A Short Introduction to Autism Spectrum Disorders

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CONTENTS

Caution: As with any discussion of individuals, particularly of individuals with Autism Spectrum Disorders, it should be remembered that each person is an individual first. The information provided is general in nature and should be used to help guide finding the individual's unique strengths and challenges.

Chapter 1: Definition and History of Autism Spectrum Disorders

- Definitions related to Autism Spectrum Disorders
    - Autism Spectrum Disorders (ASD): "developmental neurobiological disorders characterized by severe and pervasive impairments in reciprocal social interaction skills and communication skills (verbal and nonverbal), and by restricted, repetitive, and stereotyped behavior, interests, and activities" (Bodea & Lubetsky, 2011).
        - "As a neurodevelopmental disorder, ASD arises very early in life, often has associated biological and medical conditions, and is often not easily treated" (Joseph, Soorya, & Thurm, 2015).
        - Autism Spectrum Disorders is a broad category; individuals who are diagnosed with ASD may have a number of differences between them, including: IQ, adaptive abilities, strengths, challenges, comorbidities, gender, sexuality, etc…
        - As a lifelong neurodevelopmental disorder, the expression of an Autism Spectrum Disorder may change within a single individual, with symptoms improving or remitting, worsening, or new symptoms may develop; all within the individual's lifespan.
        - ASD is not the result of bad or permissive parenting. Individuals with ASD do not "choose" to act like they do. There are distinct neurological differences within the brains of individuals with ASD that underlie the behavior.
        - This should not be considered an excuse for "bad behavior." This should be considered an explanation for the underlying disorder, and should help inform those working with individuals with ASD.
        - There are a number of different evidence-based practices that can help the person with ASD develop the skills necessary to be productive, successful members of society (please see the National Standards Project from the National Autism Center for a list and description of current evidence-based practices).

- Autism: the word autism comes from the Greek word “autos” meaning “self.”
- Asperger Syndrome: a neurodevelopmental disorder closely related to Autism that is characterized by clinically significant difficulties in social interaction, along with restricted, repetitive, and stereotyped patterns of behavior and interests.
    - Main distinctions between Asperger’s and Autism have been absence of a significant intellectual or communication delay or disorder.
    - Some individuals with Asperger’s have been noted to exhibit marked clumsiness.
    - Often also referred to as High Functioning Autism.
    - There has been a great deal of controversy over the years with this diagnosis, including:
        - Whether it could be consistently diagnosed separately from Autism.
        - Whether there were distinct neurobiological differences noted between Asperger’s Syndrome and Autism.
        - The folding of Asperger Syndrome into the broader category of Autism Spectrum Disorders in the Diagnostic and Statistical Manual—Fifth Edition.
- Pervasive Developmental Disorder: often used as a “catchall” for individuals who demonstrate some of the difficulties noted in Autism Spectrum Disorders, but that do not meet all of the criteria. Pervasive Developmental Disorder was the term used in the Diagnostic and Statistical Manual—Fourth Edition which included Autism. Pervasive Developmental Disorder has since been wrapped into the Autism Spectrum Disorders category in the Diagnostic and Statistical Manual—Fifth Edition. The International Classification of Diseases-10 continues to list Pervasive Developmental Disorders as the general diagnosis for individuals including Autism, Asperger’s, Rett Syndrome, and Childhood Disintegrative Disorder.
- High Functioning Autism: a description of functioning for individuals with Autism that generally implies an IQ in the average range and above and higher adaptive behavior skills.

        - The distinction between Asperger's Syndrome and High Functioning Autism can at times be very difficult to make.
    - Low Functioning Autism: a description of functioning for individuals with Autism that implies a significant cognitive impairment (generally an IQ below 70) and with lower adaptive behavior skills.
        - Individuals with Low Functioning Autism generally have significant expressive and receptive language deficits, have more stereotypies (repetitive or ritualistic movements, postures, or utterances), are more prone to echolalia (the immediate or delayed repetition of noises or phrases that the person has previously heard), and significant sensory issues (including both over- and under- sensitivity to sensory information.)
    - Comorbidity: a comorbidity is the presence of two or more chronic disorders in a single individual. Individuals with ASD can exhibit genetic (i.e., Fragile X, Tuberous Sclerosis), medical (i.e., sleep, epilepsy), and psychiatric (i.e., Anxiety, Depression) disorders.
- Autism Spectrum Disorders as a category has changed many times over its history. (adapted from Bodea & Lubetsky, 2011).
    - The first descriptions of individuals with features of autism were reported as early as the mid-1700's.
    - Eugen Bleuler (1911) uses the term "autism" to describe a group of symptoms of schizophrenia.
    - Leo Kanner (1943) first applied the term autism to a group of children that he had been studying at the time, who exhibited some of the following symptoms: disturbances in speech acquisition and use, echolalia, stereotypy, and obsessive insistence on sameness.
    - Hans Asperger (1944) identified a similar group of children in his studies at nearly same time in Vienna, Austria. These children exhibited similar oddities of speech and gaze, but he also noted difficulties in social integration. The children that Asperger studied appeared to be higher functioning than the children that Kanner studied. Asperger's paper on this was not

known to the larger medical community due to the second World War.

- Bernard Rimland (1964) proposed that a biological cause of autism was responsible for the symptoms seen. This called into question the "psychogenic" (having a psychological origin or cause rather than a physical one) etiology of Autism Spectrum Disorders.
- Bruno Bettelheim (1967) proposed the idea that Autism was the result of cold, unresponsive parents (particularly mothers) and questioned whether this style of parenting could have caused Autism.
- Michael Rutter (1967) refutes Bettelheim's claims related to a psychogenic cause for Autism.
- 1977: Twins research finds that autism is largely caused by genetics and biological differences in brain development (parents.com). There is a great deal of research starting in the 1970's and continuing through today that points to genetic and biological factors that give arise to the symptoms that are seen in Autism Spectrum Disorders.
- 1980: The Diagnostic and Statistical Manual—Third Edition distinguishes Autism from Childhood Schizophrenia.
- Lorna Wing (1981) published a paper on Hans Asperger's work in which she proposed a diagnostic category called "Asperger Syndrome."
- 1987: The Diagnostic and Statistical Manual—Third Edition Revised has a checklist for the criteria for diagnosing Autism.
- 1994: The Diagnostic and Statistical Manual—Fourth Edition included the diagnostic category of Pervasive Developmental Disabilities. Included in this category are the diagnoses: Autistic Disorder, Asperger's Disorder, Rett's Disorder, Childhood Disintegrative Disorder, and Pervasive Developmental Disorder, Not Otherwise Specified.
- 2013: The Diagnostic and Statistical Manual—Fifth Edition combines all of the subcategories into one umbrella diagnosis. Differentiations are made for severity, intellectual impairment, language impairment, association with a known medial or

genetic condition or environmental factor, and association with other known neurodevelopmental/mental/behavioral disorders.

Chapter 2: Diagnostic Concepts Related to Autism Spectrum Disorders

- Diagnosis of Autism Spectrum Disorders is based on the observations, testing, and interviews that are done with the individual and significant others in the individual's life (including, parent, teacher, etc., based on a number of factors including age and ability level).
    - Because diagnosis is based on observation, testing, and interview data, diagnosis of the disorder may be subject to the biases of the individuals doing the observing or interviewing, or answering the questions for the interviewer.
    - Diagnosis for Autism Spectrum Disorders can be made by a number of different professionals, including: medical doctors, psychologists, and clinical social workers. This list is by no means exhaustive, but does demonstrate the significant range of training that professionals making diagnoses may have in the area of Autism Spectrum Disorders. Some professionals may not be as rigorous in their application of diagnostic criteria, while others may be concerned with "over-diagnosing" ASD.
- Diagnostic and Statistical Manual—Fifth Edition (APA, 2013)
    - The Diagnostic Criteria Listed here are from the DSMV. There are other diagnostic criteria, such as the International Classification of Diseases 10, but this is the current diagnostic criteria used most frequently in the United States.
    - To qualify as have an Autism Spectrum Disorder, a person must meet both of the following criteria:
        - Persistent deficits in use or understanding of social communication and social interaction in multiple contexts, as manifested by the following, currently or by history (examples are illustrative, not exhaustive):
            - Deficits in social-emotional reciprocity, ranging, for example, from abnormal social approach and failure of normal back-and-forth conversation; to reduced sharing of interests, emotions, or affect; to failure to initiate or respond to social interactions.

