

Stress and the Student With Autism Spectrum Disorders

Strategies for Stress Reduction and Enhanced Learning

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Shane, who is in Ms. Jones's third-grade class, has autism. Ms. Jones has provided him with a schedule, a picture communication system, and a positive reinforcement system for his learning tasks. He is demonstrating progress toward his individualized education program (IEP) goals, but he still struggles with attending for any length of time, bounces and moves frequently in his seat, and often has meltdowns after lunch. Ms. Jones is using all the strategies she can think of to support his learning. However, she still believes that she is missing something. Perhaps what Ms. Jones does not know is how Shane's physiological stress response is responding to his environment. This article describes the stress response in students with autism spectrum disorders (ASD) and provides practical classroom strategies for stress reduction and enhanced focus for learning.

Introduction

Surviving the classroom experience every day can be stressful for any teacher or student. However, for the student with ASD, the classroom can be even more challenging. Research indicates that many individuals with ASD have a heightened stress response and take longer to recover from stress.

Autism is a disability that includes deficits in social skills and communication, as well as stereotyped behaviors (APA, 2000). There are several educational interventions for children with ASD; most of them focus on improving specific deficits as well as academic skills. However, these interventions do not always directly address or acknowledge one of the underlying challenges for many children with ASD—a stress disorder. Research suggests that as many as 84% of children with autism also have an anxiety disorder (Bradley, Summers, Wood, & Bryson, 2004). In

fact, Kanner (1943), the individual who first described autism, stated that children with autism showed extreme anxiety and fearfulness.

Review of the Stress Response

It is helpful to have a general understanding of the physiology of stress in order to understand how stress affects individuals with ASD. *Stress* is any demand placed on the mind or body that triggers a chemical response in the organism (Selye, 1956). Stress is not inherently bad: the interpretation of the stressor or incident determines how the body responds. For example, one individual may perceive going for a bicycle ride as relaxing, whereas another person may perceive that it is a stressful activity. The first rider is competent, and the process of riding is automatic; she can enjoy looking at the trees and nature while she rides through the park. For the unskilled rider, however,

the challenge of trying to balance, steer, and watch for obstacles creates a very different experience. This individual cannot even think about looking at the trees while she rolls through the park. Hence, depending on an individual's perceptions and experience, she may find any event distressing or not distressing. For the second individual who perceives riding a bike as very distressing, a series of events take place in the body to prepare her for action (Nolte, 2002). See box, "Functions of Brain Structures in the Stress Response," which describes the function of varying brain structures during the stress response.

This chain of events starts with several structures of the brain. Information comes into the body through the sensory system and enters the thalamus and amygdala. The thalamus is a sort of sensory information relay system

and helps regulate arousal and awareness. The amygdala serves to perceive whether something is a potential threat and is important in regulating emotional tone and social interaction (Morgan, 2006). If the amygdala perceives an event as a threat, a chain of hormonal events takes place to prepare the body for "fight or flight." This fight-or-flight response is one that most people know well from such experiences as a near-collision while driving a car or for many, public speaking or having math anxiety. In each of these situations, the hormones released are preparing the body with extra energy so that it can respond to the event. Figure 1 illustrates the stress response by showing the locations within the brain and the hormones triggered to prepare the body for action. The sequence is a bit like playing "telephone" and proceeds as follows: the amygdala perceives a

threat and tells the hypothalamus, the hypothalamus tells the pituitary, the pituitary tells the adrenal glands (with adrenocorticotropic hormone, or ACTH), and finally the adrenal glands tell the organs and muscles to prepare for action by sending them hormones: cortisol, epinephrine and norepinephrine. This process is known as the hypothalamic-pituitary-adrenal (HPA) system (Bartels, deGeus, Kirschbaum, Sluyter, & Boomsma, 2003).

In typical individuals, cortisol is higher in the morning and lower in the afternoon, with variations that are based on the demands of the environment. Research has typically used measures of this hormonal level as an indicator of stress. For example, when researchers asked undergraduate students to give a presentation, fast (that is, not eat), or compete, each stressful experience elicited changes in



Functions of Brain Structures in the Stress Response

Adrenal cortex: The pituitary hormone adrenocorticotrophic hormone (ACTH) stimulates the adrenal cortex, and the adrenal cortex releases cortisol.

