use
- Other medical conditions
- Traumatic events
- Personality tendencies and family roles
- Information on level of functionality
- Relationship dynamics/patterns
- Forms of abuse
- Culture
- Demographic information
- Any legal actions (CPS involvement, trouble with the law, incarceration, etc.)

Steps to create a genogram:

1. Determine the main purpose of this intervention
    - Will it be multi purposeful or utilized for a specific purpose?
        - Hereditary patterns (mental illness, violence, substance use, neglect, etc.)
        - Identifying supportive or hindering family relationships
        - Education over risks of mental illness and/or substance use based on family patterns
2. Determine the number of generations you will analyze
    - *Tip:* Encourage creating at least 3 or more generations, as it allows for more adequate and detailed information on family dynamics
3. Gather information
    - Begin with an individual you are comfortable with
    - Interview questions based on what information you would like to gather
        - Information of family members to consider (names, ages, important dates, social status, number of children, sex of children, health concerns, important experiences, personality, profession, emotional relationships, trauma, family incidents, etc.)
    - Listen to stories about the family
    - Seek documents, family books, or internet to gather information about the family
    - Write down information that is already known
4. Review the genogram template or online tools
    - Utilize genogram template or online genogram tool to create genogram
    - Create personal symbols or utilize the given key to represent major family events, relationship patterns, health or other vital information
5. Begin to make family tree
    - Add names, ages and relevant dates as you think of them
    - Add health conditions and individual information
    - Add relationship events and any other personal information they would like to add

      Refer to genogram example below for step by step visual
6. Analyze the genogram
7. Identify patterns in the family
8. Update genogram
    - *Tip:* As shifts or changes occur in family dynamics, make sure to update genogram as needed

Online genogram tools

https://online.visual-paradigm.com/diagrams/templates/

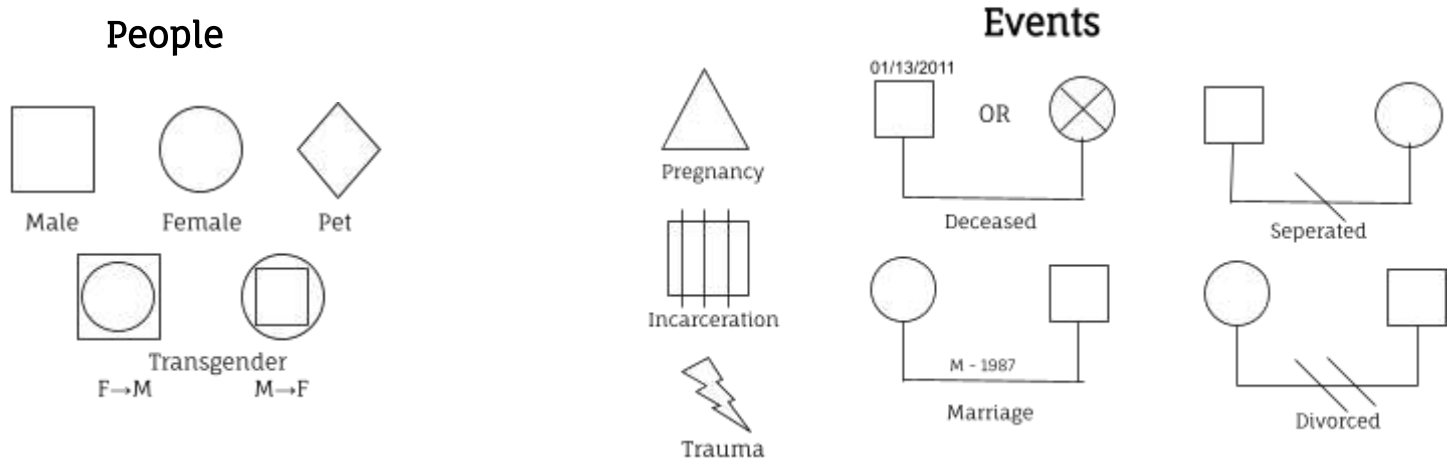
- Click templates at top of the page, and click genogram
- This will then take you to a page of free templates for a genogram
- Find best fit template and make adjustments as needed

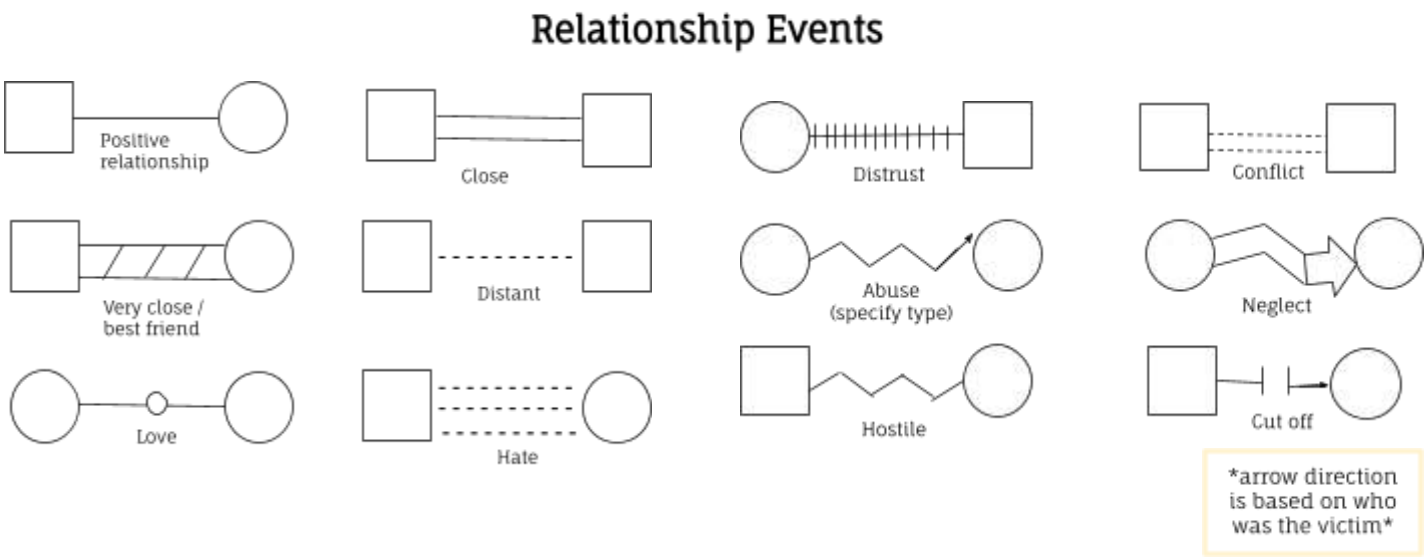
https://www.progenygenetics.com/online-pedigree/

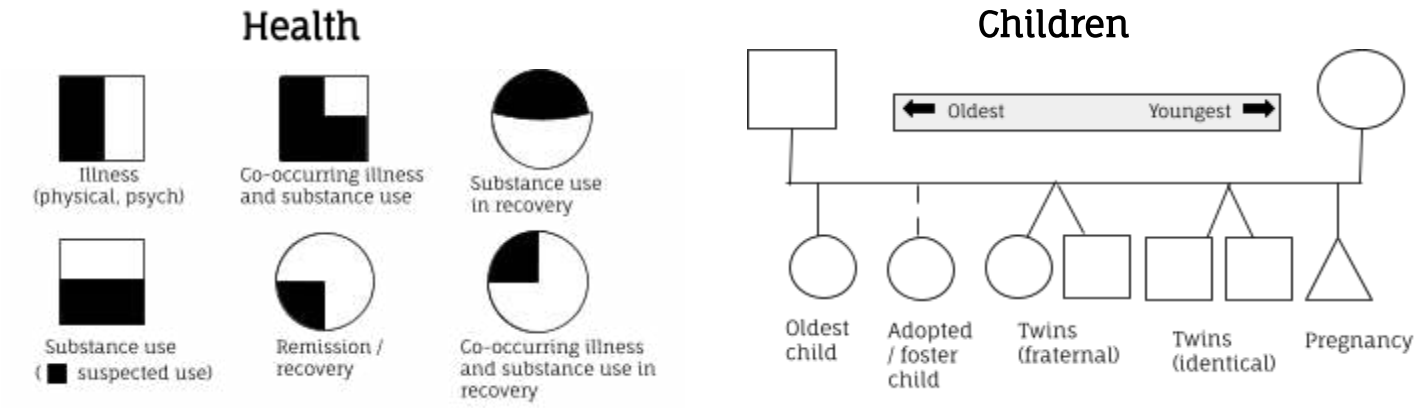
- Click begin pedigree
- This allows you to build own pedigree after inputting family relationships

Genogram key

Below contains an example of key genogram symbols. These symbols can be used to find out more information surrounding individual events, relationship patterns, and family dynamics and health. Symbols can be adapted or altered based on the individual client's needs.







Below contains a paper version of a genogram template. The genogram template serves a purpose to organize the flow of a genogram, as well as making the genogram easier to follow and interpret.

Genogram template

Great grandparents

Grandparents

Parents

Current generation
(*you go here)

Children

Grandchildren

Below contains a list of reflection questions following the completion of a genogram. It is important to recognize and reflect on the information obtained from the individual's genogram. These reflection questions serve a purpose in continuing the discussion of generational patterns that can support or hinder one's recovery process.