- Deficits in nonverbal communicative behavior used for social interaction, ranging, for example, from poorly integrated verbal and nonverbal communication; to abnormalities in eye contact and body language or deficits in understanding and use of gestures; to a total lack of facial expressions and nonverbal communication.
- Deficits in developing, maintaining, and understanding relationships, ranging, for example, from difficulties adjusting behavior to suit various social contexts; to difficulties sharing imaginative play or in making friends; to absence of interest in peers.

▪ Restricted, repetitive patterns of behavior, interests, or activities as manifested by at least two of the following, currently or by history (examples are illustrative, not exhaustive):

- Stereotyped or repetitive motor movements, use of objects, or speech; (e.g. simple motor stereotypies, lining up toys or flipping objects, echolalia, or idiosyncratic phrases).
- Insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior (e.g., extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take same route or eat same food every day).
- Highly restricted, fixated interests that are abnormal in intensity or focus (e.g., strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interests)
- Hyper- or hypo- reactivity to sensory input or unusual interest in sensory aspects of environment (e.g., apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement).

- There are a number differences between criteria listed in the DSM V and previous criteria. Some of have been previously discussed, but they will be reviewed here along with additional differences.
  - Symptoms must be present early in life, but they may only become noticeable later once social demands exceed the capacities of the individual.
  - Symptoms must cause in clinically significant impairment in social, occupational, or other important adaptive area of functioning.
  - Disorders previously included in the DSM-IV of Autistic Disorder, Asperger's Disorder, or Pervasive Developmental Disorder-Not Otherwise Specified were wrapped into the current diagnosis of Autism Spectrum Disorders.
  - A new category area was created for those individuals who demonstrate deficits in social communication, but did not demonstrate the restricted, repetitive patterns of behavior, interests, or activities called Social (Pragmatic) Disorder.
  - Individuals making Diagnostic judgments related to ASD were directed that disorders in the past that may have been rule outs for ASD (i.e., Attention Deficit Hyperactivity Disorder) were now to be listed as being associated with ASD.
  - Functioning level was to be differentiated based on the amount of support that the individual requires. This could conceivably lead to a situation where an individual with a higher IQ but significant comorbid psychiatric diagnoses may require more support than an individual with lower IQ but who requires less support due to fewer behaviors.
    - Functional levels include (adapted from: APA, 2013, Lord & Jones, 2012):
      - Requiring support (where the individual would experience some interference in daily living due to the identified social communication and restricted and repetitive behaviors)

- Requiring substantial support (where the difficulties the individual has in daily living would be obvious to even a casual observer)
- Requiring very substantial support (where the difficulties the individual has in daily living would be significantly impacted with little to no effective social communication and significant restricted and repetitive patterns of behaviors, interests, and activities). The individual may exhibit great distress

Chapter 3: Theories Related to Autism Spectrum Disorders

- 1 in 68 children have been identified with ASD according to estimates from the Centers for Disease Control and Prevention in the United States. (cdc.gov, 2012)
    - Although this is an increase in prevalence estimates from previous reports between 2002 and 2010, it is not a change from the prevalence noted in 2010.
    - Some cautions that the CDC does recommend to be considered when making a judgment about the prevalence:
        - Many children identified with ASD were not receiving comprehensive developmental evaluations as early as they could be.
        - Black and Hispanic children are less likely to be identified with ASD. Those identified with ASD receive comprehensive developmental evaluations later than white children who are identified with ASD. This may indicate issues with identification of children with ASD in these communities rather than a difference in the prevalence of ASD in these communities.
- Causes of Autism Spectrum Disorders
    - There is still no single known cause of ASD. It is commonly accepted that there is both a genetic component and an environmental component to the development of ASD, although again no single set of genes, nor any single environmental factor have been definitively identified to cause autism.
    - Genetic risk factors (cdc.gov, 2016)
        - Individuals with a sibling with ASD are at a higher risk of having ASD
        - Certain genetic syndromes and chromosomal conditions are at a greater risk of having ASD (i.e., Fragile X Syndrome; Tuberous Sclerosis).
        - Children born to older parents are at a greater risk for having ASD.
        - ASD occurs in all racial, ethnic, and socioeconomic groups.
        - ASD occurs in about 4.5 times more boys than girls.

        - About 15-20% of cases can now be tracked to genetic or chromosomal abnormalities (McFadden, Minshew, & Scherf, 2011).
    - Environmental Risk Factors (Lyall, Schmidt, & Hertz-Picciotto, 2014) (Sandin, Kolevzon, Levine, Hultman, & Reichenberg, 2013)
        - Environmental Chemicals
            - Air pollution and proximity to freeways
            - Persistent organic pollutants
            - Pesticides
        - Maternal Lifestyle
            - Alcohol
            - Cigarette smoking
            - Maternal nutrition (Folate and Other B Vitamins, Fatty Acid Intake, Vitamin D)
        - Medically Related Factors
            - Pregnancy complications
                - Complications during the pre- and perinatal periods of pregnancy
                - Multiple births
                - Gestational diabetes
                - Gestational diabetes
                - Growth restriction
                - Preterm birth
            - Infections
            - Maternal medications
                - Maternal vaccinations
                - Maternal medication use (possible association noted with SSRI's and antidepressants.
            - Vaccines: this continues to be a very controversial causal factor with a number of studies reportedly disproving this factor, and a number of anecdotal reports from parents and caregivers supporting this causal factor.

- Neurobiological Differences Noted in Individuals with Autism Spectrum Disorders
    - Differences have been noted in a class of neurons called Mirror Neurons in individuals with Autism Spectrum Disorders.
        - In neurotypical individuals, mirror neurons activate both when the person is doing something, as well as when the person observes another individual doing a similar action. (Rizzolatti & Craighero, 2004)
        - Facial expressions and hand gestures cause activation of the mirror neuron system. (Montgomery & Haxby, 2008)
        - Mirror neurons may be important for imitation, action understanding, the evolution of gestural and verbal language, empathic attunement and theory of mind.
        - An impairment of the mirror neuron system explains some of the deficits noted in Autism Spectrum Disorders (including many of the areas noted in the previous bullet point) (Rizzolatti & Fabbri-Destro, 2010)
    - Differences noted in a number of brain structures, including:
        - Amygdala: "The amygdala is a brain structure that directly mediates aspects of emotional learning and facilitates memory operations in other regions, including the hippocampus and prefrontal cortex." (LaBar & Cabeza, 2006)
            - The amygdala is important in fear learning, emotional memory, emotional arousal, attachment, determining whether a stimulus is affectively relevant, and processing social information.
            - The amygdala is fact activating—information reaches the amygdala early in processing; below the level of cognitive awareness.
            - Highly connected to structures throughout the brain, including the posterior orbital and medial prefrontal cortical areas, the hippocampus, and the thalamus.
            - A number of different findings have been determined related to differences in the amygdala of individuals with Autism Spectrum Disorders, including:

        - Greater activation (Green, et al., 2013) to sensory stimulation
        - Decreased activation in response to eyes as opposed to neurotypical controls (Prior & Ozonoff, 2007); also decreased activation during basic facial processing, discrimination of emotions, and attribution of intent (Morgan, Wu Nordahl, & Schumann, 2013)
        - Decreased response when asked to identify what another person is thinking or feeling (Morgan, Wu Nordahl, & Schumann, 2013)
        - Enlargement of the amygdala (which has been correlated with hyperarousal) (Kushki, Brian, Dupuis, & Anagnostou, 2014)
        - Unusual cellular profiles (Morgan, Wu Nordahl, & Schumann, 2013)
        - Reduced neuronal size
- Prefrontal Cortex:
    - Components:
        - Orbitofrontal neurons show connectivity with regions associated with emotional processing (amygdala), memory (hippocampus), and sensory processing (inferior temporal visual association regions). (Wood, 2003)
        - Dorsolateral prefrontal neurons show connectivity with regions associated with motor control (premotor cortex, supplementary motor area, basal ganglia), performance monitoring (anterior cingulate), and sensory processing (parietal cortex, association areas). (Wood, 2003)
        - Important in such functions as: theory of mind, social decision making, social perception and judgment, attitudes and stereotypes, control of aspects of aggression and violence, relational information, affect

regulation, and regulation and control of behavior to respond to environmental stimuli.
    - Orbitofrontal cortex important in interpreting emotional prosody
    - Prosody also detected in right inferior frontal lobe
- A number of different findings have been determined related to differences in the prefrontal cortex of individuals with Autism Spectrum Disorders, including:
    - Abnormal overgrowth in young children (Uppal & Hof, 2013)
    - Decreased connectivity between the amygdala and prefrontal cortex structures (Tsatsanis & Powell, 2014)
    - Decreased activation during social interactions (Chisholm, Lin, & Armando, 2016)
    - Deficits noted both in higher cognitive functions (executive functions) and social-emotional behavior (both domains that are regulated by the frontal cortex) are noted with individuals with ASD. (Tsatsanis & Powell, 2014)