Adrenal glands: The adrenal glands consist of the adrenal cortex (outer area) and the adrenal medulla (inner area).

Adrenal medulla: The hypothalamus stimulates the adrenal medulla to produce norepinephrine and epinephrine (adrenaline). These two hormones work to give the body energy in the fight-or-flight response.

Amygdala: The amygdala is the central part of the brain. It modulates fear and anger, perceives threats, and regulates the emotional tone of social interactions.

Hypothalamus: The hypothalamus controls the pituitary gland in the stress response and releases corticotropin-releasing hormone (CRH) to stimulate the adrenal medulla.

Pituitary gland: The pituitary gland releases beta-endorphin and ACTH, which trigger the adrenal cortex to produce cortisol.

Thalamus: The thalamus relays sensory information and regulates arousal and awareness.

cortisol levels (Haussmann, Vleck, & Farrar, 2007). In addition to an increase in hormonal levels, many outwardly apparent symptoms occur when an individual is under extreme stress. These symptoms can include anxiety leading to social withdrawal, nervous or repetitive movements, difficulty with attention and cognitive function, easy arousal or anger/frustration, impairments in memory, sleep disturbances, poor decision making, and difficulty calming (Morgan, 2006), all of which are symptoms that often occur in individuals with ASD.

Evidence of a Heightened Stress Response and Autism

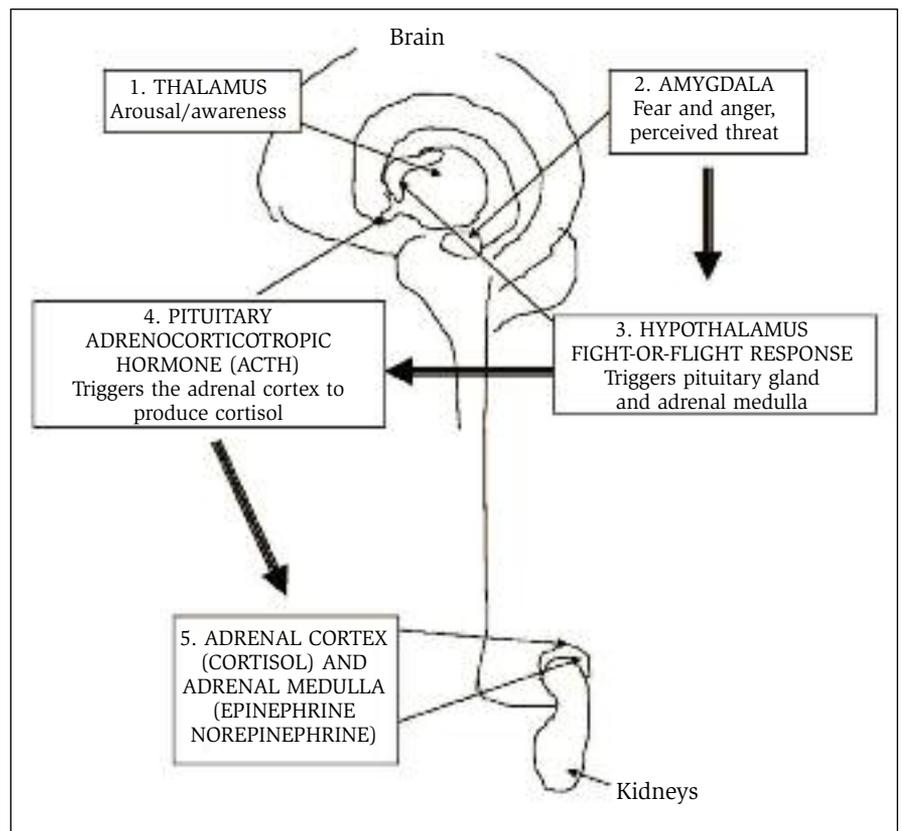
Research examining the physiological stress response in individuals with autism has revealed several interesting findings. First, brain imaging studies of individuals with autism have shown variations in the amygdala volume and possible correlations with nonverbal social impairments and anxiety. The amygdala is the portion of the brain that assists with perceived threats (Nacewicz et al., 2006; Sweenen, Posey, Shekhar, & McDougle, 2002). Second, researchers have found that levels of endorphins and ACTH are significantly higher in individuals with autism than in individuals with intellectual delays or typically developing