Reflection questions - after genogram

1. What stands out to you?

2. Specific patterns/trends that you notice after creating this genogram?

3. What emotions are you currently feeling?

4. How has your family dealt with emotions or difficulties they have faced?

5. How do you deal with others' emotions or difficulties?

6. Do events/relationships/traumas/etc. from the past show up in your present? If so, How?

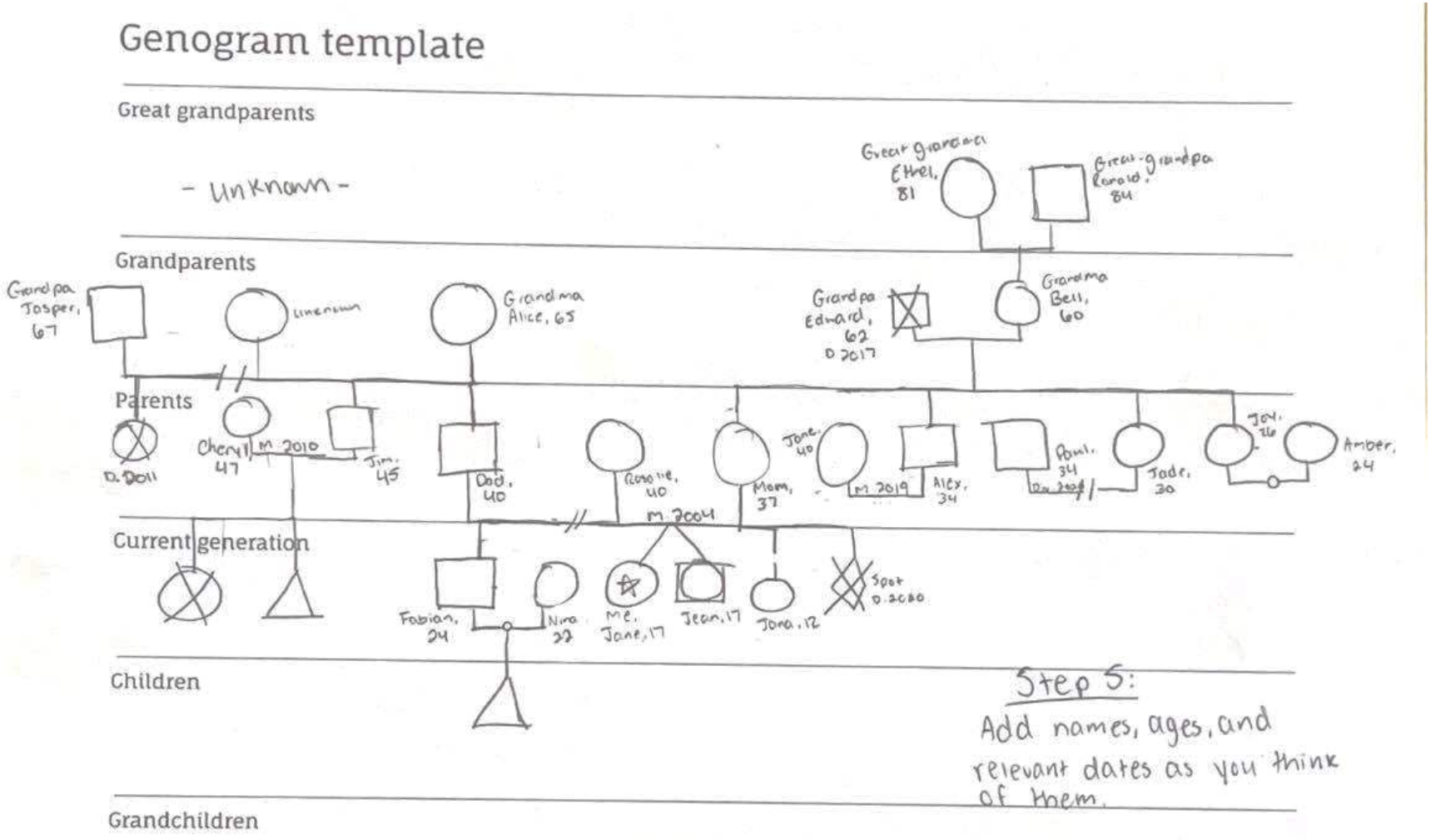
7. What are some generational patterns (positive or negative) that have been passed down?

8. What positive patterns would you like to continue?

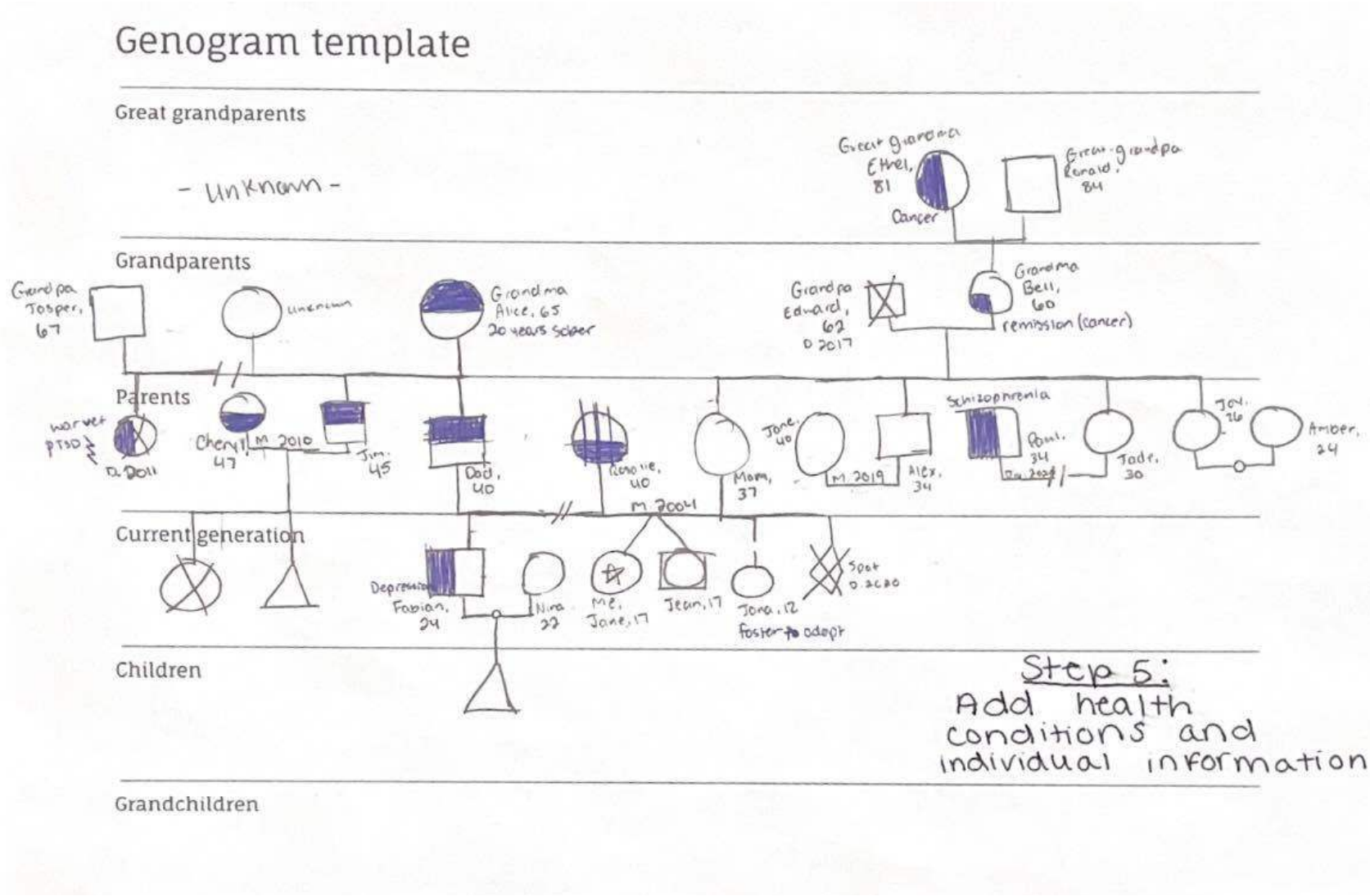
9. What negative patterns would like to end with your generation? (what you wish was different)

10. How have you responded to individual relationships and events that happened with that relationship?

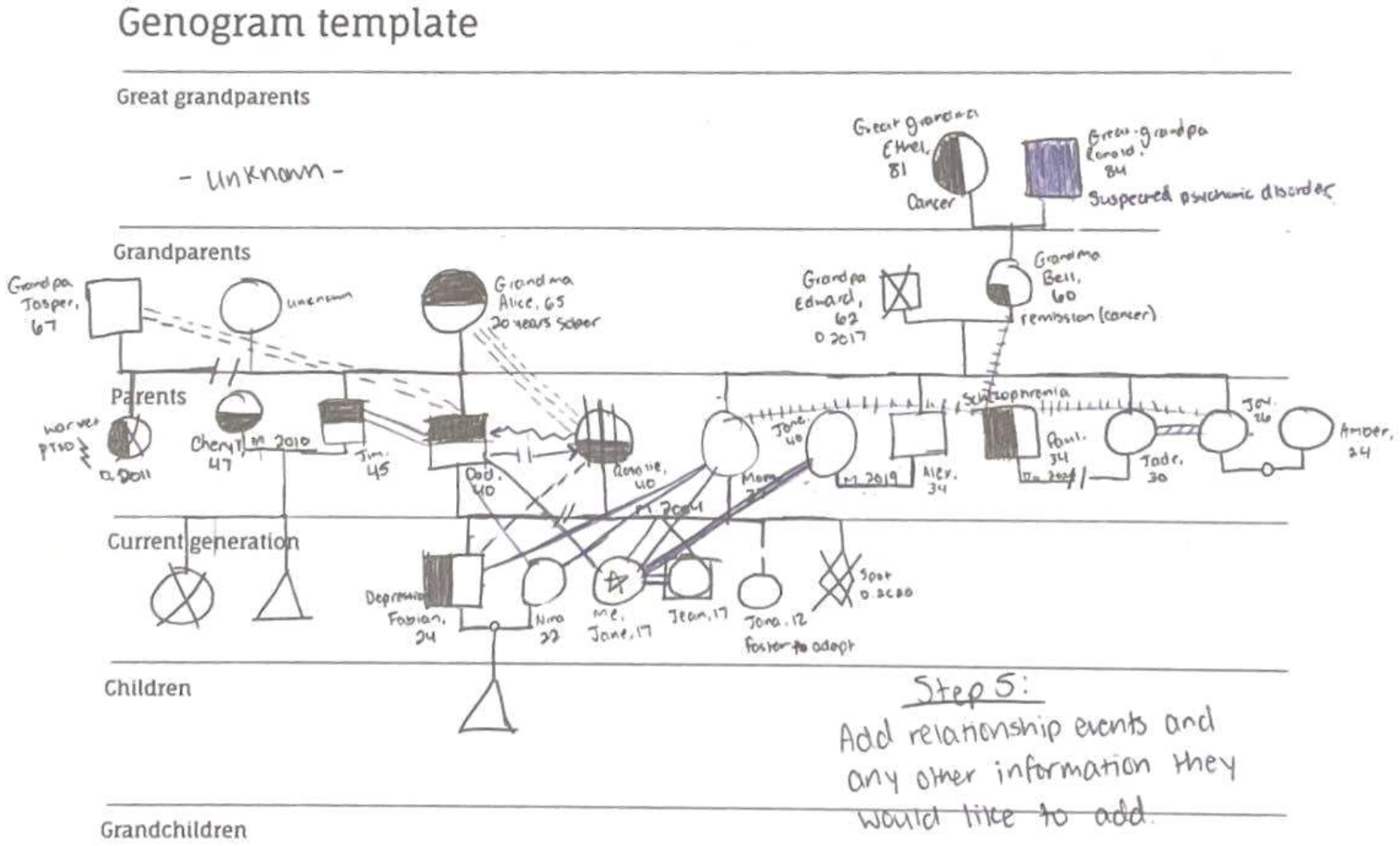
Genogram example



This example follows step 5: Add names, ages and relevant dates as you think of them



This example follows step 5: Add health conditions and individual information



This example follows step 5: Add relationship events and other information they would like to add

Interpretation of genogram on next page

While the genogram is known to have specific guidelines for creation, it is more important to focus on the information obtained from the individual. In this genogram example, there are slight errors that do not follow the "general rules" of genograms. The errors include not putting the males on the left side of females when they are married, and overdrawing the line for Jane's siblings, specifically Jana and her pet Spot. The main purpose of the genogram is to help the individual/practitioner/educator better understand the generational patterns that can be seen within family dynamics. Genograms can be used to promote the conservation of risks associated with generational and environmental mental illness and/or substance use.

Genogram example interpretation:

Jane is a seventeen year old female. She is a twin to Jean, who is trangender. They have a close relationship with one another. She also has an adopted sister, Jana, who is 12 years old. Jane has a positive relationship with both her mother and father. Jane had a pet named Spot who passed away in 2020.

