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Self-Calming Techniques for Children with Autism

Mae Kunz, OTR/L, CLT, CSRS

1

Learner Outcomes

As a result of this course, participants will be able to:

- Identify the characteristics/symptoms, prevalence, and comorbidities of Autism Spectrum Disorder (ASD).
- Name the different sensory systems and their functions.
- Define sensory integration and sensory processing dysfunction.
- Describe different treatment techniques that will improve the self-calming abilities of children with ASD.

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CONTINUED

Course Agenda

Start Time	Stop Time	Topic
1000	1005	Welcome Introduction
1005	1010	Brief Overview of Autism Spectrum Disorder (ASD)
1010	1020	Sensory Systems and their Functions
1020	1025	Sensory Integration
1025	1030	Sensory Processing Dysfunction
1030	1035	Anxiety and ASD
1035	1055	Strategies to Improve Self-Calming Abilities of Children with ASD
1055	1100	Questions

3

CONTINUED

Disclosures

- I do not have any actual or potential financial interests or relationships to disclose.

4

Autism Spectrum Disorder (ASD)

- Autism Spectrum Disorder "affects a child's social functioning, communication, and is associated with repetitive behaviors and interests" (Danial, 2013, p. 1).
- Individuals will present differently by displaying a wide variety of symptoms (Burns, Dixon, Novack, & Granpeesheh, 2017).
- Severity of symptoms can also significantly interfere with functional performance (Burns et al., 2017).

5

Autism Spectrum Disorders

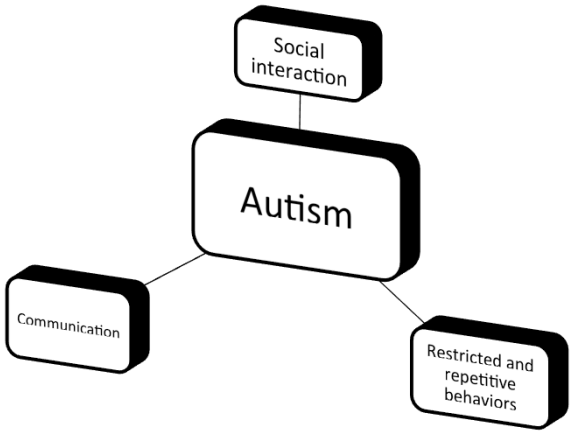


Figure by author, adapted from American Psychiatric Association (2013).

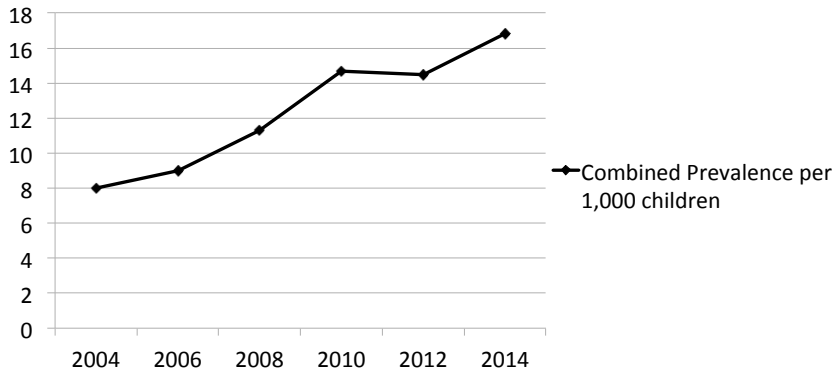
6

Autism Spectrum Disorder (ASD)

- Rising prevalence of ASD in the United States is 1 in every 59 eight-year old children in 2014 (Baio et al., 2018). This is a significant increase when comparing these same statistics from 2000-2002, which was 1 in 150 children (Baio et al., 2018).
- The prevalence of ASD is four times more likely in males than in females (Baio et al., 2018).
- "Tracking the prevalence of ASD poses unique challenges because of the heterogeneity in symptom presentation, lack of biologic diagnostic markers, and changing diagnostic criteria" (Baio et al., 2018, p. 2).