- Cingulate Gyrus
    - One influential theory proposes that this brain region detects the need for control, for example where there is competition between two or more ways of behaving in a certain situation, both of which may be triggered by events in our environment, requiring top-down input to resolve the conflict. (Bownds, 2008)
    - Primitive association area of visceral, motor, tactile, autonomic, and emotional information (Cozolino, 2006)
    - Involved in: evaluating emotional stimuli (determining emotional salience), episodic encoding, associating smells and sights with

pleasant memories, regulation of aggression, subjective experience of emotions, and emotional reaction to pain
    - Deficits have been noted in the cingulate gyrus that may impact on each of these areas. (Chisholm, Lin, & Armando, 2016)
- Fusiform (Face) Gyrus
    - Faces are among the most important visual stimuli we perceive, informing us not only about a person's identity, but also about their mood, sex, age and direction of gaze. The ability to extract this information within a fraction of a second of viewing a face is important for normal social interactions and has probably played a critical role in the survival of our primate ancestors. (Kanwisher & Yovel, 2006)
    - A region in the lateral aspect of the fusiform gyrus (FG) is more engaged by human faces than any other category of image. It has come to be known as the 'fusiform face area' (FFA) (Schultz et al., 2003)
    - Identified as being hypoactive in some individuals with autism
- Increases in white matter of the brain noted over time versus increases in grey matter development. Reduced grey matter volume noted in limbic-striato-thalamic circuitry, predominantly on the right, including the insula, posterior cingulate, and parahippocampal gyrus. (Chisholm, Lin, & Armando, 2016)
- Neurochemical abnormalities such as dopamine disruption have been noted. (Chisholm, Lin, & Armando, 2016)
- "Smaller, more densely packed neurons in the amygdala, hippocampus, entorhinal cortex, mammillary body, anterior cingulate gyrus, and nuclei of the septum; a decreased number of Purkinje cells in the posterolateral and inferior cerebellum; and cortical abnormalities. (Findings) from morphometric studies suggest dendritic

tree and neuropil underdevelopment, reflecting incompletely developed connections between limbic system structures and the cerebral cortex." (Im, 2016)

- Neural systems of individuals with autism have fewer and smaller centers to call upon in the brain and less flexibility to do so. Hence, when the environmental demands change and different abilities are needed to address these demands, the brain in autism has less flexibility and smaller resources to draw upon.

- Brain regions do not always work in synchrony or harmony (possibly due to the under-connectivity between brain regions)

- Enactive Mind
  - Enactive mind: "people's predispositions to orient to salient social stimuli, to naturally seek to impose social meaning on what they see and hear, to differentiate what is relevant from what is not, and to be intrinsically motivated to solve a social problem once such a problem is identified."
  - Heider and Simmel cartoons from 1994: "propensity of individuals without autism to see these geometric shapes in a social manner."
  - "In the EM approach, the child 'enacts the social world', perceiving it selectively in terms of what is immediately essential for social action, whereas mental representations of that individualized social world arise from repeated experiences resulting from such perceptually guided actions."
  - In summary, in the EM approach early social predispositions are thought to create the basis and the impetus for the subsequent emergence of mental representations that, because of their inseparability from social action (i.e., they are 'embodied'), retain their adaptive value. Infants do not build veridical models of the social world based on 'universals' or context-invariant representations. Rather, their models or expectations of the world follow their salience-guided actions upon an ever-changing environment that needs to be coped

with in an adaptive, moment-by-moment and context-dependent manner."

- It is theorized that individuals with autism struggle with attending to social stimuli, and have difficulty implying social meaning on what they see and/or hear. Some of the deficits noted in Autism Spectrum Disorders can be explained by this theory.

- Extreme Male Brain Theory: "people with autism simply match an extreme of the male profile, with a particularly intense drive to systemize and an unusually low drive to empathize." (Baron-Cohen, 1999)
  - Empathizing:
    - Identify a person's thoughts and feelings
    - Respond to these with an appropriate emotion
    - Women, on average, are better at identifying and responding to the thoughts and actions of other people. In lay language and psychology, this is called empathizing.
  - Systematizing:
    - Analyse or build a system
    - Mechanical, natural, abstract, collectible
    - Men, on average, are better at building systems from parts, and at understanding these systems. In this context, a "system" is anything with inputs and outputs that is governed by rules, like a car engine or weather pattern. Baron-Cohen calls this ability "systematizing."
- Theory of Mind
  - The understanding that other people have thoughts, beliefs, ideas, feelings, desires, etc…, that influence their behavior
  - "the ability to attribute knowledge, feelings, and intentions to others." (de Waal, Good Natured, 232)
  - "our ability to explain and predict other people's behavior by attributing to them independent mental states, such as belief and desires." (Gallagher & Frith, Functional Imaging of "Theory of Mind", 77.)
  - Theory of mind "…refers to two important abilities, (a) the capacity to recognize the thoughts, beliefs, and intentions of others and understand that these mental states are different

from our own; and (b) using this understanding to predict the behavior of others." (Carnahan & Williamson, 2010)

- Mental states that are inferred as a part of having a Theory of Mind
  - Purpose of intention
  - Knowledge
  - Belief
  - Thinking
  - Trusting
  - Wanting
  - Guessing
  - Doubt
  - Pretending
  - Deceit
  - Feeling
- Also known as:
  - Mental state attribution
  - Mindreading
  - Mentalization
  - Perspective taking
  - Empathic accuracy
- Theory of Mind Deficits in Autism Spectrum Disorders (Cumine, Leach, & Stevenson, 1998)
  - May be unable to perceive and comprehend the thoughts and feelings of others. They suffer from "mindblindness." They do not apprehend the fact that individuals have beliefs, thoughts, feelings, plans and intentions, i.e., mental states that influence their actions; nor are they able to comprehend that the thoughts, feelings, and actions of others need to be taken into account in social transactions as guides to reciprocal behavior (Prior & Ozonoff, 2007)
  - May have difficulty understanding that others have thoughts, feelings, ideas, etc…
  - May have difficulty taking into account others thoughts, feelings, ideas, etc…, when communicating or interacting with them.

    - Difficulty in reading the intentions of others and understanding the motives behind their behaviors.
    - Difficulty taking into account what other people know or can be expected to know, leading to pedantic or incomprehensible language.
- May have difficulty appreciating/valuing others thoughts, feelings, ideas, etc…
- May have difficulty taking the perspective of others during a conversation.
- Difficulty in predicting other's behavior, leading to a fear and avoidance of other people. Thus, there will be a preference for activities which do not depend on other people, or even require the involvement of others.
- May believe that others have the same thoughts and opinions that they do (Boutot & Myles, 2010)
- May have difficulty understanding why others would make a particular choice or do something because they themselves would not do so (Boutot & Myles, 2010)
- Difficulty in explaining own behavior.
- Difficulty in understanding emotions—their own and those of others, leading to a lack of empathy.
- Difficulty understanding that behavior affects how others think or feel, leading to a lack of conscience, of motivation to please.
- Inability to read and react to the listener's level of interest in what is being said.
- Inability to anticipate what others might think of one's actions.
- Inability to deceive or to understand deception.
- No sharing of attention, leading to idiosyncratic references.
- Lack of understanding of social interaction, leading to difficulties with turn-taking, poor topic maintenance in conversation, and inappropriate use of eye contact.
- Difficulty in understanding 'pretend', and differentiating fact from fiction.