Jane's fathers side:

Jane's father is 40 years old and is in recovery for a substance use disorder. He had previously been married to a woman, Rosalie, who also had a substance use disorder. Rosalie is incarcerated, and Jane's father cut her off and he had experienced some sort of abuse from her. He got divorced before remarrying to Jane's mother in 2004. Rosalie and grandma Alice have a hateful relationship with one another.

Jane's father and Rosalie had a child together, named Fabian. This means that Jane has a half brother who is 24 years old. Fabian does not have a close relationship with his mother, Rosalie. He has also been diagnosed with depression. Fabian is in a loving relationship with Nina, who is 22 years old and pregnant.

Jane's grandpa, Jasper, was married to an unknown female at one point in his life, and they had a child together. That child has since passed away. She was a war vet and had PTSD. Jasper and the unknown person divorced at some point, and he remarried to Alice. Alice is Jane's grandma. Alice has been in recovery from substance use for 20 years. Alice and Jasper had 2 sons together, Jane's father and Jim. Jane's father and her grandpa Jasper have a conflicting relationship.

Jim, Jane's uncle, got married to Cheryl in 2010. Jim is in recovery for substance use, and Cheryl is currently still using substances. They had a female child together that passed away at an unknown time. Cheryl is currently pregnant.

Jane's mother's side:

Jane's mother is 37 years old and has been married to her dad since 2004. Jane's mother has three siblings, Alex, Jade and Joy.

Her brother, Alex is 34 years old and got married in 2019 to a female named Jane. Jane has a close relationship with her Aunt Jane (Alex's wife).

Jane's mothers sister, Jade, was married but got divorced in 2020. She was married to a male named Paul, who was diagnosed with schizophrenia. Paul has several distrusting relationships with others. Paul has a distrusting relationship with Jane's mother, Jane's grandma (Bell) and Joy.

Jane's mothers youngest sister, Joy, is in a loving relationship with Amber. Joy also has a very close relationship with her sister, Jade.

Jane's grandpa passed away in 2017 at age 62. Her grandma, Bell, is 60 years old and is in remission from cancer. Jane's great grandparents, Ethel and Ronald, are in their 80's. Ethel has a diagnosis of cancer and Ronald has a suspected but not confirmed psychotic disorder.

What happens next?

Use the guided questions to have a conversation regarding the genogram based on the information that sticks out. Important topics from this example may include the history of substance use on the fathers side, physical and mental health challenges on the mothers side, positive relationships within the immediate family, and major family changes (death, pregnancy, etc.)

Ecomaps

An ecomap is a visual representation that depicts individual or family support(s) in their environment (Social Work Portal, n.d). This information is crucial as it shows relationships already in place, which helps to identify and strengthen the protective factor of social connections. Through an ecomap, clients are encouraged to identify and assess sources of support and the level of connection to each source. Through this, ecomaps uncover hidden supports put in place. An ecomap uses bubbles and arrows to depict interactions and relationships in their environment.

Ecomaps can be used for a variety of reasons, including:

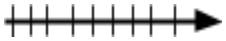
- Gather insights over individual or family social contexts
- Show sources of support or conflict in relationships
- Helps pinpoint areas in which more support is needed
- Helps to better understand family dynamics
- Identify an individual's connections within the community
- Allows client to view their environment in a different way
- Identify significant life stressors

Steps to create ecomap:

- Draw a circle in the center of the page
    - Add individual or family name in the center of the circle
- Create nearby circles that include the represent each relationship or social connection in your life
    - Add names of supports/services within your life
    - Examples of systems: health system, friends, family members, social services, community engagement, schooling, work, etc.
- Identify the relationships influence on the individual/family
    - Is the relationship helpful or conflictual?
- Create lines/arrows
    - Thicker lines = closer, more supportive relationship
    - Thinner lines = less supportive relationship, not as strong
    - Dash lines = weak/tenuous relationship

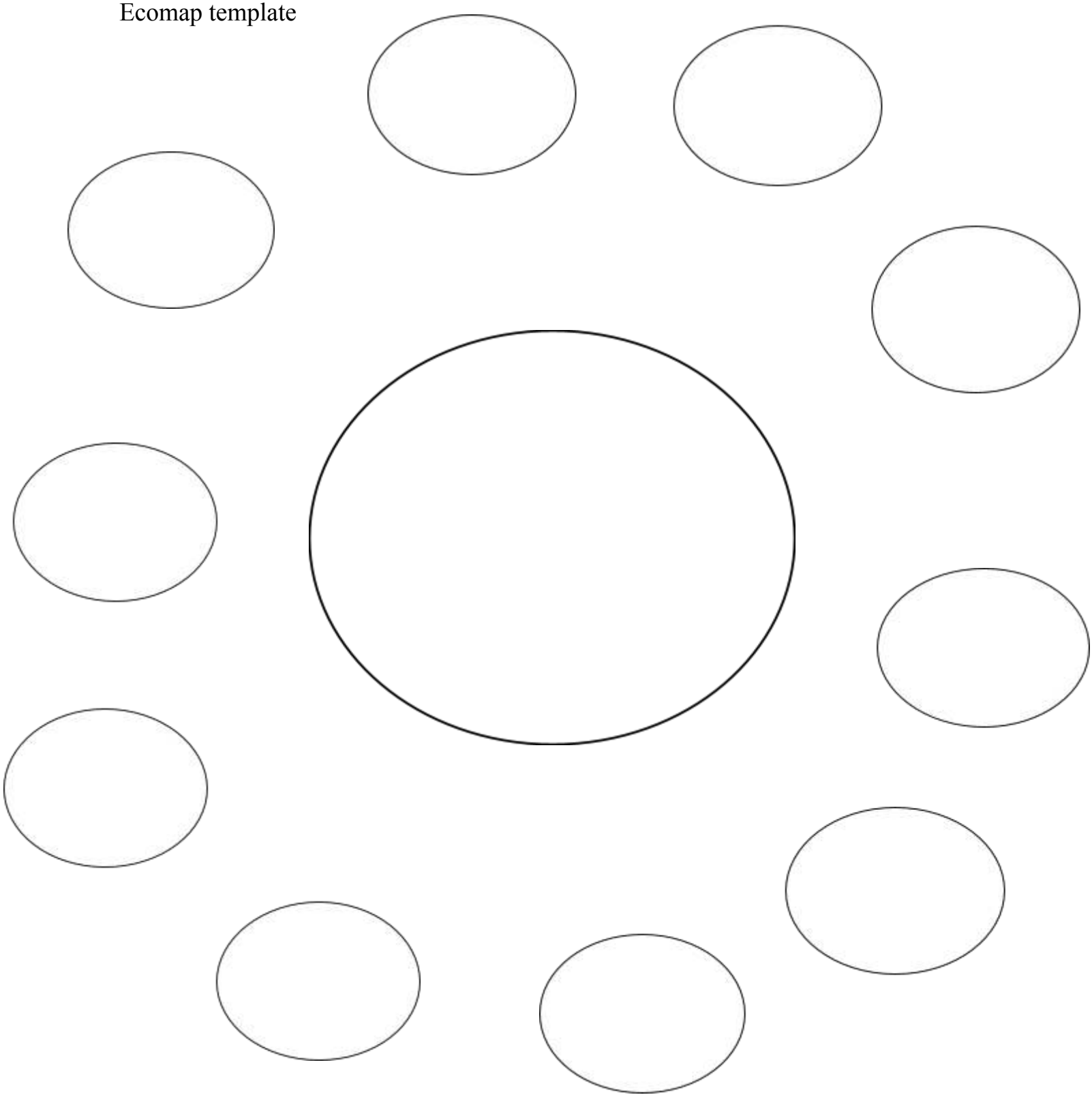
General guidelines to follow when creating an ecomap:

- Arrows will be added in the direction of who is receiving support
    - Arrows pointing to the client depict influence on the client
    - Arrows pointing to the systems depict that the client has influence on the system
    - Arrows pointing in both directions depict a reciprocal relationship
- Relationships with conflict are typically depicted with cross hatching

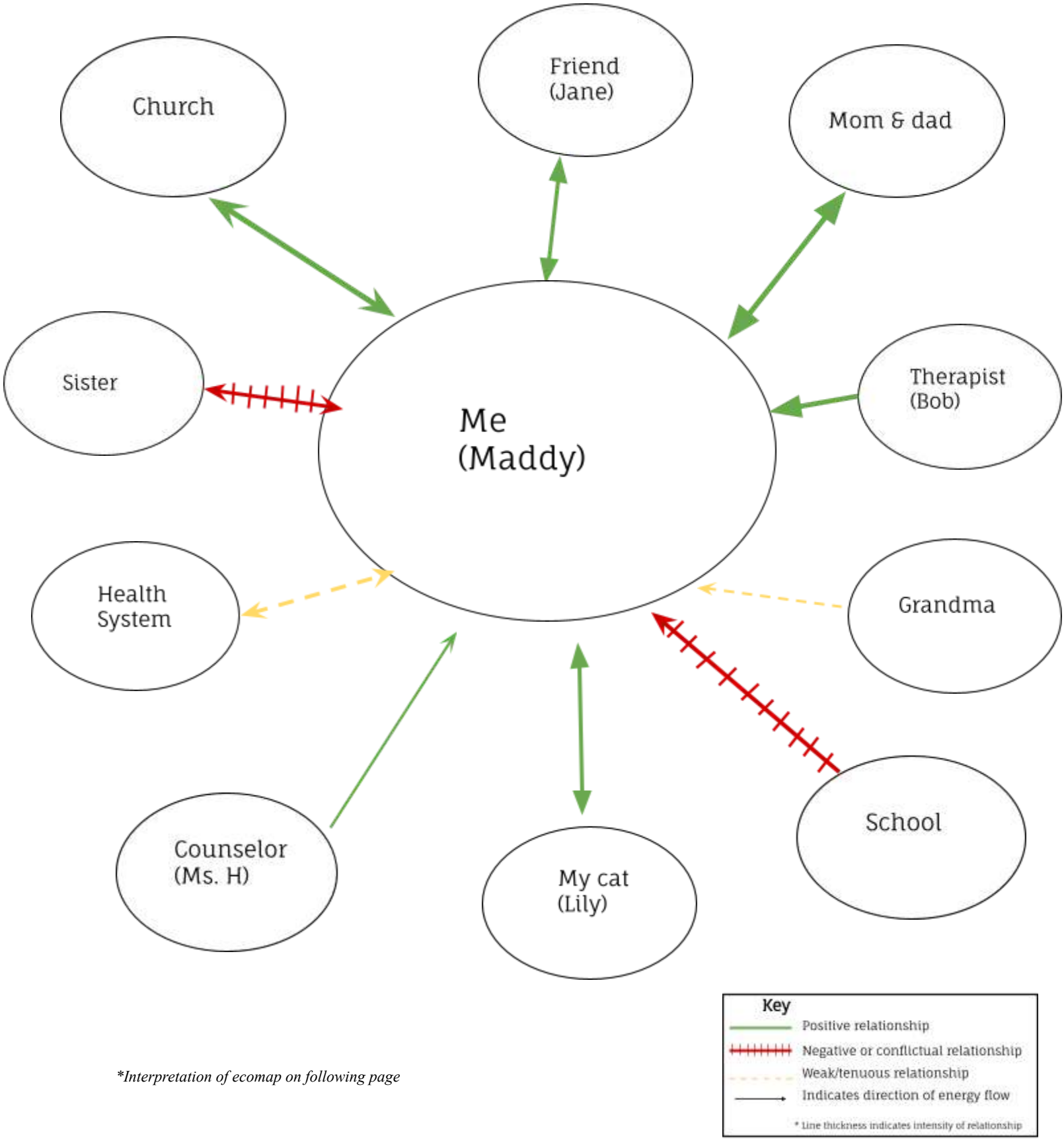
    EX: 