7

Autism Spectrum Disorder (ASD)



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8

Autism Spectrum Disorder (ASD)

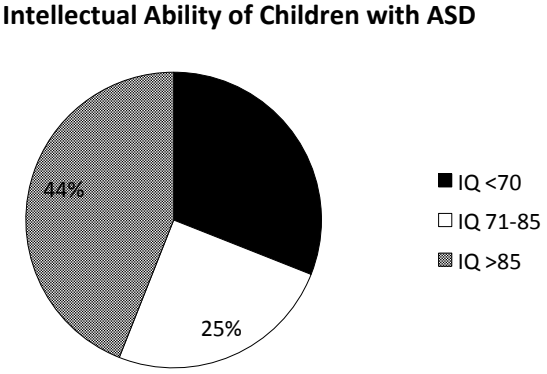

Figure by author, adapted from Baio et al. (2018).

9

Sensory Integration/Processing

- First developed by occupational therapist A. Jean Ayres in the 1960s.
- Defined as "the brain's ability to process and respond to stimuli from the environment taken in by the body's senses" (Wolfe, 2013, p. 4).
- This process requires a very small amount of conscious effort (Ayres, 1972).

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Sensory Integration/Processing

- The theory behind sensory integration is rooted in the idea that the body receives data from the different sensory systems, and then delivers the message to the brain so that a response can be formulated (Ayres, 1972).
- It impacts different areas of a person's development: cognitively, emotionally, neurologically, physically, and behaviorally (Ayres, 1972).

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Sensory Systems

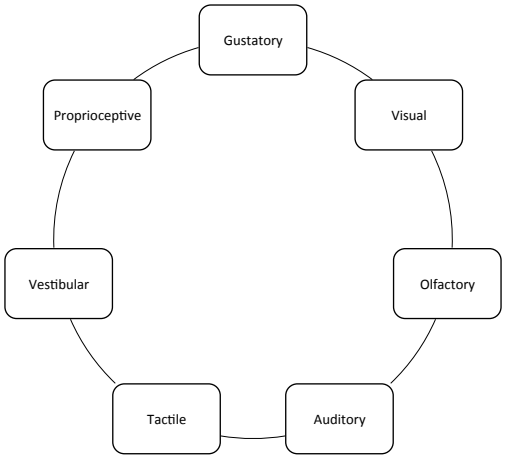

Figure by author, adapted from Ayres (1972).

12

Sensory Systems

Visual System

- Is responsible for recognizing and processing visual data such as color, saturation of light, movements, distance, contextual factors, and positional awareness (Priest, Reese, Balandis, & Derby, 2016).
- Visual Pathway (Priest et al., 2016): Visual input is received at the eyes. It then moves along the pathway of the cornea, pupil, and lens until it reaches the retina where color and light are filtered. It travels the optic nerve and continues to the occipital lobe where the information is processed and interpreted.

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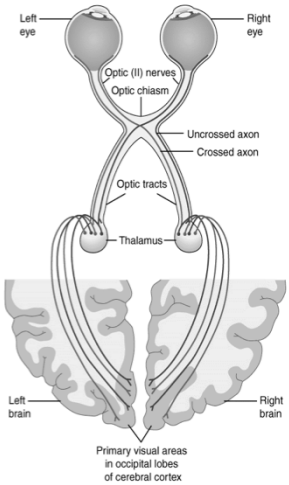
Visual System



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Sensory Systems

Visual Perception

- There is strong evidence that supports that children diagnosed with ASD have difficulties in tracking visual information, attending to visual data, and sustaining visual focus when compared to typical responses of children their age (Schaaf & Lane, 2015). This is usually seen in social events.
- An early sign of ASD can also be seen in the way infants and toddlers fix their eyes on different objects and track them (Schaaf & Lane, 2015).
- Children who have difficulty focusing on the entirety of an object such as a face are more predisposed to have ASD (Schaaf & Lane, 2015). The ability to visually comprehend emotions through scanning and focusing is also more limited in these children (Schaaf & Lane, 2015).

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Sensory Systems

Auditory System

- Recognizes and interprets sound waves (Priest et al., 2016).
- Is responsible for creating an understanding of electromagnetic sound waves (Priest et al., 2016).
- Auditory Pathway (Priest et al., 2016): Different vibrations from the air and bone are modified by the eardrum into electrical impulses. This data is then sent to the midbrain where it is organized. Finally, the cerebral cortex receives the information that was initially heard and establishes meaning to it.