        - May impact on the individual development of a coherent sense of self. (Paxton & Estay, 2007)
    - Impact of Theory of Mind Deficits on Reading Skills (Carnahan & Williamson, 2010)
        - Difficulties with Theory of Mind impacts on reading in the following fashions:
            - Tendency toward literal interpretations (because cannot take the perspective of speaker)
            - Perspective taking is important to "make sense of the actions of characters in a story" Understanding how and why a character behaves in a certain way is crucial for accurate comprehension
            - Understanding that different characters have different perspectives and shifting between those perspectives is how we come to understand text
            - Failure to recognize each character's perspective makes it difficult to make inferences or reconcile actions and behavior while reading
- Central Coherence
    - Frith (1989) describes 'central coherence' as the tendency to draw together diverse information to construct higher-level meaning in context. In individuals who process information normally, there is a tendency to make sense of situations and events according to their context. (Cumine, Leach, & Stevenson, 1998)
    - "…typically developing individuals focus on meaning or the big picture of events at the expense of small details." (Carnahan & Williamson, 2010)
        - Strong central coherence enables one to quickly comprehend and remember the gist of a story or situation. With strong central coherence, one can easily get a sense of the whole and not focus on the details. In attempting to reconstruct a story, tell about a place, or describe a situation at a later time, the details will not all be remembered. Those that are remembered may not be completely accurate, but the global meaning will be

understood and the remembered details will be consistent with the global meaning or gist. (Jacobsen, 2003)

- Strong central coherence may explain the ability to generalize. Generalizing requires recognizing what is relevant, the gist, so that the relevant can be recognized in new situations. That recognition of what is relevant in one situation, and then another, makes the second situation similar and familiar, even when the details are not all the same. This is clearly present in those with good executive functioning. With strong central coherence, one does not become distracted or overwhelmed by details that seem less relevant, or even irrelevant, to the central concept. (Jacobsen, 2003)

- "Our primary goal when presented with an event, concept, or task is to understand the central tenets and create meaning from the smaller parts." (Carnahan & Williamson, 2010)
- Individuals with autism have a strength in the ability to focus on the detail, but have more struggles with perceiving the whole, essence, or entirety of a situation.
- Some individuals with ASD may attend to irrelevant features of materials or the environment to the exclusion of more salient features
- These individuals may attend to specific parts or aspects of a situation without regard for the context within which the situation occurred. (Carnahan & Williamson, 2010)
    - May relate to overly focused attention. This appears to be associated with a reliance on an analytical and computational approach to processing incoming information. An analytical (versus holistic, gestalt, or synthetic) processing style is thought to underlie performance on tasks requiring the reconstruction of block designs, on which superior performance has been documented in people with autism (Bryson, 2005)
    - Failure to process information in context. The information processing of typically developing individuals is motivated by a drive to achieve higher level meaning and a preference for global processing. ASD individuals are

more prone to detail-focused processing. Difficulty with tasks that require integration of constituent parts into coherent wholes, but perform normally (or even in a superior fashion) on tasks that require a focus on detail or "local processing."

- Abnormalities of the hippocampus and its connection to the prefrontal cortex could lead to impairment in process of "feature binding." A reduction in the ability to integrate information into a coherent and meaningful whole.

- Implications of Central Coherence Deficits (Cumine, Leach, & Stevenson, 1998)
  - Idiosyncratic focus of attention. The child will not necessarily focus on what you as the teacher may consider to be the obvious focus of attention, or point of the task.
  - Imposition of own perspective. What appears prominent to the child will determine his perspective on the learning situation.
  - Preference for the known. Without the ability to quickly see the point, and 'get the drift' of others' actions and communications, the child with Asperger syndrome will feel safer sticking to known procedures and established routines.
  - Inattentiveness to new tasks. As a teacher, you will find it difficult to enthuse a pupil with Asperger syndrome by talking of new, exciting and interesting ideas, as their potential appeal will not be recognized.
  - Difficulty in choosing and prioritizing. Without a guiding principle or superordinate goal, the child with Asperger syndrome has difficulty in choosing and prioritizing.
  - Difficulty in prioritizing self, materials, experiences. Again, without a guiding principle or overall plan, the child with Asperger syndrome often has difficulty in matters of organization.
  - Difficulty seeing connections and generalizing skills and knowledge. Children with Asperger syndrome may show

great aptitude in one area of knowledge, but be unable to generalize this in a variety of situations.
        - Lack of compliance.
        - All of these difficulties which arise from the proposed Central Coherence Deficit affect the child's ability to integrate into his class group in school. They restrict the child's ability to cooperate with, or even simply, to notice the demands of others—affecting not only behavior but also thinking, and thus the ability to benefit from the school curriculum.
    - Difficulties with Central Coherence impact on reading in the following fashions:
        - "Students with ASD demonstrate attention to and memory for specific details and rote facts over conceptual or "big picture" ideas."
        - "When reading, many minor details are parsed out as we come to understand the essence of a story or passage. However, until the big idea forms, it is often necessary to hold smaller details in our working memory."
- Executive Functions
    - The neural system or systems underlying executive functions are responsible for the broad skills of organization, regulation, and awareness. (Killiany et al., 2005)
        - Organizational skills include: guiding attention, concentration, making decisions, planning, and sequencing
        - Regulational skills include: initiating behavior, repeating responses, and controlling anger, inhibiting irrelevant responses
        - Awareness skills include: recognizing deficits in oneself, complying to the social norm, and using feedback to regulate behavior
    - Executive functions generally controlled by frontal lobes
    - For general learning, attention must be guided appropriately, irrelevant responses must be inhibited, rules must be extracted from examples and goals must be generated as a task is executed (Volkmar et al., 2004)

- Executive function impairments are found among range of children with ASD, and other disorders (e.g., ADHD): (Tager-Flusberg, 2010) (Boutot & Myles, 2010)
  - Working memory
  - Planning and Organization skills
  - Inhibiting prepotent response
  - Shifting sets
  - Monitoring actions
  - Metacognition
  - Problem solving
- People with autism have difficulty inhibiting the well-practiced actions associated with particular familiar objects (Bryson, 2005)
  - "The ability to reflect on the self depends on what may be common to most if not all high-order executive functions; namely, the capacity to suspend immediate experience, whether direct perception or thought arising from perception, in order to think about that which is being experienced."
  - "They have difficulty disengaging from emotionally significant events or thoughts, and that these can become the focus of prolonged and obsessive or anxiety-driven attention. In my experience, reasoning with them is difficult, as their attention is overly focused on the event in question, and once fixated, it is extremely difficult for them to disengage and think about anything else. The potential significance of this is underscored by claims that the disengagement operation plays an important role in the regulation of emotion. Perhaps the most basic way we deal with emotional upset is by disengaging or distracting ourselves from the source of distress. In people with autism, difficulties disengaging attention may place them at increased risk for intense or prolonged emotional upset."
- Implications of Executive Function Deficit (Cumine, Leach, & Stevenson, 1998)

        - Difficulties in perceiving emotion. There is an inability to hold images of the different forms of expression internally. The person with autism or Asperger syndrome is guided by the external appearance of the face of the perceptual pattern, so that an open mouth can equally be an expression of fear of surprise. (The perceptual pattern thus dominating and determining the response is described as 'prepotent'.)
        - Difficulties in imitation. Similarly, there is a need to hold an image of the other's behaviors in mind long enough to be able to imitate it.
        - Difficulties in pretend play. In order to pretend, external objects in the environment have to held in mind, then transformed or represented (re-presented) as something else.
        - The difficulty with Executive Function Deficit theory as a primary explanation of autism impairments is that children with other developmental disabilities also evidence executive function impairments.
        - Difficulty in planning. Children with Asperger syndrome will often appear incapable of organizing an approach to a task.
        - Difficulty in starting and stopping.
    - Difficulties with Executive Functions impacts on reading in the following fashions: (Carnahan & Williamson, 2010)
        - "…while individuals with ASD are able to access background knowledge, applying relevant knowledge across texts may be challenging."
        - "In the case of reading comprehension, integrating text with relevant previous experience is crucial."
        - "True comprehension requires attention to some details with little regard for others. However, comprehension is not simply attention to detail. As we read, we monitor our comprehension and self-correct as necessary.