Online Ecomap tools

Ecomap template

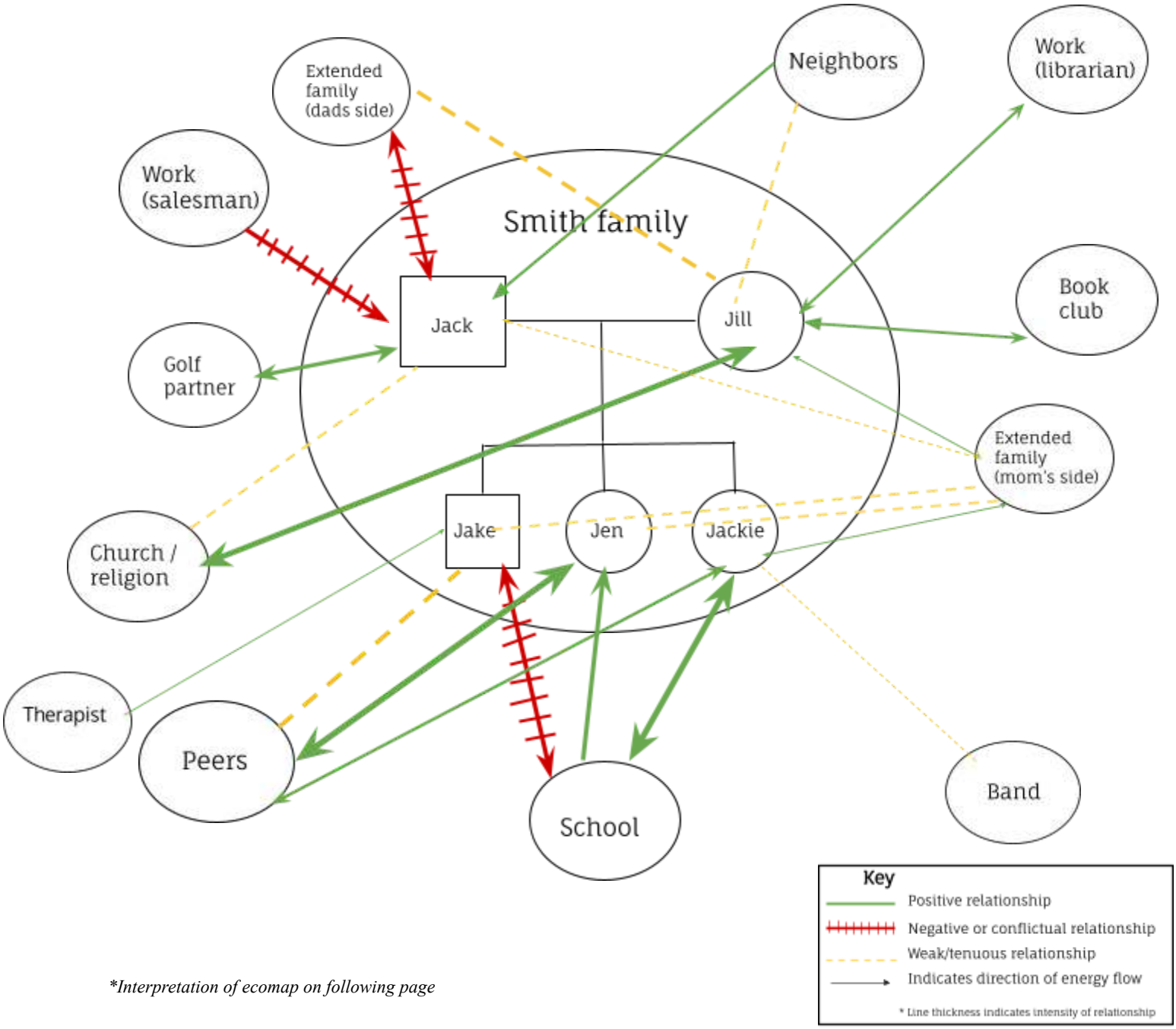


Ecomap example #1 (individual)



**Interpretation of ecomap on following page*

Ecomap example #2 (family)



**Interpretation of ecomap on following page*

Ecomap example #1

Interpretation: Overall, Maddy has various positive supports put into place. She reported positive relationships with her therapist (Bob), parents, friend (Jane), church, counselor and cat. She shares her strongest, mutually beneficial relationship with her parents, friend (Jane), church and her pet cat. This means that she is there for them, and they are also there for her. She is also receiving support from her counselor and therapist. These arrows are only towards her as she does not provide them with support, rather they help her. Within her direct family, she and her sister have a conflictual relationship. Additionally, Maddy is experiencing some sort of conflict within the school system.

What happens next?

Use the guided questions to have a conversation regarding her ecomap based on the information that sticks out. Important topics from this example may include the support from her friend and the challenges that she faces with her sister and within the school.

Ecomap example #2

Interpretation: Jack has several relationships, with different qualities. He has some sort of conflictual relationship with his extended family, as well as with his job. He identified one mutually strong and positive relationship with his golf partner. He also has a positive relationship with his neighbor, in which they provide him with some support. He has weak relationships with his spouse's extended family and church services.

Jill has several positive, mutually beneficial relationships. She reported mutually positive relationships with her job as a librarian, book club and church. She also has a positive relationship with her extended family, in which they provide her with support. She has a weak relationship with her neighbors and her spouse's extended family. She does not have any negative/conflictual relationships at this time.

Jake is currently experiencing conflicts within the school system. He is also experiencing a weak relationship with his peers in school. On his mothers side, he has a weak relationship with her extended family. He currently does not have any mutually beneficial relationships, but he does have a positive, supportive relationship from his therapist.

Jen has a positive relationship with her school, and receives mutual positive support from her peers while at school. Her mothers extended family has a weak relationship with her. There are no other relationships that Jen has outside of her family dynamic.

Jackie’s relationships include a mutually positive and supportive relationship with her school and her peers. However, she has a weak relationship with the band that she plays in at school. She also has a mutually positive relationship with her mothers extended family, making her the only one out of the three children.

What happens next?

Use the guided questions to have a conversation regarding her ecomap based on the information that sticks out. Important topics from this example may include the amount of negative/weak relationships that Jack has, how Jake appears to have challenges with school and may be relying on professional agencies for his main source of support, or the lack of support available outside of school and peers for the children.

Below contains a list of reflection questions following the completion of an individual/family ecomap. It is important to recognize and reflect on the information obtained from the ecomap. These reflection questions serve a purpose in analyzing the level and types of support already in place. These questions can be used to guide the discussion of the ecomap with clients.

1. Are they instances of reliance on professional agencies for support?

2. Are there family/friends/neighbors who are supportive?

3. Are services being duplicated or is there good communication between services providing assistance to family members?

4. Are there any supports of people from their own cultural background? Are their values appreciated or in conflict with the surrounding environment?

5. Is there any involvement in any activities outside of school/work?

6. Do they belong to any social groups?

7. Is there access to meaningful health care?

8. Are there areas of need that are not being met and is there capacity to access needed support within the local community?

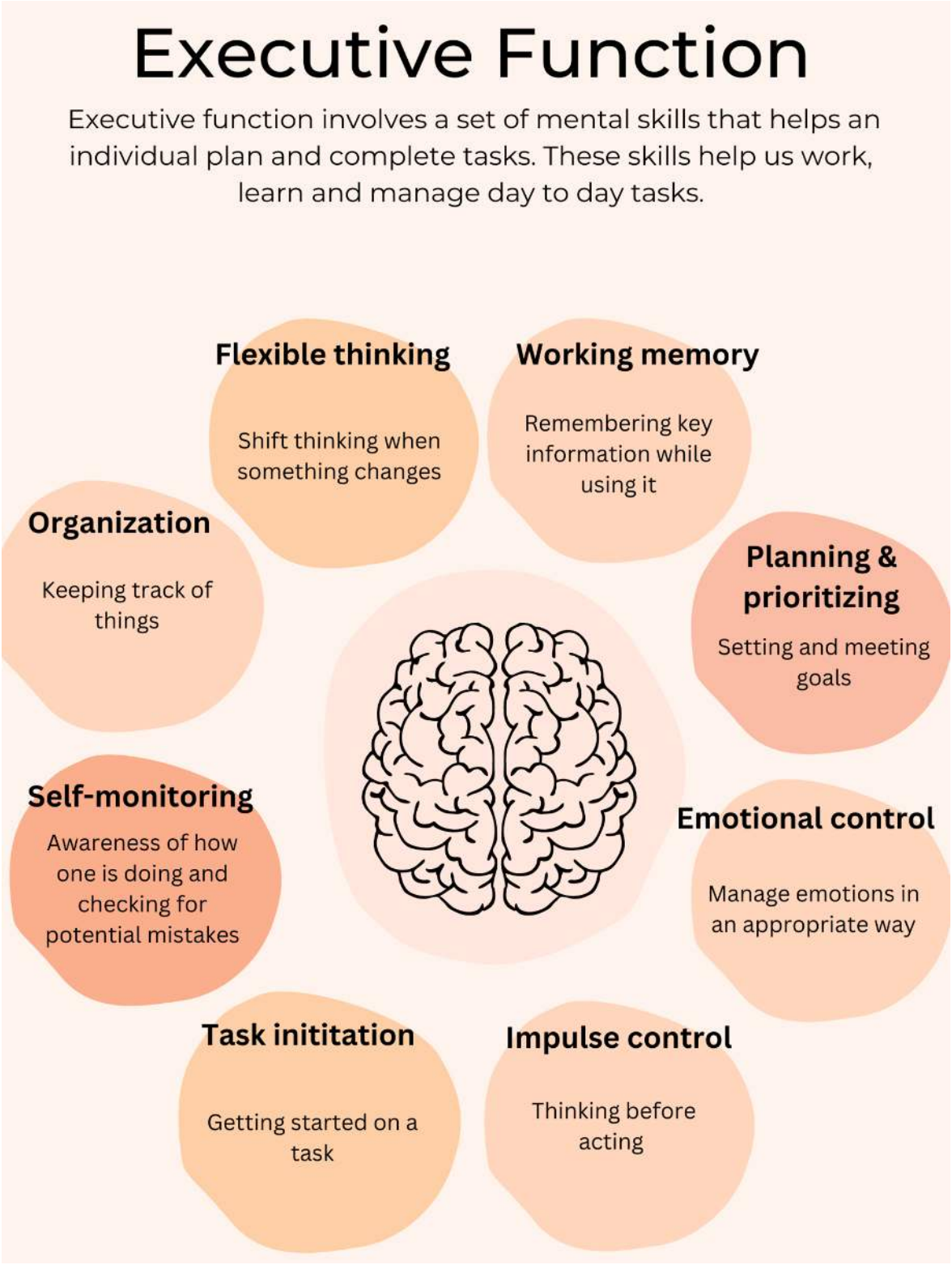
9. If you have news to share, whether good news or bad news, who is the first person you talk to? Is there a specific reason as to why they are your first contact?

