

Tutorial: Attention

WHAT IS ATTENTION?

In general, the word “attention” refers to the mental processes that enable people to be alert and to selectively focus on information from the environment or from the contents of their thinking. Included in this set of mental processes are the following:

- *Arousal and alertness*: being awake and receptive to incoming stimuli or other information
- *Preparing attention*: presetting oneself to attend to selected information (e.g., deciding what information to look for before beginning to read a chapter in a text book)
- *Selecting a focus of attention (concentrating)*: Attending to only one thing when there are many stimuli occurring at the same time (e.g., listening to the teacher talk when there are other activities occurring in the classroom)
- *Maintaining/sustaining attention*: maintaining a focus of attention over time (e.g., attending to a teacher’s lecture for a full 60 minutes;)
- *Suppressing/filtering distractions*: maintaining a focus of attention while also actively avoiding attention to competing stimuli or information (e.g., refusing to pay attention to student chatter while listening to a teacher’s lecture)
- *Shifting/switching attention*: changing the focus of attention from one thing or topic to another
- *Dividing/sharing attention*: actively paying attention to more than one source of information at one time (e.g., taking notes and listening to teacher talk at the same time)

Attention is important and has been intensively studied because it is the gateway to the rest of cognition. That is, students must be paying attention if they are to organize incoming information, comprehend it, remember it, engage in problem solving, and the like.

However, it is hard to distinguish primary attention problems from other cognitive problems and from emotional or behavioral problems. For example, if a student’s processing of information is slow (i.e., primary speed of processing problem), then it will be difficult to pay attention to fast-paced information. Or if a student has difficulty organizing incoming information (i.e., primary organizational problem), then again attention will be difficult to maintain. Similarly, students who are anxious, sad, or depressed may appear to have attention deficits when the problem is really an emotional problem. Thus staff and family members should try to identify the primary contributor(s) to the problem before proceeding with intervention and support plans. This web site should help with identification.

WHAT ARE ATTENTION DISORDERS AND WHY IS ATTENTION IMPORTANT FOR MANY STUDENTS AFTER TBI?

In the early days and weeks after a severe TBI, individuals may be in a coma or otherwise difficult to arouse. Such a severe disorder of attention is due to severe generalized brain trauma or damage to the brain stem. For most individuals, this state of minimal consciousness passes and the person becomes normally “vigilant”, but possibly with a variety of ongoing cognitive deficits.

In the months and years following a severe injury, both children and adults with TBI frequently report problems with concentration, distractibility, short attention span, forgetfulness, and difficulty doing more than one thing at a time. It is likely that these problems are related to damage to the frontal lobes, resulting in poor control over attentional functions, or related to widespread brain damage, resulting in generally slow and inefficient processing of information. Students with these problems may perform at adequate levels on educational or psychological tests that tend to be short and administered in a non-distracting environment. However, concentration, maintenance of attention, and shifting and dividing attention may nevertheless be difficult in busy and noisy real-world settings.

Mild-to-moderate brain injury can also have poorly controlled attention as a consequence. For example athletes who have a concussion often report distractibility to be among their problems for some period of time. This problem may resolve within a few days or weeks or may persist.

Furthermore, attention deficit hyperactivity disorder (ADHD) is one of the risk factors for TBI in children. Thus many students with TBI had a diagnosis of ADHD before their injury. Others acquire attention deficits and related disorders as a result of the injury. Therefore attention-related problems are common among students with TBI.

There are at least two main types of students with ADHD, which may be combined: those who are primarily impulsive and hyperactive (ADHD-H) and those who are primarily inattentive (ADHD-I). Characteristics of ADHD-H include the following: frequent fidgeting, squirming, and leaving the seat; inappropriate running or climbing; difficulty playing quietly; excessive talking; talking out of turn; difficulty waiting; frequent interruptions. Characteristics of ADHD-I include the following: distractibility; failure to pay close attention; careless mistakes; frequent inattention to others; weak sustained attention; poor organization of things and activities; frequent loss of things; poor follow through on tasks; aversion to tasks that require mental effort; forgetfulness. Students with the combined type of ADHD have characteristics from both lists.

Whether the problem is congenital or acquired as a result of brain injury, several problems tend to be associated with attention disorders. Students with attention-related disorders tend to be disorganized and impulsive, to have poor orientation to time, and to learn very inefficiently from the consequences of their behavior. In addition, they may have co-existing learning problems and behavior problems.

WHAT ARE THE MAIN THEMES IN INTERVENTION AND SUPPORT FOR STUDENTS WITH ATTENTION DEFICITS?

Understanding the Problem


As with all problems, step one is understanding the problem. For example, attention problems may be misidentified as non-compliance or defiance. Similarly, problems with organization, memory, or comprehension may be misidentified as attention problems. Anxiety or depression may also result in behaviors misidentified as attention problems. The context-sensitive assessment procedures on this web site may assist in correct identification of the underlying problem(s).

Environmental Accommodations and Supports


Following adult understanding of the student's abilities (and possibly pharmacologic intervention), the next important step is to organize and modify environmental factors with the goal of optimizing the student's successful learning and self-management. Although a distinction is drawn below between environmental management and student training, it is possible that the environmental changes will also result in improvements in the student's functioning.