Chapter 4: Strengths of Individuals with Autism Spectrum Disorders (adapted from: Canavan, 2015; Bissonnette, 2009; Bissonnette, 2013; Bissonnette 2015)

Individuals with Autism Spectrum Disorders may demonstrate many of the following strengths:

- Visual Thinkers
    - They are generally fairly good with visuospatial reasoning.
    - They may "Think in Pictures." They may develop visual mental representations that are fairly elaborate and can be good at using these mental representation effectively for learning and vocational activities.
- Bottom-Up Processing
    - They demonstrate both an accuracy and attention to detail in their work.
    - They are particularly adept at noticing errors, inconsistencies, loopholes, or changes from previous patterns or directions.
    - They often demonstrate a systematic information processing style.
- Sustained attention to areas of interest
    - Persistence especially when completing tasks that are in an area of interest.
    - When they start a task, they often want to do it perfectly.
    - They may become highly skilled in a particular area.
- Excellent memory for details and facts
    - They may develop a deep knowledge of specialized topics.
    - They tend to have an excellent memory for facts, figures, dates, film dialogue, and visual patterns/structure.
    - They may develop an almost encyclopedic knowledge in areas of interest.
    - They may develop extremely precise technical abilities.
- Ability to thrive in a structured, well-organized environment
    - They often want to cooperate, and will respond to structured, well-organized directions and expectations that help them understand what is expected of them.
    - They can be very methodical in their approach to doing things

- Idiosyncratic forms of humor
    - They may often use puns, or make up their own jokes.
- A strong sense of justice, fairness, and right vs. wrong
    - They will most often not do anything that they perceive as deliberately wrong.
- Honesty and loyalty
    - They may persevere with a friendship, even when they have been disappointed.
    - When they ask a question, they will want an honest answer to it. There is no hidden motive to it.
    - They will tell you what they really think and feel about something, rather than telling you what they think that you want to hear.
    - They will tell the truth, even when what they say may get them in trouble.
    - They will provide you with an objective, logical analysis of situations.
    - They can be nonjudgmental listeners.
    - They are often very accepting of others.

Chapter 5: Comorbidities and Autism Spectrum Disorders

- Comorbidities in Autism Spectrum Disorders can be broadly broken down into four major types:
    - Comorbid Neurological Disorders: such as seizure disorders, sleep disorders, autonomic dysfunction, sensory processing disorder, intellectual disabilities, and communication and language disabilities
    - Comorbid Genetic Disorders: such as Fragile X Syndrome and Tuberous Sclerosis (this area will not be reviewed as a part of this short introduction)
    - Comorbid Medical Issues and Problems: such as feeding/eating issues, gastrointestinal issues, allergies, accidents/injuries/safety, dental issues
    - Comorbid Psychiatric Disorders: such as Anxiety, Mood Disorders, Obsessive-Compulsive Disorder, Attention Deficit Disorder, Post-Traumatic Stress Disorder, Attachment Disorder, Schizophrenia, Thought Disorder, and Oppositional Defiant Disorder
- Comorbid Neurological Issues (Ming, 2014)
    - Why do are individuals with ASD more susceptible to neurological disorders? (Ming, 2014)
        - Changes in brain function and structure found in ASD may be responsible for abnormal behaviors
    - Seizure Disorders (epilepsy)
        - “Seizures are generated when part of or the whole brain cells’ electrical activity discharges spontaneously and unexpectedly.” (Ming, 2014)
        - “(C)hildren are typically diagnosed with epilepsy after having more than two unprovoked seizures.” (Volkmar, et al., 2014)
        - Prevalence in the general population for seizures/epilepsy is .4 to 1% during childhood, with some giving a prevalence rate as high as 42%. (Volkmar, et al., 2014)
        - Seizures may be provoked by another medical condition, including: fever, hypoglycemia, electrolyte imbalances, drugs, or medication overdoses. (Ming, 2014)

        - "Epilepsy has a bimodal onset in autism, with a peak occurring in children under 5 years of age and then again in adolescence." (Volkmar, et al., 2014)
        - Types of Seizures: (Gillberg & Neville, 2011)
            - Atonic: generalized seizures with loss of postural tone and consciousness.
            - Myoclonic: single or multiple brief, shock-like jerking movements of the head, trunk or extremities
            - Absence (petit mal): staring spells, usually less than 20 seconds in duration, sometimes with a flickering of the eyes.
            - Complex partial (psychomotor): blanking out with associated automatisms (such as lip smacking, hand wringing, or plucking at clothes.
            - Generalized tonic-clonic (grand mal): alternate stiffening and jerking of extremities with associated loss of consciousness.
    - Sleep Disorders (Miano, Giannotti, & Cortesi, 2016) (Ming, 2014) (Volkmar, et al., 2014) (Aitken, 2012)
        - Individuals with Autism Spectrum Disorders are particularly susceptible to sleep difficulties. Sleep problems occur in from 40-86% of those with ASD. (Aitken, 2012) (Volkmar, et al., 2014)
        - The most common form of sleep problem noted in individuals with ASD is insomnia. According to parental reports, sleep onset problems and night awakenings also occur frequently. (Miano, Giannotti, & Cortesi, 2016)
        - One factor that may significantly impact on sleep for some individuals with ASD is bedroom access to a television or computer. (Miano, Giannotti, & Cortesi, 2016)
        - Some metabolic and physiologic factors that can influence sleep include: (Aitken, 2012)
            - Blood pressure
            - Presence of ear infections
            - Metabolic syndrome
            - Gastro-Esophageal Reflux Disease

        - Inflammatory biomarkers
    - Sleep disorders may also be related to: (Volkmar, et al., 2014)
        - ADHD
        - Asthma
        - Sensory hypersensitivities
        - Use of certain medications
        - Cosleeping
    - One proposed mechanism for certain sleep disorders is a disturbed circadian rhythm, with abnormalities in the melatonin production. (Volkmar, et al., 2014)
- Autonomic Dysfunction
    - The autonomic nervous system is responsible for maintaining the body's allostasis (the process by which the body responds to stressors in order to regain homeostasis). It does so with regulating input from the sympathetic (fight or flight) or the parasympathetic systems (rest and digest). (Panju, Brian, Dupuis, Anagnostou, & Kushki, 2015)
    - Autonomic atypicalities have been associated with ASD. (Panju, Brian, Dupuis, Anagnostou, & Kushki, 2015)
    - Porges' (2011) polyvagal theory proposes a possible second route of dysfunction for the autonomic nervous system. It may be that the individual's with ASD have difficulty "recruiting the neural circuit that regulates the social engagement system." The social engagement system is regulated by the parasympathetic system through the myelinated vagus which allows for social communication, self-soothing, and inhibition of the sympathetic-adrenal system. When this system is not able to be recruited successfully, the individual will be at greater risk for Fight, Flight, or Freeze (which are more sympathetic related systems).
    - "Arousal of the autonomic nervous system can energize a person to apply his repertoire of adequate coping responses to a situation, or act out in a socially inadequate manner." (Ory, 2007)

- Sensory Processing Disorder
  - Closely related to autonomic issues that individuals with ASD might experience are the Sensory Processing issues that may occur for the individual.
  - Many individuals with ASD experience difficulties regulating their sensory input. This may be experienced in a number of different ways, including:
    - Sensory modulation (regulating the intensity of responses to sensory input)
    - Sensory discrimination (incorrectly processing sensory input/information)
    - Sensory-based motor disorder (disorganization as a result of incorrect processing of sensory information) (https://en.wikipedia.org/wiki/Sensory_processing_disorder#Sensory-based_motor_disorder_.28SBMD.29)
  - Research has demonstrated that individuals with ASD show "neural hyper-responsivity to sensory stimuli, and that behavioral symptoms of SOR (sensory over-responsivity) may be related to both heightened responsivity in primary sensory regions as well as areas related to emotion processing and regulation." (Green, et al., 2013)
  - The individual with ASD may demonstrate: (Bryson, 2005)
    - "Hypersensitivity to sensory input results in states of overarousal and the adoption of an overly narrow beam of attention."
    - "Hypersensitivity to sensory stimulation, whether novel, unpredictable, or otherwise experienced as intense or disturbing, may induce a state of overarousal, such that the mind is obstructed by the senses, and information uptake is incomplete or distorted."

- "In an attempt to offset states of overarousal, information uptake may be further restricted by the adoption of overly narrow focus of attention."
- Narrowly focused attention is associated with acute perception, an analytical-computational and sequential approach to processing information, and a precise but context-dependent memory system.