10. Are there any noticeable patterns with the positive relationships?

11. Are there any noticeable patterns with the negative/weak relationships?

Questions adapted from:
Jesuit Social Services, 2009

Handout: What is executive function?



Executive Function Activities

Executive function activities: These activities are meant to promote executive function skills throughout childhood. Below contains a list of possible activities that can be performed, with the specific executive function skills they are addressing. It is important to consider what activities your child likes, and select activities that are most enjoyable and interesting to them.

Infancy: 6-18 mo

Activity:	Executive function skills targeted:
Lap games: Peekaboo, Pat-a-Cake, This is the Way the Farmer Rides	● This works on the child's working memory as they have to track the movements you are making and have to anticipate responses.
Hiding games: Hide and seek, Hide toy under a cloth and encourage child to locate it	● This works on the child's working memory as they try to remember what was there and where it went.
Fingerplay: Intsy Bitsy spider	● This works on the child's working memory and self control as they learn to copy the sequence.
Role play: Take turns with any activity (sweeping, picking up toys, play dress up, play shopping, having "conversation" on phone together, etc.)	● This works on the child's working memory, self control and attention. The child also begins to utilize imaginative play.
Imitation/copying games: simple gestures **(**waving, facial expressions), organizing toys	● This works on the child's working memory, self control and attention as the child needs to keep track of the caregivers action(s), remember them and recall it.

Early childhood: 18-36 mo

Activity:	Executive function skills targeted:
Active games: Follow the Leader, Freeze dance (musical statuses), Hokey Pokey, I'm a Little Teapot, Head, Shoulders, Knees and Toes	● This works on the child's working memory, self control, attention and focus in regards to a task. This is a learning process, and at this stage children may need frequent reminders to follow directions or to keep on trying if the first attempt is unsuccessful.
Imaginary play: sweeping, picking up toys, play dress up, play shopping, having "conversation" on phone together, etc. Children at this age are able to sustain imaginary play	● This works on the child's working memory, self regulation and attention. Giving the child an opportunity to dictate what role you should play and how encourages development of their own self regulation skills.
Matching / sorting games: Sort by color, shape, texture, size, smell, etc.	● This works on the child's working memory, problem solving and self control as the child will have to try to remember what they are matching or by organizing items into categories.
Conversation and storytelling: Narrating the child's play ("what will you do next?", "is there any other way you could have done that?") Talk about your child's feelings ("you look upset")	● This works on the child's working memory and self regulation skills. It promotes the discussion of healthy coping mechanisms as well.

Child: 3-5 years old

Activity:	Executive function skills targeted:
Imaginary Play: Use props and toys, read books, go on field trips, watch videos	● This works on the child's working memory, planning, cognitive flexibility (or the ability to go from one concept to another)
Storytelling: Encourage children to tell stories, act out stories, and working with others to tell a group story	● This works on the child's working memory, as they have to hold in the information before saying it. It also works on planning, by following a storyline.
Movement challenges: Skipping, balancing, obstacle courses, playground, yoga poses, Freeze dance, Songs that add movements- She'll be Coming 'Round the Mountain, backwards counting songs such as Speckled Frogs	● This works on the child's working memory, attention to task and self regulation skills.
Quiet games and other activities: Quirkle and S'Match, cooking, puzzles, working on matching/sorting games and switching to a new rule halfway through the activity	● This works on working memory, while having to hold directions in mind, focusing attention by counting/sorting/matching items.

Child: 5-7 years old

Activity:	Executive function skills targeted:
Card/board games: Card game- Concentration, Go Fish, Old Maid, Happy Families, Snap, Slapjack, Crazy Eights, Uno, Spoons Board games- Sorry!, Battleship, Checkers, Chinese Checkers	● This works on the child's working memory, while promoting mental flexibility as they have to plan and strategize their next moves.
Physical activities/games: Freeze Dance (musical statuses), musical chairs, Red Light Green Light, Duck, Duck, Goose, Mother May I?, What Time is it Mr. Fox?, Magic word game Dodgeball, four square, sports (soccer, baseball, etc)	● This works on maintaining attention to a task, focusing, following rules, decision-making and impulse control.
Movement or song games: *Punchinella, Boom Chicka Boom, I met a Bear, She'll be Coming 'Round the Mountain, Miss Mary Mack, Down Down Baby*	● These address a child's working memory as they have to recall information. Songs can also be beneficial for working on impulse control.
Quiet activities requiring strategy and reflection: Puzzles, 20 questions, brain teaser activities (mazes, counting), ISpy and the ISpy books	● These activities promote decision making and problem solving skills. The child will also have to use their working memory and cognitive flexibility throughout these tasks.

Child: 7-12 years old

Activity:	Executive function skills targeted:
Card/board games: *Hearts, Spades, Bridge, Rummy* games, *Go, Chess, Minecraft, Dungeons & Dragons* *Many video games practice these skills, but may include violent content. It is important to select appropriate games based on the child's age and to set time limits.	• This promotes a child's attention, planning, strategizing, problem-solving, working memory and cognitive flexibility.
Physical activities/games: sports, *jump rope, double dutch, Chinese jump rope*, *flashlight tag, Ghost in the Graveyard, laser tag*	• These activities have various rules, meaning children will have to hold those in their mind while playing. This promotes a child's working memory, attention, planning, and decision making.
Music, signing and dance: Learning a musical instrument, participate in music class, singing and dancing	• This works on a child's working memory, self-monitoring, and attention while also adding physical movements.
Brain teasers: Crossword puzzles, *Sudoku, Rubik's cube, Cogmed and Lumosity*	• Brain teasers address a child's working memory, attention, and cognitive flexibility.

Adolescence

Activity:	Executive function skills targeted:
Goal setting, planning and monitoring: Identify short and long term goals	• This serves a purpose to work on self regulation. The skills of identifying goals, planning, monitoring oneself, and adjusting as necessary can be used in situations such as sports, academics, work, relationships, obtaining drivers license, etc.
Self monitoring: Self talk, walking through each step, writing in a journal, adults can help adolescence see different perspectives and help them recognize that experiences can offer valuable lessons	• Self talk can help adolescents identify problem behavior or patterns in behavior. This promotes their emotional control and wellbeing. It also helps in organizing information in a logical sense.
Activities: sports, yoga, meditation, music, theater, strategy games and logic puzzles, computer games	• This works on a range of self regulation skills. These activities also address attention, decision making, working memory and cognitive flexibility.
Study skills: Break down a project into smaller pieces, self monitor when working on schoolwork, use mnemonics to aid in remembering information, keep calendar to promote a set schedule, reflect on the information you have learned after completing an assignment	• This works on organization, as adolescents are becoming increasingly independent. Study skills also begin to address metacognition (thinking about thinking).

Resource: adapted from Center on the Developing Child at Harvard University (2014). *Enhancing and Practicing Executive Function Skills with Children from Infancy to Adolescence.* https://harvardcenter.wpenginepowered.com/wp-content/uploads/2015/05/Enhancing-and-Practicing-Executive- Function-Skills-with-Children-from-Infancy-to-Adolescence-1.pdf

Informative Videos about the brain

Targeted towards children-

The Brain for Kids - What is the brain and how does it work? - YouTube (4:45 minutes) - This video breaks down different regions of the brain and explains the function in simpler terms. This video also explains the differences between the brains left and right hemispheres.
How Your Brain Works? - The Dr. Binocs Show | Best Learning Videos For Kids | Peekaboo Kidz - YouTube (4:48 min) - In this video, a character known as Dr. Binocs explains the functions of the brain. This video emphasizes visuals to explain the brain in an easier way.
A Tour of the Brain! | Self-Regulation Lesson 1 - YouTube (3:25 min) - This video explains how different areas of the brain operate separately, to work together. This video also gives examples of what brain region is responsible for different tasks, such as talking, bike riding and recalling.

Focusing on early brain development-

<table>
<tr><td>How a child's brain develops through early experiences - YouTube (4:05 min) - This video explains how experiences in early life affect and shape our brain. This video also emphasizes that stress can damage basic brain structures, ultimately impacting a child's development.</td><td rowspan="2">Podcast: Brain Science: Neuroscience, Behavior

Episode(s):
Your brain can change (49 min)
Memory and learning (36 min)

Link: Brain Science: Neuroscience, Behavior on Apple Podcasts
 
</td></tr>
<tr><td>Early brain development - YouTube (1:42 min) - This video explains the functions of different brain regions throughout the first three years of a child's life.</td></tr>
<tr><td>How Early Childhood Experiences Affect Lifelong Health and Learning - Center on the Developing Child at Harvard University (5:11 min) - This animated video describes the brain and how early life experiences affect lifelong health.</td><td>Podcast: TED health
Episodes(s): The science behind how parents affect child development (17:32 min)
How your brains executive function works
And how to improve it (7:47 min)

Link: TED Health (google.com)
 
</td></tr>
</table>

Focusing on the Adolescent brain-

Sarah-Jayne Blakemore: The mysterious workings of the adolescent brain | TED Talk (14:10 min) - This video explains how the brain changes during adolescence and plays a role in their behavior.
Decision making and the adolescent brain - YouTube (2:21 min) - This video breaks down the Limbic system ("emotional center") and the prefrontal cortex regions of the brain during adolescence. It explains why adolescent emotions typically outweigh problem solving abilities.
Use It or Lose It: The Adolescent Brain - YouTube (1:11 min) - This video explains how the brain changes during adolescence and how it gets rid of connections to make the brain more efficient.
The Adolescent Brain: A second window of opportunity - YouTube (1:23 min) - This video explains how early adolescence is a critical period for brain development. It also shows the remodeling that the brain goes through at this stage.
Podcast: TED health Episode(s): How puberty changes your brain (6:07 min) - TED Health (google.com)

Other-

What is Neuroplasticity? - YouTube (3:15 min) - This video gives a breakdown of the term "neuroplasticity" and also explains how the brain is able to change itself in response to repetitive experiences.
Life Stages Of The Brain : TED Radio Hour : NPR - This link provides chapters of episodes pertaining to life stages of the brain. The episodes include: Why teenagers make risky decisions (9:26 minutes) How you can grow new brain cells (8:36 min) By age five, children's brain can look very different - and family income is a factor (18:30 min) "Menopause brain" is a real thing. Here's what to do about it (12:12 min)

Tips to support prenatal development

How to support your baby while pregnant?

Prenatal care can help prevent complications and serves to inform pregnant individuals about the steps they can take to support their child and lead a healthy pregnancy.