peers (Jansen et al., 1999; Tani et al., 2005). This finding suggests a heightened response to stress. In another study, individuals with autism showed more variations in their levels of cortisol throughout the day. They had a higher level of cortisol following

exposure to a novel event, again suggesting an exaggerated stress response (Corbett, Mendoza, Abdullah, Wegelin, & Levine, 2006). Finally, cortisol levels of children with autism in integrated settings were higher than those of their peers without autism, indicating perhaps that the integrated environment was more stressful for them than for their peers (Richdale & Prior, 1992). Although small increases in cortisol have a positive effect and provide quick energy, heightened memory, increased immunity, and lower sensitivity to pain, an overly responsive system can lead to anxiety (see box, "Behavioral Symptoms of Autism and Anxiety," which lists common behavioral symptoms seen in children with autism that match those of individuals with excessive stress and anxiety). Parents of children with autism also express significant concerns regarding their children's stress and coping abilities (Lee, Harrington, Louie, & Newschaffer, 2007).

Stress and ASD appear to be inseparable, but this inseparability does not mean that they are unmanageable.

Figure 1. The Stress Response



Behavioral Symptoms of Autism and Anxiety

- Repetitive movement
- Ritualistic or compulsive behavior
- Atypical attention
- Changes in cognitive function
- Easy to arouse
- Difficult to soothe
- Hypervigilance
- Sleep disturbances
- Poor decision-making skills
- Impairment in working memory

Goodwin, Groden, Velicer, and Diller (2007) have made inroads toward identifying primary stressors for people with ASD by creating a tool, the Stress Survey Schedule for Persons with Autism and other Developmental Disabilities. This schedule identifies situations that different individuals perceive as the most stressful. Potential stressors include change, anticipation and uncertainty, sensory/personal contact, food-related activities, social/environmental interactions, and ritual-related stress (e.g., having personal objects out of order; Goodwin et al.). A survey of individuals who were between 3- and 41-years old and had ASD indicated that stress increases with age, perhaps because families and early childhood intervention programs are sheltered and structured and often cater to the specific needs of very young children. As children age and spend more time in school and community activities, stressors increase. For that reason, teachers should employ strategies to reduce stress throughout the instructional day and help students with ASD learn to regulate their own stress levels.

Intervention Strategies to Reduce Stress in an Educational Setting

Environment

Novel settings, tasks, and materials can induce stress for all individuals but particularly for most people with ASD

(Dunn, 2007). Such new environments as classrooms, gymnasiums, and cafeterias can be overwhelming and distracting. Fluorescent lights, crowded shelves, colorful materials, new smells, and new sounds can all add up to create sensory overload. Eliminating

and gradually regain optimal functioning after a stressful experience.

Relaxation Corners

Sometimes new activities, a change in material, or just the demands of the day can create stress for students with

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unnecessary distractions by using such simple measures as the following is good practice:

- Close doors or cover shelves to hide material that is not in use.
- Turn off or cover fluorescent lights when possible, or replace them with incandescent lighting.
- Minimize noise by speaking in a softer voice, turning down public-address system speakers, and closing the door to the hallway.
- Avoid using loud noises, such as clapping or whistling, to get attention.