- Intellectual Disabilities
  - Individuals with ASD can be anywhere on the bell curve for intellectual development from being quite gifted to having severe to profound intellectual disabilities.
  - For those individuals with ASD who are able to participate in intellectual testing, the following general observations have been made:
    - Wide scattering of skills
    - Tend to perform best on intellectual tasks requiring visuospatial reasoning, attention to detail and rote memory
    - Tend to have more difficulty with tasks requiring use of language, abstract reasoning, and integration/sequencing of information
    - Performance IQ generally higher than Verbal IQ (up to 15% of individuals with ASD demonstrate higher Verbal IQ than Performance IQ)
    - Comprehension subtest often the lowest verbal score (Prior & Ozonoff, 2007)
    - Uneven neurocognitive profiles noted during testing
    - Comprehension subtest difficulties may reflect deficits in conceptual reasoning, social judgment, and perhaps the ability to reason about other's minds.
    - Some individuals with autism may demonstrate Performance and Perceptual Reasoning score in the average range. They may demonstrate difficulties with processing speed and/or working memory that may cause significant issues for them

in learning, home, work, and community environments.
- Preoccupations, obsessions, and repetitive behavioral tendencies are closely associated with Savant Skills.
- Reitzel & Satzmari, 2003: Children with ASD have a number of specific deficits in information processing but also a number of age appropriate skills. It is perhaps the unevenness of the cognitive profile that places academic achievement at risk

o Language and Communication Disabilities
  - This is closely tied to the individual's Intellectual Abilities.
  - Even though this may be true, it is important to avoid limiting the individual based on their Intellectual Abilities (referred to as Cognitive Referencing). Many individuals can communicate better than their language skills may imply.
  - The development of language and communication skills is an inherently social activity, requiring significant back-and-forth, or reciprocal, interactions between the individual and people in his or her environment. This requirement may impact on the development of both language and communication skills.
  - Common language/communication deficits in ASD include:
    - Has flat or limited facial expression
    - May understand and use language in a very literal fashion
    - May not use gestures, or may use gestures in unusual ways.
    - May exhibit difficulties with initiating, maintaining, and terminating conversations. May have difficulty moving from a topic of interest, and may not demonstrate an awareness of others desire to talk about something else.
    - Fails to imitate actions or sounds

- May have little or no speech, or may be quite verbal
- Repeats or echoes words and phrases (echolalia)
- May use an unusual vocal intonation/rhythm. The prosody of their speech may be unusual, or communicate something like sarcasm even when this is not what the individual means.
- May demonstrate difficulties with understanding some word meanings, particularly those related to areas that are not of interest to the individual.
- May have difficulty with higher-order language skills: idioms, metaphors, inferences, paragraph comprehension
- May have a very formal language structure, or they may use an informal language structure when talking with others even when this is not appropriate.
- May have difficulties with developing a coherent narrative for an experience: may also be overly focused on the details of what happened without being able to communicate the gist of the experience.

- Comorbid Medical Issues and Problems
  - Feeding/eating issues
    - Individuals with ASD have a number of eating and food issues, including: (Volkmar, et al., 2014)
      - Food preferences
        - "Difficulties with change further complicate the introduction of new and varied foods in the diets of children with autism, thus the child may have a highly idiosyncratic diet with resultant implications for physical growth and development."
      - Food sensitivities
      - Pica (consumption of nonedibles)

- Gastrointestinal issues
  - Prevalence of gastrointestinal complaints in individuals with ASD is around 58%. (Burke & Stoddart, 2014)
  - Reported gastrointestinal disorders include: (Burke & Stoddart, 2014)
    - Heartburn
    - Bloating and abdominal pain
    - Food intolerance
    - Gastritis
    - Chronic constipation
    - Diarrhea
  - Gastrointestinal issues can cause irritability and aggression. (Monteiro, 2014)
  - Some association has been found between milk intake and gluten consumption with gastrointestinal problems such as soiling and increased abdominal pain. (Volkmar, et al., 2014)
  - Problematic behaviors may be a sign of abdominal pain or discomfort: (Monteiro, 2014)
    - Sleep disturbances
    - Self-Injurious Behaviors
    - Tantrums
    - Aggression
    - Oppositional behavior
  - A possible gastrointestinal issue should be suspected if the individual is “pressing his or her abdomen, holding the abdomen and crying, or exhibiting problem behaviors in relationship to meals.” (Monteiro, 2014)
- Allergies
  - Common allergic conditions seen in individuals with ASD: (Jyonouchi, 2014)
    - Food allergies
    - Aeroallergen allergies
    - Drug allergies
    - Chemical sensitivities

        - Allergic conditions “causing inflammation in the gut, airway, and skin may induce or aggravate psychiatric conditions.” (Jyonouchi, 2014)
        - Allergies can cause significant health emergencies and should be watched very closely.
    - Accidents/injuries/safety
        - Many individuals with ASD, even those who are verbal, may not be able to indicate that they are in pain (or they may have altered pain tolerance or awareness).
        - Many individuals with ASD do not show fear, are not aware of the consequences of their actions, or may not be able to anticipate the danger of a situation, and thus may be more at risk for accidents and injuries.
        - Some factors that may influence the risk for accidents and injuries in individuals with ASD include:
            - Intellectual ability
            - Age
            - Comorbid psychiatric illness
            - Poor emotional regulation
            - Inability to read the nonverbal cues from others: we often give nonverbal cues when someone is acting in a risky fashion and the individual with ASD may not pick up on them
            - Executive functioning difficulties: particularly difficulties with impulsivity and response inhibition
            - Social naiveté: may place themselves in unsafe positions due to manipulation of others
            - Sensory processing disorder, including hypersensitivities, may place the individual with ASD at risk to have unsafe responses in situations where sensory input triggers a fight or flight response
    - Dental issues
        - “Children who have inadequate (dental care) are at risk for major problems as they age, for example, dental pain may cause self-injurious behavior and untreated dental

problems can lead to other medical problems—sometimes severe ones." (Volkmar, et al., 2014)

- "Children with autism are often cited as having certain behavioral factors which may lead to an increased risk for caries. Behavior factors include: (Akhila & Sharmin, 2015)
  - Medications causing xerostomia
  - Dietary choice (preference or soft/sweet foods)
  - Poor oral hygiene
  - Requiring help with tooth brushing"
- "The other oral manifestations which are common in children with autism are: (Akhila & Sharmin, 2015)
  - Bruxism (20-25%)
  - Non-nutritive chewing
  - Tongue thrusting.
  - Self-injury (picking at gingiva, biting lips) creating ulcerations.
  - Erosion (many parents report regurgitation, medical consult may be indicated).
  - Caries-similar to general population, however some children receive sweet foods as behavioral rewards (suggest sugar-free substitutes).
  - Poor oral hygiene since home care measures is exceedingly difficult for many children/parents"
  - Dental and oral injuries due to seizure disorders—individuals with ASD "may suffer oral injuries during or after a seizure resulting in a fall or involving tongue biting." (Spivack, Robinson, & Ballesteros, 2014)
- "Prevention is a critically important aspect of dental care and one that is often overlooked or avoided given the multiple difficulties of a child with ASD." (Volkmar, et al., 2014)

- Comorbid Psychiatric Disorders
  - In a population-based study, it was determined that 70 % of their sample of individuals with ASD met criteria for at least one

additional mental disorder, and 41 % met criteria for two mental disorders. (Simonoff, Pickles, Charman, Loucas, & Baird, 2008)

- Anxiety
  - Across studies, 39.6% of young people with ASD had at least one comorbid DSM-IV anxiety disorder, the most frequent being specific phobia (29.8%) followed by OCD (17.4%) and social anxiety disorder (16.6%). (van Steensel, Bogels, & Perrin, 2011)
  - Reported prevalence of anxiety in ASD ranges from 18.6 to 84.1%. (Uljarevic, Nuske, & Vivanti, 2016)
  - "In trying to make sense of the world, people with autism often want to imagine the outcomes of events or situations that involve them. This may start from the position of trying to make the world less stressful by creating a picture or map of the future so that change or new experiences don't seem quite so daunting. Depending on how the thought processes are structured, however, rather than making life easier, this may lead to catastrophizing (or worrying about the worst-case scenario) as people imagine in great detail all the terrible things that may happen. Catastrophizing is not usually about likely or even possible events, but can be related to social paranoia – not understanding how non-autistic people operate, so creating an unlikely, negative future that revolves around misunderstanding the motivations of others." (Purkis, Goodhall, & Nugent, 2016)
  - Other factors that may influence the experience of anxiety for the individual with ASD:
    - Differences in individuals processing of the world: sensory hyper-sensitivities
    - Social interaction difficulties
    - Rigidity and need for sameness
    - Communication deficits
    - Peer or caregiver rejection
    - Bullying