- Mothers health
    - The mother's health is an important part of pregnancy. If the mother's health is poor, it could cause the baby to be born prematurely. If a mother is experiencing abuse, lack of nutrients, or other stressful life events that put increased pressure on the prenatal environment, it can lead to a prematurely born baby (CDC, 2022).
- Stop substance use
    - Any harmful substance that the mother uses during pregnancy goes through the blood, the placenta, the umbilical cord, and to the baby. Thus, mothers who use drugs while pregnant put their babies at an increased risk of being born dependent on the same substance.
    - Tobacco and alcohol have been linked to an increase risk of Sudden Infant Death Syndrome (SIDS)
    - Tobacco use in early pregnancy increases the baby's risk of developing heart defects (specifically a hole in the heart known as septal defect)
    - Opioid use has been linked to negative health outcomes including preterm birth, still birth, and Neonatal Abstinence Syndrome (NAS).
        - NAS → If a substance is used during pregnancy, the baby may become dependent on the substance as soon as they are born. This condition affects the baby and results in sudden withdrawal from the substance they were exposed to during pregnancy.
    - A mother who consumes alcohol during pregnancy also has an increased risk of having a baby with fetal alcohol syndrome disorder (FASD). This is due to the fact that the alcohol will pass through the mothers placenta, to the babies umbilical cord. Babies born with FASD typically present with abnormal facial features, intellectual disabilities, behavioral challenges, and/or difficulty with executive function skills.
        - FASD is also linked to increased risk of developing alcohol or other substance related problems, increased risk for adult substance use disorders, mood disorders, and neurocognitive impairments (Grant et al., 2013)
    - Smoking during pregnancy increases the risk of health problems for developing babies, including premature birth, low birth weight, and birth defects to the mouth/lip (cleft lip, etc). Nicotine can cause damage to the babies developing brain and lungs. Smoking during and after pregnancy also increases the risk of sudden infant death syndrome (SIDS).
    - Some research suggests that use of marijuana during pregnancy is linked to health concerns, including increased use of other substances that may impact pregnancy and infant health such as tobacco, and developmental problems in adolescents (CDC, 2022).
- Learn about family history
    - One of the reasons for a baby being born with a predisposition for a mental health condition or disability is due to genes or the combination of chromosomes.
    - Research has suggested a genetic link in mental illness across families.

    - Genetic factors can put certain babies at a higher risk for genetically inherited disorders such as Marfan syndrome.
- Ensure medications you are taking are safe
    - Certain medications (such as acne treatment) contain harmful ingredients and can harm the fetus if consumed. Speak with a doctor if you have concerns about medications you are taking.
    - Read the label as it can list possible risks for women who are pregnant.
    - Report any problems or side effects to the doctor.
- Manage stress levels
    - Practice Mindfulness and/or practice breathing exercises. Mobile apps such as Mindfulness Coach and UCLA Mindful have numerous meditations and exercises to help individuals regulate their nervous system and feel “more calm”.
    - Try a yoga class or watch online yoga tutorials.
    - Practice healthy sleeping habits.
- Read / talk to baby bump
    - This encourages the baby to learn new sounds, tones, and rhythms while also producing a calming effect.
    - The baby can begin hearing sounds during the second trimester.
    - Play music, or make sounds.
- More sleep
    - Limit daytime naps to 30-45 minutes.
- Exercise / stay active
    - Movement and exercise, even as little as 20 minutes a day can reduce stress levels and improve sleep quality.
    - Exercising during pregnancy increases energy, improves mood, can help manage certain health conditions and help with recovery once your baby is born.
- Eat healthy diet
    - The food that you ingest will go to the baby, thus practice healthy eating habits to ensure proper nutrients for the child.
    - Speak to a doctor regarding supplements such as prenatal vitamins, Folic acid, calcium, zinc, iron, omega-3.
    - Stay hydrated - Staying hydrated helps to improve fetal brain development.
- Social Connections and Support
    - Identify the type of support you need for a successful pregnancy.
    - Attend pregnancy or parenting groups/classes.
- Learn about child development

Implications for healthcare practitioners at prenatal stage

Risk factors to be aware of during this stage	Interventions to consider at this stage
● Alcohol or substance use ● Family history of SUD ● Poverty ● Low access to prenatal health care ● Lack of social/partner support	● Build and strengthen rapport with client as this can be a difficult transition, promote honesty and authenticity ● Enhance behaviors to improve fetal development ● Create a genogram of family history to depict likelihood of child developing substance use disorder and/or mental illness ○ Encourage client to rate their own levels of protective factors ● Review clients schedule ○ EX: have the client fill out what time they go to bed, what they do before bed, and when they wake up ○ EX: have the client track when they use the substance, what they're thinking before hand, how their mood is before/after taking the substance, and time of day ● Promote stress management strategies ○ Deep breathing techniques, exercise, positive self talk ○ Grounding techniques ● Promote Mindfulness ○ Mobile apps such as Mindfulness Coach and UCLA Mindful can be beneficial in walking through mindfulness or meditation ● Discuss importance of first few years of a child's development ○ Education over healthy early childhood experiences, which help promote future brain development ● Get ready, Do, Done ○ This model helps an individual create a plan, steps to get there and timeline of how long each step will take ● Role play or utilize a doll to help prepare mother for baby ● Create SMART goals and track the goals ○ Specific, Measurable, Achievable, Realistic and Timely ○ EX: I will attend 4 AA meetings each week for 3 weeks ● Address Transtheoretical model / stages of change ● Promote development of new routine(s)

Adapted from: (White et al., 2019)

Tips to Support Newborn Development

How to support healthy brain development for newborns?

Relationships play an important influence on the child's brain development at this age. Positive experiences can help promote brain development in newborns. Below contains a list of activities/methods that parents can do to support their child's development.

- Sing / read together
    - Listening to music, singing songs or reading can enhance language and help the child learn sounds, rhythms and language patterns. You can also add body movements to a song or story to encourage your child to connect sounds with motor activity.
- Explore environment(s)
    - Point out new things and encourage questions from child
    - Use a “serve and return” interaction, in which one person does something or “serves”, and the other “returns” with a response.
        - EX: baby plays with toys, you also play with toys
        - EX: baby points to something, you acknowledge and point too
        - EX: baby cries, you give them a hug
- Play games
    - Interactive toys can improve a child's motor skills and help them learn cause and effect.
    - Additional games such as peek-a-boo and “patty cake” can encourage imagination
    - Encourage use of senses during play (sight, sound, taste, smell)
- Healthy diet / proper nutrition
    - Eating a variety of fruits, vegetables, whole grains, lean meats and low-fat dairy products
- Be attentive
    - Take an active interest in what your baby is doing and converse with them
    - Connect with child through touch/holding
- Ensure adequate sleep
    - Set a routine schedule and follow it
    - Avoid caffeine, alcohol and nicotine
    - Use your bed only for sleep and sexual intimacy. if you are in your bed watching tv, on the phone, etc., the body is less likely to fall asleep due to all of the stimulation.
    - Sleep in a comfortable environment that suits your needs (reduce light, play white noise, alter temperatures in room, etc.)
- Provide child with options and allow them to pick
    - For instance, have your child pick between 2 colored plates. This encourages decision making which is an essential skill that will be developed later in life.
- Modify spaces
    - Make modifications to your environment so that your child can explore their interests as fully as possible in a safe manner.
- Encourage new opportunities
    - There is a relationship between the number of brain connections (or synapses) an individual has and the age at which they start something. For instance, becoming involved in a sport or musical instrument at a younger age, will be easier to learn as opposed to starting later in life.

Handout: How to help children who have experienced trauma

- Ensure safety in the environment
    - Minimize argumentative language, fighting, and raising voices
    - Lock the doors if necessary
    - Review how to handle phone conversations (ie. 911) or conversing with strangers
    - Reassurance can help make a child feel more secure
- Engage with your child
    - Acknowledge and validate your child's concerns or feelings
    - Communicate with your child in an age-appropriate manner
    - Provide your child with opportunities to talk, vent or draw pictures
- Increase support and reassurance
    - Help to identify people, places, and topics that act as reminders of the trauma, but are not in themselves dangerous. Help children approach, not avoid these reminders
    - Help to teach the difference between danger and non danger
- Ensure coping skills are being used
    - Review coping skills such as relaxation, deep breathing, mindfulness, journaling, hobbies, listening to music, meditation, etc. Identify and practice these coping skills
    - Prompt the child to use coping skills when they are having challenges handling their emotions
- Create a safety plan for uncomfortable situations
    - Write out plans of action for different scenarios you may encounter
    - Identify safe people and places

Implications for healthcare practitioners at newborn stage

Risk factors to be aware of during this stage	Interventions to consider at this stage
● Maltreatment (abuse, neglect) ● Low support to assist parenting ● Poverty ● Stressors ● Labile emotions ● Chronic medical/ psychiatric/ addiction illness in parent(s) ● Difficult temperament baby ● Having a large amount of siblings	● Breastfeeding ● Parenting training ● Role playing ● Mobile app training over CDC milestone tracker ● Bonding training ● Education over relationships and healthy boundaries ● Medication adherence ● Promote normative social relations ● Promote regular exercise ● Make an exercise program together (HEPtogo.com) ● Try yoga or chair yoga ● Establish self efficient health behaviors (sleep schedule, eating hygiene, etc) ● Track sleep/food/mood schedule each week ● Create a genogram of family history to depict likelihood of child developing SUD and/or MI ● Get ready, Do, Done (worksheet included) ○ This model helps an individual create a plan, steps to get there and timeline of how long each step will take

Adapted from: (White et al., 2019)

Using Praise to support healthy brain development for children

Tips for caregivers

Using Praise

positive parenting skill

Praise is a powerful tool that parents can use to encourage their child's good behaviors. Research has shown that positive reinforcement—such as praise--is far more effective than discipline. This handout describes techniques for using praise to its maximum potential.

Catch your child being good.

It's normal to focus more on unwanted behaviors, rather than good ones. Sometimes, a good behavior can be as simple as the *absence* of an unwanted behavior (for example, talking with a sibling instead of arguing). Make a point to praise your child's good behaviors, even if they seem ordinary.

"You were really good during dinner."

"Thank you for getting along with your brother."

Start with small steps.

An easy goal for adults might be a big deal for kids. Try starting small. Instead of waiting for your child to follow the rules all day, praise them when they follow the rules for 15 minutes. Focus on the *steps* toward achieving a goal, rather than the end goal itself.

"Good job bringing home your homework."

"Thank you for remembering to start your chores."

Praise effort, not outcome.

Many things in life are outside of our control. For example, your child might study for hours and still not get the grade they want. By praising the actions that are in your child's control (studying), you will teach them skills that are more likely to create good outcomes (good grades).

"You've been doing such a good job studying—I'm sorry you didn't get the grade you wanted."

"I'm proud of you for trying out for the swim team. It's great that you tried, even if you didn't make it."

Don't sweat the small stuff.

When kids don't get positive attention, they'll often settle for negative attention. If an unwanted behavior isn't dangerous or destructive, try ignoring it. After the unwanted behavior has stopped, wait a few moments, and praise your child for something good they are doing.

Be consistent.

Just like eating one apple won't make you healthy, praising your child once won't instantly improve their behavior. Giving praise *regularly* will help your child build the behavior you're looking for.