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Sensory Systems

Auditory System

- According to Priest et al. (2016), dimensions of sound consist of:

1. Frequency/Pitch (number of sound waves per second, in Hertz)
2. Duration
3. Intensity (loudness, in decibels)
4. Localization

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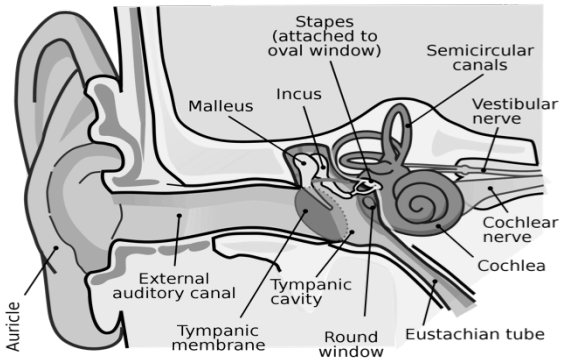
Auditory System



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Sensory Systems

Auditory Perception:

- Individuals with ASD have impairments in attending to auditory information for prolonged periods of time (Schaaf & Lane, 2015).
- Studies have also found that these children have difficulties with recognizing the location of sounds and interpreting auditory data (Schaaf & Lane, 2015).
- Preconscious levels of processing auditory input in the brain is also limited (Schaaf & Lane, 2015).

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Sensory Systems

Tactile System

- Enables individuals to physically respond and adapt to what is around them (Priest et al., 2016).
- The skin has receptors that recognize and interpret different tactile information (Priest et al., 2016). This includes light touch, deep pressure, vibratory sense, pain, temperature, and movement (Priest et al., 2016).
- The protective and the discriminative systems are the components of the tactile system (Priest et al., 2016).

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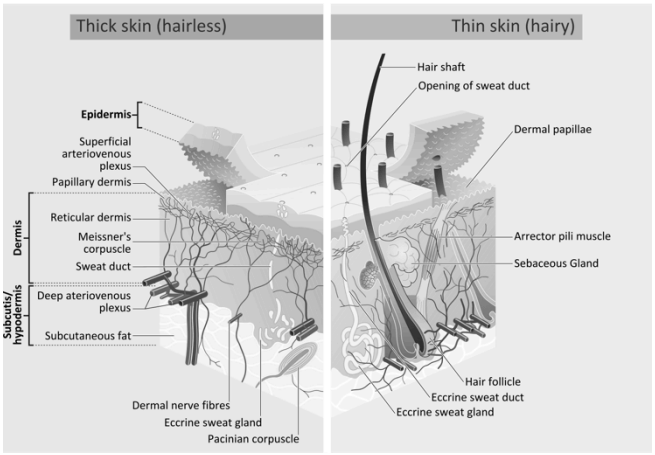
Tactile System



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21

CONTINUED

Sensory Systems

Tactile System

- Research has found no statistical differences with differentiating textures and responding to tactile input when comparing children with ASD to typical controls (Schaaf & Lane, 2015).
- New data has surfaced indicating that the brain of individuals with ASD has decreased ability to process tactile input. This emphasizes the need to assess tactile processing along with reaction times, as well as how tactile input affects behavioral responses in daily activities in children with ASD (Schaaf & Lane, 2015).

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Sensory Systems

Olfactory System

- Detects, organizes, and transmits information pertaining to different odors from the environment to the brain (Priest et al., 2016).
- Olfactory Pathway (Priest et al., 2016): Particles that are transmitted in the air reach the nose and are accepted by the olfactory receptors. This activates the olfactory neurons, which connects with the special neurons in the olfactory bulb. The process of recognizing the smell moves along the olfactory tract until it reaches the brain where this data is interpreted.