        - Academic work
        - Seasonal disintegration
    - Recognizing that an individual with ASD may be experiencing anxiety: (Sims, 2011)
        - Increase in need for routine
        - Increased withdrawal into special interests
        - Reluctance to go to school
        - Stopping an activity that they normally enjoy
        - Increase in rigidity in thinking processes
        - Increase in restricted, repetitive and stereotyped patterns of behavior
        - Meltdowns
        - Difficulty calming down
- Mood Disorders
    - Several studies documented high rates of psychiatric comorbidities in individuals with ASD, especially with regard to internalizing disorders. An association has been frequently reported with mood disorders, including depression and bipolar disorders. Prevalence studies put rates of mood disorders in ASD between 1.4 and 70% of individuals with ASD. (Postorino, Vicari, & Mazzone, 2016)
    - A genetic overlap may exist between ASD and mood disorders. (Postorino, Vicari, & Mazzone, 2016)
    - Lynn (2000) identified four features in ASD that might influence development of a Mood Disorder:
        - A powerful predisposition for anxiety and stimulus sensitivity
        - Processing issues
        - Inertia or terror when stressed
        - Impaired ability to be practical about things; impaired ability to learn from experience
    - Other factors that may influence the experience of mood disorders for the individual with ASD:
        - Social isolation

- For individuals with High Functioning Autism—their insight and intellectual awareness may increase the risk for a mood disorders
- Differences in processing the world
- Peer/Caregiver rejection
- Bullying
- Unique life stressors (unique response to stressors)—stressful life events

▪ Recognizing depression in an individual with ASD: (Sims, 2011)

- Clear changes in mood, facial expressions, posture, etc.
- Increased agitation, irritability, and or aggression
- Disturbance in usual sleep pattern or escalation of pre-existing sleep problems
- Changes in appetite and/or significant changes in weight
- Loss of self-care skills, like washing and dressing
- Decrease in general activity
- Increased social withdrawal
- Reluctance to go to school
- Not coping so well in an environment like school
- Stopping an activity that they normally enjoy
- Changes in the character of special interests
- Increase in ritualistic behaviours
- Increase in--or the start of--self-injurious behaviour
- (Worried ruminations)
- Suicidal talk or ideas

o Obsessive-Compulsive Disorder

▪ Restrictive interests and repetitive behaviors are defining features in ASD. (Scahill & Challa, 2016)
▪ Prevalence of Obsessive Compulsive Disorder in individuals with ASD has been estimated at 2.6 to 37.2%. (Scahill & Challa, 2016)
▪ The most common type of compulsion seen in children with ASD is a ritual involving other individuals; nearly half

of the children diagnosed with OCD have compulsions that involved others having to do things in a certain way. (Lynn, Understanding and Helping the Asperger's Plus Child K-12 and Beyond Seminar Handout, 2012)

- Individuals with ASD who have OCD symptoms may also exhibit more repetitive telling or questioning, touching, or ordering. (Paxton & Estay, 2007)
- OCD and ASD (Baron-Cohen & Wheelwright, 1999)
    - Early accounts tended to assume obsessions were a form of repetitive behavior functioning to control high arousal
    - Another account suggests obsessions are the child's attempt to impose order or control in a world where social behavior appeared unpredictable and confusing
    - Individuals with ASD typically follow their interests or hobbies to an extreme and narrow degree, so that they become experts in their chosen field.
    - Children with ASD conditions show more obsessional interest in mechanical systems or other systems that can be understood in physical-causal or lawful terms.
- Other factors that may influence the experience of Obsessive Compulsive Disorders for the individual with ASD:
    - Repetitive behaviors
    - Differences in the individual's processing of the world
    - Inflexibility (need for routine and structure)
    - Focus on mechanical functions/systemitizing
- Differentiating ASD repetitive behaviors and OCD obsessions and compulsions
    - The repetitive behavior, or restricted area of interest, provides an aspect of pleasure, or self-calming, to the individual with ASD.

        - The obsession or compulsion causes the individual to worry.
    - Attention Deficit Disorder
        - Poor attention levels and over-activity are commonly found in children with ASD, and their coexistence can significantly change how a child behaves. (Karim, Ali, & O'Reilly, 2014)
        - Prevalence of ADD in individuals with ASD has been estimated at between 13 and 50%. (Cortese, 2016)
        - Individuals with a comorbidity of ASD and ADD have a greater risk of developing other psychiatric disorders, including: schizophrenia, bipolar disorder, depressive disorder, anxiety disorder, disruptive behavior disorder, and tic disorder. (Chen, et al., 2015)
        - "Living with a child with ASD and ADHD can often be described as 'eventful', with life dominated by a very overly active child who has little impulse control and in whom there appears to be no 'off button'. On a more serious note, these children are also more likely to suffer injury, have poor understanding of road safety, and are the ones the educational system may find the most difficult to manage." (Karim, Ali, & O'Reilly, 2014)
        - A genetic overlap has been proposed between ASD and ADD. (Cortese, 2016)
        - Other factors that may influence the experience of Attention Deficit Disorder for the individual with ASD:
            - Individuals with ASD tend to glance longer at objects than people
            - Difficulty shifting attention (both engaging and disengaging)
            - Difficulty with understanding information that requires constant shifts of attention
            - Ability to focus on one sensory modality at a time
            - Differences in eye gaze
            - Drawn into an internal world without an apparent awareness of the environment

        - Sensory differences may lead to distraction in certain environments
    - Post-Traumatic Stress Disorder
        - Increasing evidence suggests that individuals with ASD may be exposed more often to traumatic experiences, and may be more likely to develop PTSD. (Dell'Osso & Luche, 2015)
        - Factors that may expose the individual with ASD to experiences that may create Trauma: (adapted from Charlton, Kliethermes, Matthew, Taverne, & Tishelman, 2004)
            - Individuals with ASD are trained to be compliant
            - They are dependent on caregivers for a longer period of time
            - They are often unable to meet expectations
            - They are often isolated from resources to whom a report of abuse can be made
            - They are more likely to be impaired in their ability to communicate
            - They are more likely than other children to be placed in residential care
            - They are often not provided with general sex education; caregivers may not understand the need for sex education
            - They may be more believing of others and less prone to critical thinking; they may be easier for others to manipulate
            - They are often viewed negatively by society
        - In additional, individuals with ASD may have the following experiences which may impact create Trauma:
            - Others who are out-of-sync with them (who require them to process information faster or slower than they would prefer, or are able to)
            - Higher rates of harassment/bullying/sexual abuse/employment discrimination

        - Misunderstanding and intolerance of their "behaviors" by others
    - Possible Reasons for Increased Stress Response in Individuals with ASD
        - Cognitive and perceptual difficulties that may interfere with understanding what is happening
        - More difficulty coping with normal life stressors given the limited resources available
        - Increased emotional vulnerability
        - Poor judgment and lack of self-protective skills
        - Awareness of differences in functioning
        - Feelings of isolation and withdrawal
        - Predisposition toward difficulties with emotional regulation and impaired resiliency
        - Reduced protective and coping mechanisms
        - Difficulty adapting to change
        - Difficulty expressing grief/mourning
- Attachment Disorder
    - Attachment is the affective bond between a child and mothering figure. (Volkmar, Rogers, Paul, & Pelphrey, 2014)
    - Atypical patterns of social cognition and interaction are a core feature of ASD. Their emergence during early childhood coincides with the 'sensitive period' for the development of attachment relationships, which Bowlby stated occurred for most babies before the age of six months but which may sometimes continue into the child's second year of life. (Perry & Flood, 2016)
    - A meta-analysis of 10 studies of attachment in preschoolers with ASD…reported that across all studies, 53% of the children showed evidence of secure attachment, significantly lower than the rates of secure attachment in comparison groups. Moderators included diagnosis and mental ability, with both greater severity of social impairments and severity of intellectual disability adversely affecting the ability of a parent–child dyad to

establish a secure emotional attachment. (Volkmar, Rogers, Paul, & Pelphrey, 2014)