Tips to Support Adolescent Development

How to support a teen during adolescence

- Ask them open ended questions
- Acknowledge all feelings
- Encourage healthy sleep habits
    - Adolescents actually need MORE sleep than we think. Experts recommend at least 9-10 hours of sleep for adolescents (Sleep foundation, 2022).
    - Adequate sleep for adolescents promotes their emotional wellbeing and development, physical health, and school performance.
    - Some mental health conditions such as anxiety, depression and bipolar disorder have been linked to poor sleep. Improving quality of sleep in teens may play a role in prevention or symptom reduction.
- Provide learning opportunities to promote healthy risks
- Research suggests that parenting styles that depict warmth, expectations and respect decreases the adolescents likelihood of having mental illness and substance use compared to peers whose parents do not show those qualities (UCLA Center for the Developing Adolescent, n.d)
    - Examples include giving your child praise, spending quality time together, consistent communication, respect, asking one another for help, and positivity.
- Discuss risky behavior and the consequences
    - Substance use, sexual activity, etc.
- Bring up the conversation of social media
    - While social media has positive and negative effects, recent research has depicted the negative implications of social media. In adolescence using social media, they are at an increased risk for: depressed mood, digital addiction, disordered body image, eating disorders, anxiety, criminal activity, bullying (Schønning, et. al., 2020; Akram & Kumar, 2017).
- Promote injury prevention
    - The brain is experiencing a crucial time for development. It is important to protect the brain from potential injury or impact.
    - Encourage safety precautions such as wearing a seatbelt, or wearing a helmet in an effort to protect the brain and body.
- Promote stress management skills
    - Stress management skills may include: getting adequate sleep, exercising, practicing hobbies, promoting creativity, deep breathing techniques, mindfulness and eating nutritious meals.
- Be aware of the warning signs of substance use and mental health challenges
- Encourage open conversation surrounding mental health and wellness

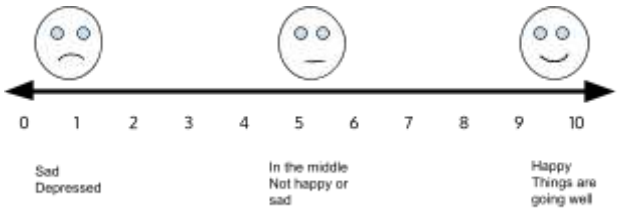
Implications for healthcare practitioners at adolescent stage

Risk factors to be aware of during this stage	Interventions to consider at this stage
● Boredom ● Physically inactive ● Antisociality ● Lack of participation in clubs or organizations ● Low self esteem and coping efficiency ● Poor psychological self-regulation ● Affiliate with substance using peers ● Disruptive behavior in school ● Academic underachievement ● Substances present in the environment (school, home, etc.)	● Coping and self efficiency training ● Education over grounding techniques, meditation and mindfulness ● Teach competencies ○ hobby work, music, etc. ● Empathy skill building ● Address interpersonal skills ● Role play ○ Healthy communication ○ Life situations ● Create genogram with client over family history to reflect on family dynamics ○ Helps to identify both positive and negative supports in their life ○ Discussion of family patterns ○ Helps to identify patterns of mental illness or substance use in families ● Parent oversight and involvement ● Get ready, Do, Done ○ This model helps an individual create a plan, steps to get there and timeline of how long each step will take ● Promote creativity ○ Paint, crafts, build structure, etc.

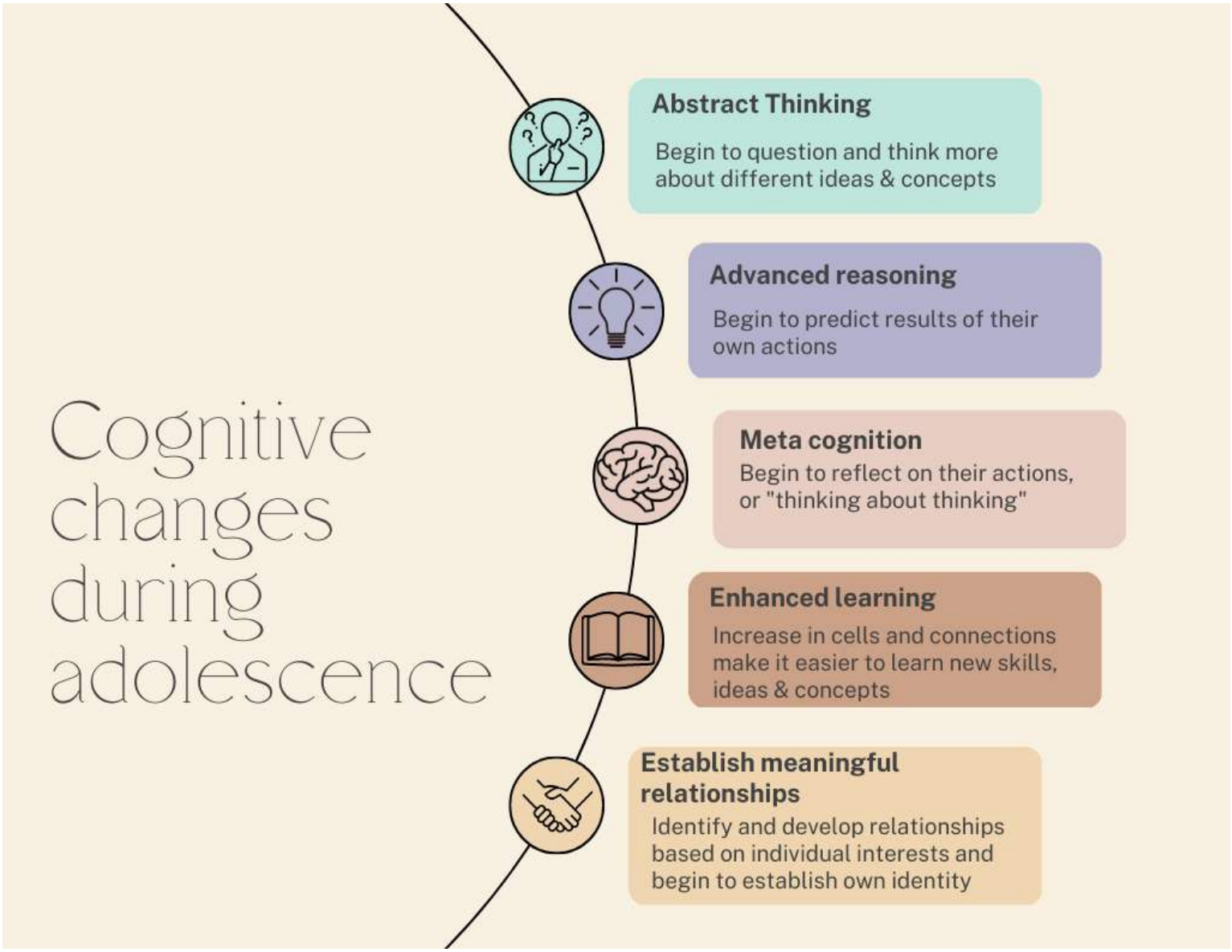
Adapted from: (White et al., 2019)

Tips for caregivers: Talking to adolescents about mental health

- Learn more about mental health before discussing it openly
    - Research the symptoms the child is experiencing and local supports available
    - Normalize the concept of mental health through non-judgemental conversation
    - Let them know if you understand what they are going through
    - EX: “I have dealt with similar things in my life, and often find talking about it helps. I am here to listen and support you”
- Be genuine and provide reassurance as needed
    - “That situation sounds really difficult, would you like to talk more about it?”
    - “Nothing you are going through changes the way I feel about you”
    - “I can see what you are going through, and will support you through the process of figuring it out together”
- Listen, ask questions & allow for silence
    - Provide them with an opportunity to openly express their emotions
    - “How did that make you feel when that happened?”
    - “Why do you think you are feeling this way?”
    - “I can see everything that you have going on in your life, is everything okay?”
- Share observations
    - Note any changes in mood, changes in appetite, changes in level of activity, etc. as this may indicate a symptom of mental health difficulties
    - EX: “Have these feelings led to any specific changes you have noticed (such as trouble sleeping, completing school work, engaging in social activities?”)
    - EX: “I have noticed you've been keeping to yourself much more recently, can we sit down and discuss this further?”
- Link mental health and healthy brain habits
    - Reinforce the importance of 8-9 hours of sleep
    - Learn more about the risk factors that the child experiences
    - Discuss the changes in the brain occurring
        - “In adolescence, the brain is more likely to act on emotions compared to critical thinking and reasoning. This is because the region of the brain responsible for decision making, critical thinking and reasoning, the prefrontal cortex, is still developing until age 25. This can explain why adolescents are more likely to engage in risky behavior, and dismiss the consequences to their actions.”
- Keep the conversation going and prepare to be an advocate
    - Offer support
    - “I want to support you, and will be here if you would like to talk more about this.”
    - “I can drive or go with you to your appointment”
- Use a simple daily rating scale to get a better understanding of their feelings/emotions
    - This allows for a measurable understanding of one's emotions challenges on a day to day basis
    - “How do you feel today from 1-10?”



Handout: Cognitive changes during adolescence



Handout: Importance of Caregiver-child relationship

- To best support healthy brain development, the child's connection to the caregiver needs to be strong and positive (West Ed, 2017)
- Caregiver-child relationships are built through interactions that occur on a day to day basis

Research suggests:

- The formation of warm, nurturing relationships between caregiver and child is significant to the child's survival and development
    - Children who feel connected to the their caregiver develop stronger social skills and achieve more in school
    - A strong healthy connection helps in preventing a child from experiencing toxic stress
    - Associated with fewer negatives outcomes, such as mental illness or substance use
- A secure attachment between caregiver(s) and child helps the child throughout their development. Secure attachment typically occurs when there is a sense of love and support no matter what happens.
- A lack of consistent, loving responses can result in disruptions to the brain and body. For instance, the body may have a stress response and activate stress hormones.
- For children to develop resilience, they need at least one stable and committed relationship with a supportive parent, caregiver, or other adult (Center on the Developing Child, n.d)

How to maintain a healthy caregiver-child relationship

Tips for caregivers

Promote / improve interaction with child(ren) by:

- Use positive talk, and try to avoid using negative commands or threats
- Watch the child's facial expressions and body movements for cues
    - For example, they may move or change their expression to indicate they are cold.
- Pay attention to the sounds and environment that the child enjoys
    - For example, some children may feel comforted being held, rocked, being walked outside, or listening to soft music

As children get older, you can:

- Offer concrete advice and support to help with the child's emotional regulation skills
- Avoid unnecessary restrictions / punishments
- Stick to your promises that you make, as this helps to develop trust
- Be available when your child needs support or help, this will also help them develop trust (Raising Children Network, 2020)
- Set firm, consistent and fair rules, as this helps children learn consistently (Raising Children Network, 2020)

Handout: Importance of Caregiver-Child Relationships

Importance of Caregiver-Child Relationship

Tips for parents

1. Use positive talk, try to avoid using negative commands or threats
2. Watch the child's facial expressions and body movements for cues
3. Pay attention to the sounds & environment that your child enjoys
4. Spend quality time together
   Ex: Go on a walk, eat a meal together, take a trip to the playground, movie at home, etc.
5. Provide praise & acknowledgement to their efforts and acheivements
6. Offer concrete advice & support to help with your child's emotional regulation skills and to promote trusting relationships

Worksheet: How to express your concern about someone's mental health

Worksheet: How to tell others I am struggling

For the past *(*day/week/month/year/_____), **I have been feeling** (unlike myself/sad/angry/anxious/moody/agitated/lonely/hopeless/fearful/overwhelmed/ distracted/confused/stressed/empty/restless/unable to function or get out of bed/_____*)*.