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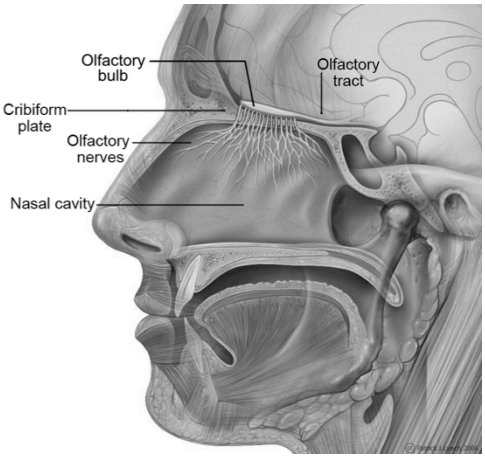
Olfactory System



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24

Sensory Systems

Gustatory System

- The most vital structure is the taste bud (Priest et al., 2016).
- Two classes of taste receptor mechanisms exist (Priest et al., 2016):

1. G-protein coupled receptors (GPCR): recognizes sweet, bitter, and umami (savory) flavors
2. Ion-channel receptors: identifies what tastes sour or salty

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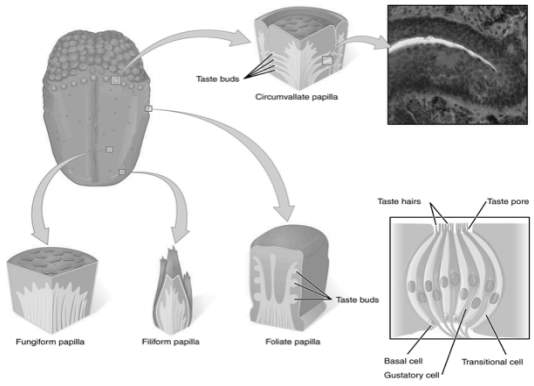
Gustatory System



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26

Sensory Systems

Vestibular System

- Is responsible for providing spatial awareness when coupled with gravity (Priest et al., 2016).
- The most important parts of this system are located within the labyrinth of the inner ear. This area is comprised of the semicircular canals, which translate rotation, and the otoliths, which bring meaning to the concept of acceleration (Priest et al., 2016).

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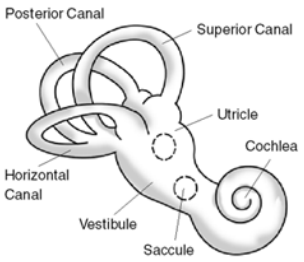
Vestibular System



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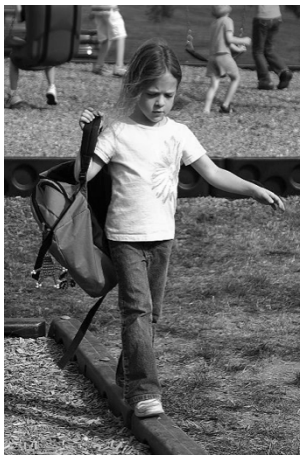

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Sensory Systems

Proprioceptive System

- Is body position sense and movement (Ayres, 1972).
- It is sensory information coming from muscles, tendons, and joints (Kuhaneck & Watling, 2010).
- It affects the ability to use the body effectively when acting and interacting with the environment (Schaaf & Lane, 2015).
- It is necessary for fine and gross motor skills (Kuhaneck & Watling, 2010).
- Difficulties can include poor awareness of force (Schaaf & Lane, 2015).

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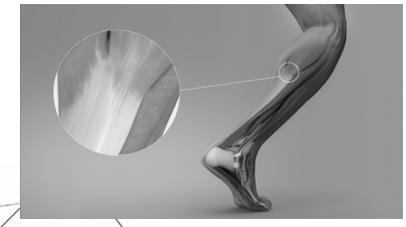
Proprioceptive System



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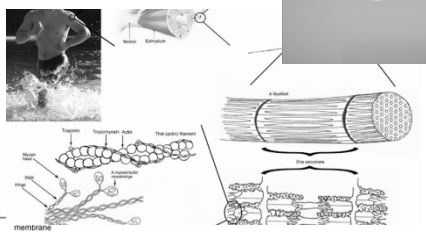

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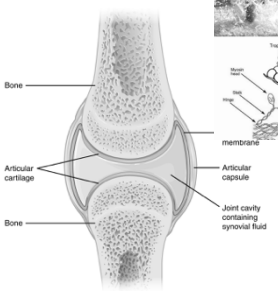

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30

Sensory Systems

Proprioceptive System

- It was once thought that individuals with ASD relied more on their visual rather than their proprioceptive system. This was later found to be inaccurate. Recent studies now show that children with ASD greatly rely on their proprioceptive system to help them learn how to control their movements for different tasks (Schaaf & Lane, 2015).
- According to some studies, children with ASD actually use their proprioceptive system to a greater degree compared to typically-developing peers (Schaaf & Lane, 2015).