Familiarization

Allow time for familiarization to occur. The first few days of school are full of wide-eyed wonder for first-time students and can challenge even the most experienced teacher. After the first 2 or 3 weeks, everyone typically settles into a routine. Although some students with ASD may settle in quite quickly, some may not be at ease until the middle of the year, and still others may need the whole school year. It may be appropriate to introduce a new environment for only a few minutes at a time to a student who appears anxious, until the student indicates that he or she is ready to stay longer. Visits to new classrooms or new settings are a good way to help a child prepare for a change. Always follow a visit to a new setting with a return to a comfortable familiar setting, since cortisol levels tend to stay elevated in children with ASD. Returning to a familiar setting gives a child the opportunity to relax

ASD. Providing an area for relaxation or preferred sensory input is a simple strategy to help students. This area can be a corner of the classroom or a different room. Relaxation spaces or sensory rooms may be attached to resource rooms or be within a classroom; they provide students with a place to unwind while resource personnel or teachers are near them if needed. Encourage students to indicate when they believe that they will benefit from spending time in the relaxation corner; allow them to leave the activity that they are working on, relax, and then continue their work. Letting the student go to this space when he needs to and allowing him to choose preferred activities can reduce meltdowns later in the day. The availability of such an area will also help teach the student to self-regulate his own behavior. However, setting parameters is also important so that the student does not take advantage of this space and spend all day playing in the relaxation corner. The teacher may need to set limits on the number of times per day and length of time that a student spends in this area. Although allowing a student to spend time in the relaxation corner may seem disruptive to his work production, the child may accomplish more because he can regulate his stress level and spend more time in a productive mode. Students realize that even though an activity may be noisy or new, they can participate to the extent that they are comfortable; they are then able to increase participation at their own rate. Helping a student learn self-regulation gives him a valuable lifelong skill.

Many simple activities can be available in this relaxation corner. These activities can include the following:

- Students can flip through a notebook illustrating stretches or yoga poses and model them.
- Headphones can enable students to listen to music. They can choose relaxing classical, peppy country, or lively rock, depending on their personal preferences and needs.
- Movement activities such as jumping on a minitrampoline or bouncing on a therapy ball can be calming.
- A rocking chair in this space allows students to obtain needed vestibular input while listening to music or looking at a book.
- Lava lamps can also have a calming visual effect.
- Aromatherapy can be a helpful stress reducer. The teacher can place cotton balls with aromatherapy oils in small boxes or plastic containers. Students can make a game of identifying the smell or can just use them to relax.
- Students can listen to visualization stories on a tape recorder. Such stories can take a student through a relaxing story or a progressive body relaxation or guide them to their own visual place of relaxation.

Naturally, each student with ASD will prefer different calming sensory activities. The student or specialists such as occupational therapists, can add specialized activities as needed (see box, “Activities for Stress Reduction”).

Routines

Change can be a major stressor for individuals with ASD (Goodwin et al., 2007). Providing routines that are constant, visible, and followed can help reduce stress. Routines provide a predictable environment that helps students with ASD know what to expect. Educators have found that visual schedules are useful for students with ASD. Schedules can be in words or in pictures, depending on the student.

Activities for Stress Reduction

- Yoga, *Babar’s Yoga for Elephants* by Laurent de Brunhoff (2006)
- Tai chi
- Nutritious snacks
- Stretching exercises
- Aromatherapy bottles or boxes (citrus, lavender, mint, etc.)
- Fragrant hand lotions
- Exercise (walk/jog break)
- Swinging (outside play structures)
- Rocking (rocking chair in quiet area)
- Bouncing (trampoline, therapy ball)
- Lava lamps or slow visual light displays
- Visualization (listening to a visualization story)
- Heavy work break (carrying books, pushing chairs, pushing desks, etc.)
- Music of choice



The schedule should show the activities that will occur, their order, and for some students, how long the activity will last. In addition, cueing students about the time remaining for an activity is a good way to prepare them for transitions. Some students respond well to using a visual timer that shows the time remaining during an activity.

Individuals with ASD benefit from predictability, so avoid surprises whenever possible. If the school-day routine is going to change, be certain to update the visual schedule and make sure that the student is aware of the alteration (Flannery & Homer, 1994). In addition, educators can teach students to communicate a concern if their routine is disrupted by asking the teacher what to do: students can ask by using verbal questioning, using pictures to express confusion, or signing (Carr et al., 1994).