Expectations: Step one in environmental management is to ensure that education staff and family members have appropriate expectations regarding the attention and self-regulation abilities of students with attention and related disorders. For example, some students are incapable of focusing quietly for more than 10 or 15 minutes at a time. These students should be given regular breaks, possibly including some type of physical activity. Some students are incapable of organizing the materials in their desk or the activities in their planning systems. These students need organizational help from others. If the student's limits are not understood, a negative cycle of problem behavior and punishment is likely to result.

Controlling Environmental Factors: In general, students with attention deficits and related disorders profit from an environment that has a clear structure, stable routines, and well understood expectations.

1. **Stable Routines:** (See  Tutorials on [Organization](#); [Transition Routines](#); [Instructional Routines](#)) At home and at school, routines should be as stable as possible. Create consistent time schedules. Have consistent places for objects (e.g., for books, materials, etc) and activities (e.g., a quiet study place). Create consistent beginnings and endings to activity periods (e.g., routines for beginning activities should include instructions that are brief and include visual cues). Preset the student to changes in routines. Provide written or pictured cues for the steps of a complex task or routine.
2. **Adequate Change, Novelty, and Interest:** Often students with attention deficits and related disorders engage in off-task or disruptive behavior because they need greater stimulation than other students. This may appear to be inconsistent with the need for stable routines, but need not be. Routines should be reasonably brief and include adequate physical activity (e.g., standing, moving between activities). Learning projects should be interesting and engaging (e.g., colorful materials, personally interesting tasks). Large tasks should be broken down into small steps and adult feedback and encouragement should be frequent and positive. Low and high interest tasks should be alternated so the student has a motivating task to look forward to. “Fidgety” students should be allowed physical activities that do not disrupt other students (e.g., tapping a pencil that has a sponge head).

It was once thought that students with attention deficits and related disorders would benefit from quiet cubicle spaces with no distractions. Studies have shown that this type of environment is not helpful. Students may need to be in reasonably stimulating environments (e.g., posters on the walls, interesting bulletin boards), but with stable routines within those environments.


3. **Assignments:** To ensure selective attention to task, the following procedures are useful. Make sure that the student has something specific to listen for during listening tasks. When giving assignments, show the student a model of what the finished product will look like. Use job cards, outlines, checklists, graphic organizers, color coding, or other highlighting procedures for assignments. Use a magic marker to highlight instructions, headings, and math process signs on worksheets. Use prompt cards to guide behavior during unstructured times. Ask students to repeat instructions to ensure their comprehension.
4. **Cooperative Learning Groups:** Students who have difficulty attending and organizing themselves often benefit from learning within the context of cooperative learning groups. Their thinking and learning can be organized by interaction with peers. Their need for stimulation and novelty can be met by peer interaction and brainstorming. Students may need to be taught explicit rules for the various roles within learning groups. To control turn taking, a “talking stick” can be passed from speaker to speaker. Peer tutoring has also been found to be useful for students with attention deficits and related disorders. Whether or not cooperative learning groups are used, students with attention deficits and related disorders should have opportunities for task-related talking.
5. **Turning Over Responsibility to the Student:** Environmental management always runs the risk of an unwanted and possibly growing reliance on environmental supports. Supporting students should always be organized around the motto, “Help students without making them helpless.” Thus environmental supports should be reduced as it becomes possible to do so. Furthermore, staff should gradually turn over to the student responsibility for organizing tasks and setting deadlines, creating monitoring systems for homework, deciding when and how to complete household chores, asking for help, staying on topic, and solving problems. Students with TBI and cognitive disorders may need more time and smaller steps for this transfer of responsibility. (See  Tutorial on [Self-Regulation Routines](#).)


Student Interventions

The distinction between environmental and student interventions is somewhat artificial. First, environmental interventions often give students an opportunity to practice their skills, including self-regulation skills, and therefore can be considered part of a package of intervention designed to improve the student’s functioning, rather than just relying on environmental management. Second, as stated above, staff and parents can contribute to student independence by gradually turning over to the student responsibility for managing and organizing environmental interventions.

1. **Pharmacologic Intervention:** Stimulant medications are often useful for students with TBI and attention deficits, whether the attention deficit predated the injury or was caused by the injury. Because treatment with medication can be complicated by brain injury, parents and teachers should ensure that the prescribing physician has experience with children with brain injury. Often several medications and doses are explored before the optimal combination is identified. A systematic procedure must be in place to monitor the effectiveness of the medication and its dose.

Stimulant medication has been shown to reduce problematic symptoms (e.g., impulsiveness, disorganization, poorly controlled attention) in students with attention deficits and related disorders. Behavioral interventions (described below) add to this effect. In some students, the focusing effect of the medication increases the likelihood that environmental and behavioral interventions will be effective.