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Sensory Processing Disorder

- Previously referred to as sensory integration dysfunction (SID).
- Can result from impairments in one or more of the different sensory systems (Ayres, 1972).
- Children with ASD often use self-stimulatory behaviors to accommodate for lack of sensory input or disengage when there is excessive sensory stimulation (Karim & Mohammed, 2015).

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Sensory Processing Disorder

- Found in 42% to 88% of children with ASD globally (Karim & Mohammed, 2015).
- Interferes with daily tasks like showering, getting dressed, brushing teeth, and eating.
- Abnormal sensory processing can be: hyposensitivity, hypersensitivity, and sensory-seeking behaviors (Burns et al., 2017).

33

Sensory Processing Disorder

Hyposensitivity

Hypersensitivity

Sensory-Seeking

Figure by author, adapted from Burns et al. (2017).

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Sensory Processing Disorder: Hyposensitivity

- Inadequate or absent response to sensory input (Burns et al., 2017).
- Also referred to as under-responsiveness or hypo-responsiveness (Burns et al., 2017).
- Examples include: decreased response to pain, using excessive force when writing, speaking in a loud voice, and preferring to wear tight clothing (Baranek, Boyd, Poe, David, & Watson, 2007; Burns et al., 2017).

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Sensory Processing Disorder: Hypersensitivity

- Overactive behaviors to normal sensory inputs (Baranek et al., 2007).
- Could be referred to as over-responsitivity or hyper-responsitivity (Burns et al., 2017).
- Examples include: refusing to wear certain clothes due to textural preferences, closing eyes in response to bright lights, covering ears to block out loud noises, not wanting to brush teeth, and behavioral outbursts when getting a haircut (Baranek et al., 2007; Burns et al., 2017).

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Sensory Processing Disorder: Sensory-Seeking

- Include aberrant movements that enhance a sensory input (Burns et al., 2017).
- Commonly found in children with ASD (Kirby, Little, Schultz, & Baranek, 2015).
- Commonly known as the stereotypical, repetitive behaviors seen in children with ASD (Gabriels et al., 2008).
- Examples include rocking while seated, making continuous vocalizations, hanging upside down, constant clenching of the jaw, flapping the arms, banging the head against the wall or other surfaces, persistent chewing, constant yelling, and seeking out specific tactile experiences (Burns et al., 2017; Kuhanick & Watling, 2010).

37

Anxiety and ASD

- According to the American Psychiatric Association (APA), anxiety is commonly found in children with ASD (APA, 2013).
- Signs and symptoms of anxiety are pacing, inability to trust others, easily angered, decreased level of concentration, tight muscles, and restless sleep (Chan, Sze, Siu, Lau, & Mei-chun, 2013).
- Children with ASD often react with temper tantrums, as well as repeated, stiff, and instinctual behaviors (Chan et al., 2013).

38

Anxiety and ASD

- As children with ASD age, their perception of the differences between themselves and their typical peers becomes more evident to them (Volkmar, Klin, & McPartland, 2014) .
- Children with ASD tend to create individualized behaviors which correlate with how their sensory systems operate. This impacts their self-control and thought processes (Wolfe, 2013).

39

Anxiety and ASD

- According to Carleton (2012), “Intolerance of Uncertainty (IU) appears to represent a broad dispositional risk factor for development and maintenance of clinically significant anxiety and depression” (p. 942).
- IU creates undesirable reactions to unsure settings on an emotional, cognitive, and behavioral level (Buhr & Dugas, 2009).

40

Anxiety and ASD

- IU plays a critical part in how autism and anxiety interact (Rodgers et al., 2017).
- IU appears to have a relationship with the different sensory systems, and how well an adaptive response is created and executed (Neil, Olsson, & Pelicano, 2016).

41

Self-Calming Strategies

42

Yoga

- Is becoming more prevalent in the pediatric community due to its low costs and beneficial effects (Kaur, 2016).
- Promising changes have been seen in children with ASD in terms of their social, behavioral, motor, and cognitive skills (Kaur, 2016).
- Has been shown to decrease overall anxiety, stress, and offensive behaviors (Kaur, 2016).
- Refer to the handout for specific examples.