Choice

Although predictability is beneficial, too much repetition may have a negative effect on motivation, performance, and behavior (Van Bourgondien, 1996). Providing choices and a variety of activities and materials is important so

that students remain interested in and motivated by the educational environment. Choice does not have to alter students’ schedules; for example, the teacher may allow students to choose whether they would like to read at their desks or in the library. Such choice empowers the student and helps reduce disruptive behaviors. Another way to ensure that students with ASD can exercise choice is to build free time into the schedule and provide several activities that the child may select during that time. For example, teachers may allow a student to listen to music, go for a walk, or get a drink of water during the 5 minutes between academic lessons. Having the ability to make choices increases a student’s feeling of autonomy and increases engagement (Mithaug, Mithaug, Agran, Martin, & Wehmeyer, 2003), which in turn decreases anxiety.

Communication

Communication abilities differ widely among individuals with ASD; some students may be nonverbal, whereas others may have an age appropriate vocabulary. However, students with ASD typically have impaired use of lan-

guage in social situations. People with ASD tend to attach literal meanings to words and often miss subtle nonverbal cues. Teachers need to ensure that students with ASD understand instructions and have a method for letting their needs be known.

The teacher should present instructions at the student's level of understanding through preferred methods of communication (words, pictures, or demonstration). Instructions need to be clear and unambiguous. The teacher should clearly present expectations for success. If an unexpected response

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occurs following an instruction, review what you actually presented; perhaps the student interpreted the instruction in a different way. For example, while a student stood facing a dartboard, the teacher handed him a dart and said, "Try to hit the bull's-eye." The student walked up to the dartboard and hit the bull's-eye with his open hand. On reflection, the teacher realized that the student had performed exactly what she requested. The teacher rephrased the instruction to "Throw the dart at the bulls-eye," which resulted in the student's performing the desired action.

Many people with ASD are nonverbal, thus limiting expressive communication. Functional expressive communication skills are essential to understanding each person's needs and preferences (Van Bourgondien, 1996). When people do not understand another person's needs, frustration and anger can occur. It is important for students to have a communication system that matches their level of understanding. The most appropriate communication device may involve using objects, gestures, pictures, pictograms, written words, verbalizations, or a combination of them. In addition, students with ASD often process language more slowly than their peers. For that reason, giving time for each child to

understand a question or instructions is important. Allow extra time for each student to respond to a question or communicate with others, whether he uses words, gestures, or pictures. Understanding the preferences of each child helps students feel welcome and comfortable in their environment.

Exercise

Exercise is a beneficial stress reducer. Researchers have shown that regular, moderate physical activity decreases stereotypical behavior of children with ASD (Prupas & Reid, 2001) by enabling

the student to pay more attention to the task at hand. Providing physical activity breaks for students with ASD may not only help them sit calmly, but may also help them finish their work while seated at their desks. Taylor (2007) recommends a brisk jog or walk as often as every 90 minutes to help students stay calm and focused. Other positive physical activities include swinging on the playground or helping with heavy work in the classroom such as carrying books to the library or moving chairs, desks, or heavy mats. Such heavy work provides deep-pressure input to the system and can be a helpful centering activity.

Final Thoughts

Understanding the stress response in the typical individual and the irregularities of this response in individuals with ASD can help the teacher better comprehend why stress-reduction strategies are important in planning learning environments for these students. Although many of the strategies described in this article are not novel, understanding why they work and the importance of using multiple methods is important. For example, the typical student can function with one recess break in the morning; however, the student with ASD may need two to

four short breaks to enable him to focus throughout the morning.

In the scenario provided at the beginning of this article, Ms. Jones may be able to prevent afternoon meltdowns for Shane by adding relaxation breaks to the instructional strategies that she is already using. Allowing Shane to have 5 to 10 minute breaks with activities such as swinging, music with aromatherapy, walking, and heavy lifting after each 20 to 30 minutes of focused time will reduce the cortisol levels in his system and help prevent anger, frustration, or inappropriate behavior. Although this list of activities may work for Shane, planning stress reduction activities with the parents, teachers, therapists, and child (when appropriate) to ensure that the activities are supporting relaxation for the child rather than increasing stress is important. Remember, relaxation is individualized: although one person may like heavy metal, another may like classical music.

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