I have struggled with (changes in appetite/changes in weight/loss of interest in things I used to enjoy/ hearing things that were not there/seeing things that were not there/ feeling unsure if things are real or not real/ my brain playing tricks on me/ lack of energy/increased energy/ inability to concentrate/alcohol or drug use or abuse/self-harm/skipping meals/overeating/overwhelming focus on weight or appearance/feeling worthless/ uncontrollable thoughts/guilt/paranoia/nightmares/ bullying/not sleeping enough/ sleeping too much/risky sexual behavior/overwhelming sadness/losing friends/unhealthy friendships/unexplained anger or rage/isolation/ feeling detached from my body/feeling out of control/ thoughts of self-harm/cutting/thoughts of suicide/plans of suicide/abuse/sexual assault/death of a loved one/_____).

Telling you this makes me feel (nervous/anxious/hopeful/scared/embarrassed/ empowered/pro-active/mature/self-conscious/guilty/_____), **but I'm telling you this because** (I'm worried about myself/ I am really struggling/ it is impacting my schoolwork/it is impacting my friendships/I am afraid/I don't want to feel like this/I don't know what to do/I don't have anyone else to talk to about this/I trust you/I need support/I need to open up to someone/_____).

I would like to (talk to a doctor or therapist/talk to a guidance counselor/talk about this further/create a plan to help me feel better/talk about this more/find a support group/work through this together/ research local support/ _____) and I need your help.

Adapted from Mental Health America, Inc
on 03/15/2023

Youth Thrive

Youth Thrive is a research informed framework, designed by the Center for the Study of Social Policy that focuses on youth health and wellbeing. It is based on emerging research in neuroscience and brain development as well as established research on the promotion of positive youth development (NYC department of Probation, n.d). The framework highlights the five protective and promotive factors that increase the likelihood of healthy brain development and decreases the risk of negative life experiences. As Youth Thrive believes that "all young people should be valued, loved, and supported to reach their goals" (Center for the Study of Social Policy, n.d), this initiative serves a purpose in progressing the conversation of the role that the brain plays in regards to mental health.

For more information of the overview of what Youth Thrive is, refer to:

- YT Theory of Change One Pager (cssp.org)
- YT Key Values One Pager (cssp.org)

For more information of Youth Thrives protective/promotive factors, refer to:

- youth-thrive-protective-promotive-factors.pdf (cssp.org)
- YT_Social-Connections.pdf (cssp.org)
- YT_Youth-Resilience.pdf (cssp.org)
- YT_Knowledge-of-Adolescent-Development.pdf (cssp.org)
- YT_Congnitive-and-Social-Emotional-Competence-in-Youth.pdf (cssp.org)
- YT_Concrete-Support-in-Times-of-Need.pdf (cssp.org)

For more information on how to promote youth wellbeing, refer to:

- Youth-Thrive-A-Framework-to-Help-Adolescents-Overcome-Trauma-and-Thrive.pdf (cssp.org)
- Youth-Thrive_Advancing-Healthy-Adolescent-Development-and-Well-Being.pdf (cssp.org)

Videos about Youth Thrive-

Youth Thrive Overview - YouTube (1:11 min) - This video provides a simple overview of what Youth Thrive is.
Youth Thrive Changing Perspectives - YouTube (1:29 min) - This video discusses the importance of maintaining a positive perspective about adolescents and promoting the skills of independence.
The Five Protective and Promotive Factors - YouTube (1:26 min) -This video breaks down the 5 protective and promotive factors: Adolescent development, youth resilience, concrete support in times of need, social connections, and cognitive and social-emotional competence.

How to promote emotional health

Tips to improve overall mood and wellbeing

- Aromatherapy/Essential Oils - Research suggests different essential oils can help reduce stress, improve overall mood, reduce anxiety and pain, and improve energy and concentration (Cleveland Clinic, 2021).
    - Lavender → help with stress, pain and sleep
    - Peppermint → help alleviate headaches, elevate mood and support memory
    - Lemon → reduce anxiety & depression, reduce pain
    - Orange → reduce anxiety and pain
    - Lemongrass → reduce stress, anxiety & depression
    - Rosemary → help with stress, relieve muscle & joint pain, help alleviate headaches, may improve brain function
    - Bergamot → helps with stress, enhances mood, reduce feelings of anxiety
    - Cedarwood → help with sleep, reduce feelings of anxiety
    - Chamomile → helps with sleep, reduce anxiety & depression

**Refer to next page for aromatherapy handout*

- Deep breathing (diaphragmatic breathing)
    - Take slower, longer breaths while focusing on breathing from your stomach.
    - The benefits include relaxation, reducing blood pressure and heart rate (Cleveland Clinic, 2022)
- Exercises
    - 20-30 minutes of any physical activity at least 3 x per week can help maintain limbic system health.
- Meditation & mindfulness
    - Meditation and mindfulness can help an individual manage their emotions and feelings with better balance. This can reduce feelings of stress, anxiety, depression, insomnia & pain while also improving attention and sleep.
    - "Mindfulness is a type of meditation in which you focus on being intensely aware of what you're sensing and feeling in the moment, without interpretation or judgment" (Mayo Clinic, 2022).

Mindfulness Coach (free, mobile app) → Offers mindfulness training in which the individual focuses on the given prompt. Some examples include: breathing exercises, mindfulness walking, mindful eating, bringing awareness to the body, and meditation. These exercises are short and can last 1-5 minutes depending on the exercise.

(U.S Department of Veterans Affairs, 2023)

UCLA Mindful (free, mobile app) → Provides basic meditations, wellness meditations, medication timers (a bell) and podcasts. Some examples include body scanning meditation, loving kindness meditation, and body scan for sleep. These exercises range in time, from 3-20 minutes. EX: for individuals experiencing pain, this app can help minimize feelings of pain by increasing ability to tolerate pain by grounding them to the present moment.

(UCLA Health System, 2023)

Journey (free, mobile app & computer) → This self-care journal promotes writing and recording different aspects of one's life throughout their day. It also tracks fitness and mood levels, which can be used to help recognize both positive and negative patterns.

(Two App Studio Pte. Ltd, 2023)

Finch - self care pet (free, purchases available, mobile app) → This app uses a cute pet to help you in your self care journey. It helps you build routines, make healthier decisions, create and meet daily goals, make reflections, and more! This app can be used to help with emotional expression and regulation.

(Finch Care Public Benefit Corporation, 2023)

Handout: Aromatherapy- Tips to promote overall well-being

Aromatherapy

To promote overall wellbeing

Research suggests different essential oils can help reduce stress, improve overall mood, reduce anxiety and pain, and improve energy and concentration. Depending on the essential oil used, a range of benefits can be seen (Cleveland Clinic, 2021).

Chamomile
Sleep
Enhance mood

Lavender
Sleep
Enhance mood
Pain

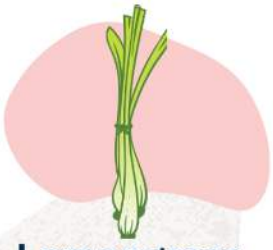
Cedarwood
Sleep
Enhance mood

Lemon
Pain
Enhance mood

Orange
Pain
Enhance mood

Peppermint
Pain
Enhance mood
Supports memory

Rosemary
Stress
Pain
Promote brain function



Lemongrass
Sleep
Enhance mood

Bergamot
Stress
Enhance mood

Grounding Techniques

Grounding Techniques: These are coping strategies that play a role in reframing your thoughts, attention and focus to the present moment.

Intro: This grounding technique can be used to help an individual focus on the present. For instance, when a person is overwhelmed, anxious, stressed or in pain, the 5,4,3,2,1 technique can be used as a coping skill designed to restore mindfulness to that individual**.** When teaching this skill, have the individual be as descriptive as possible.

5,4,3,2,1 Technique

 **5 things you can see -** "Look around you and bring your attention to five things that you can see. Pick something that you don't normally notice, like a shadow or a small crack in the concrete"

- ★ *Tip:* describe the lines, colors, shape, size, texture.

 **4 things you can touch/feel -** "Bring awareness to four things that you are currently feeling, like the texture of your pants, the feeling of the breeze on your skin, or the smooth surface of a table you are resting your hands on"

- ★ *Tip:* Additional examples of this can include clothes on the body and hair on their head.

 **3 things you can hear -** "Take a moment to listen, and note three things that you hear in the background. This can be the chirp of a bird, the deeping of machines or the faint sounds of traffic from a nearby road."

- ★ *Tip:* help bring awareness of the background noises, footsteps, nearby traffic, or ticking clock. Ask questions about the tone, pitch and rhythm.

 **2 things you can smell -** "Bring your awareness to smells that you usually filter out, whether they're pleasant or unpleasant"

- ★ *Tip:* Guide the patient to recall their favorite smell or take a deep breath to smell the environment. They may move around to look for something that has a scent.

 **1 thing you can taste -** "Focus on one thing that you can taste right now, at this moment. You can take a sip of a drink, chew a piece of gum, eat something, notice the current taste in your mouth, or open your mouth to search the air for a taste."

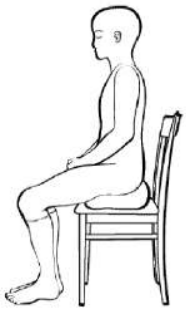
- ★ *Tip:* Have the patient recall the last thing they tasted or ask them to take a sip of their drink or eat. You can promote attention to taste by having them chew a piece of gum or eating a small piece of candy.

Meditation: Meditation can help you experience clear thoughts and emotions through balance and acceptance. It can be practiced in various environments (home, school, riding the bus, going for a walk, etc.) and does not require any special equipment except the body and mind.

Body scan meditation (Shavasana)

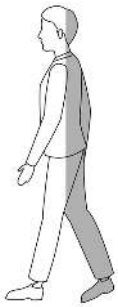
1. Lie on your back with legs extended and arms at your sides, palms facing upward.
2. Focus your attention slowly and deliberately on each part of your body, in order, from toe to head or head to toe (Bajaj Finserv Health, 2022).
3. Be aware of any sensations, emotions or thoughts associated with each part of your body.

Sitting meditation



1. Sit comfortably with your back straight, feet flat on the floor and hands in your lap. Breathing through your nose, focus on your breath moving in and out of your body.
2. Focus your attention slowly and deliberately on each part of your body, in order, from toe to head or head to toe.
3. Be aware of any sensations, emotions or thoughts associated with each part of your body.

Walking meditation



1. Find a quiet place 10 to 20 feet in length, and begin to walk slowly.
2. Focus on the experience of walking, being aware of the sensations of standing and the subtle movements that keep your balance.
3. Turn and continue walking, maintaining awareness of sensations

Worksheet: Daily Mood chart

	Happy	**Sad**	**Mad**	**Tired**	**Anxious**	**Excited**	**Other (specify)**	**Notes:**
6 AM - 8 AM								
8 AM - 10 AM								
10 AM - 12 PM								
12 PM - 2 PM								
2 PM - 4 PM								
4 PM - 6 PM								
6 PM - 8 PM								
8 PM - 10 PM								
10 PM - 12 PM								

Worksheet: Substance use self-monitoring log

Client name: Week of:

Day of week?								
Time?								
Location?								
Who are/were you with?								
What just happened?								
How are you feeling?								
If you used a substance …	**What & how much?**							
	How do you feel?							
	What happened afterwards?							
If you did not use a substance, what did you do with your time?								

Get ready, Do, Done

Get Ready	Do	Done
③ What do I need?	② What steps do I need to take to get it done? How long will each step take?	① What will it look like in the future? FUTURE PICTURE

How did the plan go?

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