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Yoga

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44

Yoga

- A yoga program designed for high-performing school-aged children with ASD was developed by Carroll-Wray (2019).
- Modifications to the classroom, daily consistent practice, clear instructions, and visual demonstrations were all found to improve the ability of children with ASD to self-regulate their emotions and behaviors (Carroll-Wray, 2019).

45

Classroom Strategies and Modifications

- Simple changes within the classroom environment can create a more empowering atmosphere for children with ASD by enabling them to gain self-control and to attend to tasks longer (Wolfe, 2013).
- Social and emotional areas of development have also been shown to improve in children with ASD (Wolfe, 2013).
- For children with ASD who have hyposensitive sensory systems; modifications such as using bright-colored objects, providing hugs, playing music, and increased physical activities have been found to increase their level of involvement (Wolfe, 2013).

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Classroom Strategies and Modifications

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47

Classroom Strategies and Modifications

- Children with hypersensitive sensory systems respond better to more predictable outcomes and fewer sensory inputs (Wolfe, 2013).
- Giving a wide variety of options allows for greater chances for children to find what fits them best (Wolfe, 2013).
- Providing different tools like yoga balls, sensory stations, and buckets of sand or water can help promote development in children with sensory impairments (Wolfe, 2013).

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Exercise-Based Interventions

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49

Exercise-Based Interventions

- Has shown to decrease repetitive behaviors and emotional outbursts (Bremer, Crozier, & Lloyd, 2016).
- Research has also found improved cognition, attention span, and social-emotional skills in children with ASD who participate in exercise-based activities (Bremer et al., 2016).
- New data has supported its effectiveness in non-verbal children with ASD (Bremer et al., 2016).

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CONTINUED

Exercise-Based Interventions

- Some examples of exercise-based interventions include running, swimming, yoga, gymnastics, martial arts, and horseback riding (Bremer et al., 2016).
- Horseback riding showed moderate effects while martial arts was proven highly effective (Bremer et al., 2016). Kata techniques showed excellent results in reducing stereotypical behaviors in children with ASD (Bahrami, Movahedi, Marandi, & Abedi, 2012).
- Overall reduction in stereotypic movements and an improvement in self-regulation have resulted from this intervention model (Bremer et al., 2016).

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CONTINUED

Chinese Mind-Body Exercise

- A mind-body intervention is defined as "any intervention which focuses on the interactions among the brain, mind, body, and behavior, with the intent to use the mind to affect functioning and promote health" (Chan et al., 2013, p. 1).
- *Nei Yang Gong* (NYG) is a traditional Chinese Chan-based mind-body exercise (Chan et al., 2013).
- It has been explored as a possible treatment approach to improve the self-control strategies of children with ASD (Chan et al., 2013).

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Chinese Mind-Body Exercise

- Utilizes fluid motions that chain together into harmonious and peaceful sets of movement patterns (Chan et al., 2013).
- Creating and maintaining a natural and calm demeanor holds great significance in this approach (Chan et al., 2013).
- "*Nei Yang Gong* set comprised five types of movement: tranquil stand, shoulder relaxation, nasal bridge massage, *Qi*-circulating movement, and passive *Dan Tian* breathing" (Chan et al., 2013, p. 5).

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Chinese Mind-Body Exercise

- The two main goals are (Chan et al., 2013):

1. Establish a greater connection with one's self by enabling a more tranquil state of mind and better self-control.
2. Provide better physical flexibility, blood flow, and loosen tight muscle while improving *Qi.*

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CONTINUED

Chinese Mind-Body Exercise

- A total of 46 participants took part in a randomized controlled trial comparing the effects of Progressive Muscle Relaxation (PMR) technique to the Chinese Mind-Body Exercise *Nei Yang Gong* to determine self-control capabilities of children with ASD (Chan et al., 2013).
- Whenever negative feelings or aggravation occurred, the participants were taught to utilize NYG self-guided massages (Chan et al., 2013).
- Some of these movements involved lying down with the participants' hands on their stomachs and concentrating on their breathing (Chan et al., 2013). Other movements consisted of bending the knees and maintaining balance to become more self-aware (Chan et al., 2013). Another motion involved making small circular strokes in front of the chest and the abdomen (Chan et al., 2013).