- Individuals with ASD may be prone to a more disorganized attachment. (Austin & Sciarra, 2016)
- The following behaviors have been noted in those with disorganized attachment: (Austin & Sciarra, 2016)
    - A display of contradictory behaviors that could alternate between a strong attachment behavior and one marked by avoidance, freezing, or being dazed.
    - Contradictory behaviors that might include strong avoidance followed by behaviors that are contact seeking, distressed, or angered.
    - Movements and expressions that are undirected, misdirected, incomplete, and interrupted that often include expressions of distress along with movements away from, rather than toward the attachment figure.
    - Movements that are stereotyped, asymmetrical and mistimed away from rather than toward the attachment figure and abnormal postures such as stumbling for no reason solely in the presence of the parent.
    - Movements and expressions that resemble freezing, stilling, and as if one were swimming underwater.
- One of the implications of these findings is that the attachment figure and the child with ASD will need to make an informed effort to develop a well-synchronized interaction pattern, although the pattern may develop later than usual or maybe not all. (Austin & Sciarra, 2016)

o Schizophrenia

- Prevalence of schizophrenia in individuals with ASD has been estimated at a mean of 12.8%. (Chisholm, Lin, & Armando, 2016)
- A genetic overlap has been proposed between ASD and schizophrenia.

- Abnormalities in similar parts of the brain are noted in schizophrenia and ASD
    - Amygdala
    - Fusiform gyrus
    - Hippocampus
- Both individuals with schizophrenia and individuals with ASD share a difficulty with Theory of Mind.
- Thought Disorders and ASD (Rumsey, Andreasen, & Rapoport, 1986)
    - High functioning individuals with ASD exhibit a higher incidence of poverty of speech, poverty of content, perseveration, and affective flattening.
    - May exhibit some derailment, illogicality, and “other thought disorders”, though less common than in Schizophrenia or Mania
    - Perseveration, echolalia are not uncommon in individuals with ASD
- Other factors that may influence the experience of Schizophrenia for the individual with ASD:
    - Misinterpretations of others behaviors/emotions, which lead to delusions (Chisholm, Lin, & Armando, 2016)
    - Difficulty with telling fantasy from reality
    - Poorly integrated sense of self
    - Disorganized thinking
    - Perseveration/getting stuck
    - Differences in individual’s processing of the world/perceptual distortions
    - Responses to psychosocial stress
- Mistaking Asperger Syndrome for Psychosis (Berney, 2004)
    - Thoughts expressed simply and concretely by someone who has difficulty in describing internal symptoms can sound very like hallucinations.
    - Occasionally, a very vivid account of events is held consistently but is plainly false; these perceptions

do not seem to trouble the individual or be associated with any functional change. There is the sense that the individual is living in a 'video world', only detectable and comprehensible if the interviewer has also seen the film.

- High arousal in a developmental disorder can produce an acute and transient psychotic state with hallucinations and thought disorder.
- Incomplete answers can sound like psychotic symptoms. For example, a bald report, without elaboration or context, of everyday teasing can sound like persecutory delusions.
- A pragmatic difficulty in appreciating the extent or limitations of someone else's knowledge of a topic, coupled with a tendency to obsessionality, can result in over-inclusive, irrelevant speech that mimics schizophrenic thought disorder.
- Impassivity and a lack of awareness of the emotional climate can look like inappropriate or blunted affect.
- The catatonic symptoms (e.g., odd mannerisms and postures, freezing or difficulty initiating movement) that occur in a variety of neurological conditions, including schizophrenia, can also occur in autistic-spectrum disorders.
- The slow and reluctant response of patients asked to perform a task that has no meaning for them resembles the negative symptoms of schizophrenia.
- Autistic-spectrum disorders can show improvement with neuroleptics

o Oppositional Defiant Disorder

- The symptoms of ODD according to DSM-5 include: often losing temper or being easily annoyed; and arguing with authority figures. (Kutscher, 2014)

- The DSM-5 separates the features of ODD into ‘angry and irritable symptoms’ (AIS), ‘argumentative and defiant behaviour’ (ADB) and ‘vindictiveness’ (APA, 2013).
    - In one study, symptoms of ODD were common, with 87% of the sample having one definitely present ODD symptom, and 55% having at least four. (Mandy, Roughan, & Skuse, 2013)
    - Symptoms of AIS were common in our clinical ASD sample and were associated with internalizing difficulties. People with ASD often struggle to understand and articulate their feelings, which can make their anxiety and low mood hard to detect. (Mandy, Roughan, & Skuse, 2013)
- Characteristic Features of ASD that May Appear to be Oppositional in Nature
    - Rigidity
    - May violate social rules
    - Perseveration
    - Overwhelming focus on own obsessions
    - Cognitive inertia
    - Difficulty shifting attention
    - Difficulty taking the perspective of others
    - Literal interpretation
    - Perceptual differences
    - May be unable to predict the consequence of behavior
    - Prone to hyper-arousal
    - May ask repetitive questions, for reassurance repetitively
    - May insist on routines staying the same

Chapter 6: Challenging Behavior and Autism Spectrum Disorders

A number of challenging behaviors have been associated with ASD. These include:

- Aggression: behavior that (potentially) results in injury or harm in another person or in property destruction without consideration of whether the aggressive behavior is 'deliberately' exhibited or not." (Horovitz, 2015)
- Attention-Seeking Behavior: "behavior that has been determined through functional analysis to be an attempt to get another individual to make personal contact" (Newman, Reeve, Reeve, & Ryan, 2003)
- Avoidance or Escape: actions on the part of an individual to avert or evade the attention of others, a particular task, or expectation.
- Concrete/Literal Thinking: thinking that is focused on the physical world. A tendency to focus on facts, the dictionary definition of things, and experiences from their perspective only. Difficulty understanding non-literal forms of language (such as idioms, metaphors, and sarcasm).
- Directive/Bossy Behavior: behavior that is meant to control the actions of another individual.
- Echolalia: the immediate or delayed repetition of noises or phrases that the person has previously heard
- Elopement: movement from an area that an individual is meant to stay in. Elopement often implies that the individual has left an area of safety and is engaging in unsafe behavior.
- Externalizing Behavior: negative behaviors (or energy) that is directed outwards toward the environment.
- Fear of Failure: stress or anxiety that develops around completing tasks or meeting a particular standard, especially tasks that one has had difficulty with in the past
- Fear of Success: stress or anxiety that develops when an individual is about to complete a particular task effectively or are about to meet a particular standard
- Impulsivity: a difficulty stopping oneself from enacting (carrying out) a prepotent (exceptionally powerful or habitual) response

- Internalizing Behavior: behaviors that arise from directing negative energy or problems inwards toward the self.
- Irritability: abnormal disposition to uncontrolled anger or aggression (Cortese, 2016)
- Lack of Motivation: a lack of drive to complete goals.
- Negative Language: language that is offensive to others (i.e., swearing).
- Meltdown: extreme emotional/behavioral response to stress or overstimulation (Lipsky & Richards, 2009, pp. 20)
- Perfectionism: "a tendency to hold excessively high standards associated with clinically significant distress or impairment." (Egan, Wade, Shafran, & Antony, 2014)
- Perseveration: repetition of a thought or response beyond when it is appropriate.
- Rage Incident: a violent, uncontrolled experience or expression of anger that is often out of proportion to the situation
- Rigidity: "Insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior (e.g., extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take same route or eat same food every day)." (APA, 2013)
- Rude/Insensitive Behavior: behavior that is blunt and to the point. The behavior lacks social awareness and social nuance.
- Self-Injurious Behavior: behavior that is directed at the self that is intended to injure or damage a part of the body.
- Self-Stimulatory Behavior: also known as stimming, it is the repetition of physical movements or sounds designed to provide stimulation to the individual (often it is designed to address underlying sensory needs, or to block noxious stimuli from the individual's environment
- Stereotypic Behaviors: repetitive or ritualistic movements, postures, or utterances
- Stuck: inability to move on from an activity, thought, or response
- Tantrum: an outburst of anger or frustration when the individual is required to do something that they do not want to do, or denied access to something that they desire

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