55

CONTINUED

Chinese Mind-Body Exercise

- Participants took part of either NYG or PRM biweekly for 4 weeks (Chan et al., 2013).
- The participants reported being angered less easily and being able to control themselves while using the NYG method (Chan et al., 2013).
- Increased activity in the anterior cingulate gyrus (modulates self-control) was documented utilizing an enhanced EEG machine for participants in the NYG group (Chan et al., 2013).

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CONTINUED

Chinese Mind-Body Exercise

Measure	NYG	PMR
Neurophysiological Enhancement	There was increased brain activity in both low and high-functioning groups.	Increased brain activity was found only in the low-functioning group but not in the high-functioning participants.
Behavioral Changes	Positive results were found in both groups.	The high-functioning groups showed decreased ability to attend to tasks and the low-functioning participants engaged more in self-stimulatory and repetitive behaviors.
Neuropsychological Measures	Low and high-functioning groups showed same level of progress.	Yielded the same results as the NYG group.

Table by author, adapted from Lau (2017).

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CONTINUED

Cognitive-Behavioral Therapy (CBT)

- "Is a talk-based therapy, with integral behavior components (e. g., exposure to fears) designed to help participants identify negative thoughts and develop coping strategies" (Danial, 2013, p. 2).
- Proven to be an effective tool against anxiety in children with ASD (Danial, 2013).
- Should be considered as a possible treatment intervention for children with ASD (Danial, 2013).

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Cognitive-Behavioral Therapy (CBT)

- CBT helps to create a way out of anxiety by the utilization of different coping strategies (Danial, 2013).
- By knowing and recognizing specific objects and situations that trigger anxiety, empowerment and confidence can be gained by practicing different ways to handle these scenarios (Danial, 2013).
- "Common components of CBT include cognitive restructuring, affective training, emotion recognition, parent education, and gradual exposure to fearful stimuli" (Danial, 2013, p. 4).

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Cognitive-Behavioral Therapy (CBT)
Process:

Individuals identify anxiety-inducing situations, and conceptualize specific solutions on how to cope with it in the future.

Individuals utilize and master these newly-learned coping techniques by engaging in tasks that are more challenging.

Figure by author, adapted from Danial (2013).

60

Cognitive-Behavioral Therapy (CBT)

- CBT increases the participant's level of confidence when dealing with negative situations through more positive results from previous experiences (Wood, Fujii, & Renno, 2011). It improves the participant's ability to overcome previously-feared situations and objects, and provides greater adaptation skills to future anxiety-filled scenarios (Wood et al., 2011).
- The key to successful implementation of the CBT program relies on how well it accommodates the specific needs of the individual (Danial, 2013).

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Cognitive-Behavioral Therapy (CBT)

Considerations in the population of children with ASD (Danial, 2013):

1. Including visual inputs that will make the topic more engaging
2. Teaching children different emotions
3. Social skills training
4. Increasing independence in functional performance
5. Balancing children's interests and preferred activities with ensuring successful experiences in different social situations

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Multi-Sensory Environment (MSE)

- Is a collection of objects and equipment that are present in a room with the goal of providing stimulating or relaxing sensory experiences (Brandenburg, 2012).
- Most MSEs include bubble tubes, equipment allowing music and other sound to be transmitted, projectors, and fiber optic lights (Brandenburg, 2012). Some of the equipment have switches that encourage the individual to interact with it (Brandenburg, 2012).

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Multi-Sensory Environment (MSE)

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64

Multi-Sensory Environment (MSE)

- A study by Brandenburg (2012) included 5 students with autism to observe stereotypic behaviors that are characteristic of the diagnosis.
- Treatment consisted of individually-based sensory interventions provided in a multi-sensory environment (Brandenburg, 2012).
- Decreased occurrence of stereotypical behaviors was found in all participants (Brandenburg, 2012).

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Multi-Sensory Environment (MSE)

- A study by Thompson (2011) randomly sampled 50 children with ages 8 to 18.
- Participants' behaviors were measured before, during, and after play in an MSE (Thompson, 2011).
- Many improvements in sustained attention during and after the MSE play were found, with a 14% increase after engagement in the intervention (Thompson, 2011).
- Mean scores for self-injurious behavior decreased considerably during and after engagement in the intervention, with a reduction rate of over 98% after MSE play (Thompson, 2011).
- Average happy (up by 16%) and relaxed (increased by 17%) behaviors were at their peak during the MSE intervention (Thompson, 2011).

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Sensory Gardens

- A sensory garden "is a self-contained area that concentrates a wide range of sensory experiences" (Hussein, 2010, p.116).
- Designing a sensory garden takes into consideration different factors such as color choices, environmental layout, textural inclusions, and wildlife additions to maximize sensory enjoyment (Hussein, 2010).

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Sensory Gardens

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Sensory Gardens

- Use of "sensory gardens" was explored at schools for children with special needs in the UK (Hussein, 2010).
- Information obtained from interviews with teachers and therapists, along with observations of children's behaviors found increased social skills, decreased anxiety, and more happy responses (Hussein, 2010). Children also showed improved ability to work with others (Hussein, 2010).
- The sensory-oriented design was beneficial for sensory, emotional, social, and adaptive development (Hussein, 2010).

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Video Modeling

- Videos are helpful in teaching some children with ASD due the following reasons (Burns, 2012):

1. Since children with ASD present with different levels of development, videos can be customized to meet their individual needs.
2. Children with ASD are more visual learners. Deficits in receptive language capabilities make it difficult to learn using traditional oral teaching.
3. Distracting stimuli that is commonly present in a classroom setting can be removed during video editing to maximize the learning experience.
4. Difficulties in social interaction make watching videos more tolerable rather than actual conversations with another person.
5. Positive reinforcement can be incorporated in videos to encourage children to attend.

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Video Modeling

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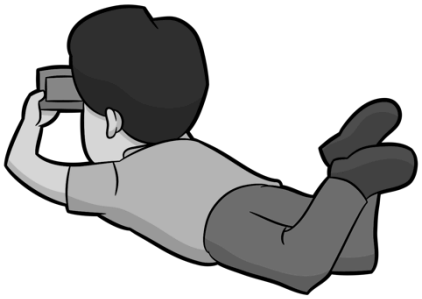

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Video Modeling

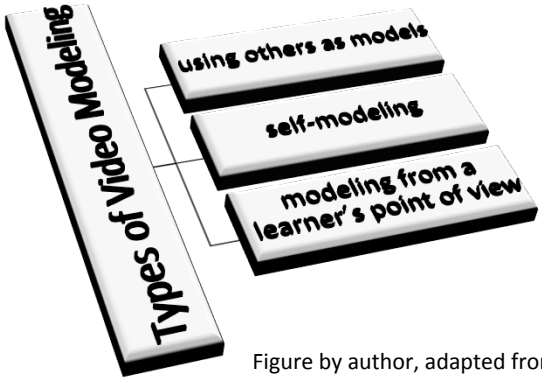

Figure by author, adapted from Burns (2012).

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Video Modeling

Video Modeling Using Others (Burns, 2012)

- The desired behavior is demonstrated by a skilled individual who could be a person of the same age as the learner or an adult.
- The learner tries to demonstrate the appropriate behavior after watching the video.

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Video Modeling

Video Self-Modeling (Burns, 2012)

- The learner is videotaped demonstrating the behavior.
- The film is then revised to only show appropriate behaviors. Off-task behaviors, assistance, and cues are all deleted.
- The edited video is shown to the learner. Then the learner attempts to demonstrate the desired behavior.

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Video Modeling

Video Modeling From Learner's Point of View (Burns, 2012):

- This is completed with the video positioned over the shoulder of the peer model or the adult.
- The hands and other necessary inputs to perform the desired behavior are included in the video. If the hands are not needed for task performance, then the video is completed in the perspective of the learner.
- The appropriate behavior is attempted after the learner reviews the video.

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Video Modeling

- Increases the predictability of certain situations resulting in improved behavioral outcomes in children with ASD (Schreibman, Whalen, & Stahmer, 2000).
- Research has found that video modeling using others and video modeling from the learner's point of view has the same level of effectiveness (Schreibman et al., 2000).
- Video modeling using others, video modeling from the learner's point of view, and self-modeling are all found to produce the same results in terms of accuracy and automaticity of subjects' responses (Van Laarhoven, Zurita, Johnson, Grider, & Grider, 2009).
- Self-modeling demands an almost double amount of effort compared to the other types, which makes it not as cost effective (Van Laarhoven et al., 2009).

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References

- See handout for a complete reference list.

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Questions?

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