2. **Attention Process Training:** In the 1980s and 90s, direct training of attention processes became popular in adult TBI rehabilitation. This intervention involved creating tasks (“exercises”) that engaged attention functions in a hierarchical manner. The individual with TBI was then required to practice the exercises using massed (back-to-back) learning trials. The analogy that was often used was that training mental processes is like exercising muscles. Considerable research on this approach has shown that individuals can improve on the training tasks, but that transfer or generalization to everyday activities and settings has been disappointing. This research outcome is consistent with 100 years of research with many different disability groups. In general, cognitive training (e.g., practice remembering, organizing, attending) with tasks and in settings that are not functional for the person can result in improvements on the training tasks, but no functional improvement on real-world activities. If attention process training is considered, referral to a specialist is recommended, with ongoing focus on the functional generalization of any treatment gains made in a therapy setting.
3. **Behavior Management Programs:** Students with attention-related disorders, whether a result of TBI or not, often have co-existing behavior problems. **For details, please see  [Tutorials on Behavior Management: Contingency Management; Behavior Management: Prevention Strategies; Positive Behavior Supports.](#)**


Behavior Management: Contingency Management: “Contingency management” refers to a set of procedures designed to change (increase or decrease) the student’s behavior by controlling its consequences. There are many details (see  [Behavior Management: Contingency Management](#)), but the general idea is to increase the frequency of desirable behavior by following it with positive consequences (i.e., reinforcement) and to decrease the frequency of undesirable behavior by following it with no consequences (i.e., ignoring the behavior) or negative consequences (i.e., punishment).


Specialists in the field of attention disorders frequently offer the following advice about contingency management with these students. (1) Because students with TBI, attention deficits, and related disorders are typically impulsive and because the area of the brain involved is the same area as that which enables humans to learn from consequences, staff and parents should not expect long-term improvements in behavior as a result of contingency management programs. (2) Nevertheless, clearly defined rewards and punishments may be necessary to turn around negative behavior over the short run. For students with attention disorders, the consequences should be more immediate (i.e., given immediately after or shortly after the behavior occurs) and more salient (e.g., intense praise or fun activities for younger students; intense praise for older students) than would be necessary for other students the same age. For example, the promise of an end-of-the-day reward will be ineffective for a young child with attention disorders. Similarly the Monday promise of a weekend reward will likely be ineffective for an adolescent with attention disorders. (3) Intense praise should be provided for effort and small steps, rather than waiting for success with larger or more important tasks. (4) Activity rewards are useful for students with attention disorders (e.g., when you are done with your math problems, you can walk to the water fountain) because they satisfy the need for high levels of activity. For highly active students,

academic activities should include frequent motor activities (e.g., making checks on a checklist, organizing materials, cleaning the chalkboard).

(5) Even if behavior is changed for the better with immediate and salient rewards or punishments, staff and parents should not expect these changes to translate into long-term changes in behavior. Remember, the parts of the frontal lobes that support self-regulated behavior, including attention, also control learning from consequences. So students who are impulsive and have poorly regulated attention are the same students who fail to learn efficiently from the consequences of their behavior. (6) Rewards for positive behavior should be part of any management system for students with TBI and attention disorders or any other disability. A generally positive environment, rich in natural rewards for successful behavior, helps prevent a downward spiral of behavior and a negative self-concept, both of which are likely if the student experiences considerable failure and punishment for negative behavior.

Behavior Management: Prevention Strategies: Prevention strategies are procedures designed to set the student up for success rather than merely reacting to the student's behavior after it has occurred. There are many details (see  [Behavior Management: Prevention Strategies](#)), but the general idea is to increase the frequency of desirable behavior by encouraging the development of positive habits. This is accomplished by teaching relevant skills and by managing the environment to avoid triggers for negative behavior and create triggers for positive behavior. The four keys to behavior management for these students are teach, teach, prevent, and prevent.

4. **Positive Alternatives to Negative Behavior:** Students with behavior problems associated with their attention deficit should be taught positive alternatives to their negative behavior. For example, if a student with a short attention span simply gets up and leaves a task after a few minutes without permission, he should be taught to request a break as an alternative. The break should be short, followed by a return to task. (See  [Tutorial on Teaching Positive Alternatives to Negative Behavior.](#))
5. **Redirection:** Students with attention deficits have difficulty remaining focused on tasks, particularly those that are not intrinsically interesting. Loss of focus should be anticipated by staff who are equipped with scripts of redirection. Redirection can range from physically redirecting the student to the task at hand (e.g., taking him back to his desk and restarting the activity) to providing subtle cues (e.g., a printed cue, like "focus"). When redirecting the student, staff and parents should be careful to avoid reinforcing off-task or other negative behavior. Unintentional reinforcement can occur, for example, if the adult provides too much attention to the negative behavior or talks at great length to the student after off-task or other negative behavior. Furthermore, if the off-task behavior is intended (consciously or unconsciously) by the student to escape the task at hand, then removing the student from the task (e.g., time out) will reinforce the negative behavior, not cause it to decrease.
6. **Well Understood Rules with Natural and Logical Consequences:** Because of the impulsiveness and disorganization associated with attention disorders, there is great value in organized environments in which rules and expectations are well understood by the student and consistently managed and enforced. In #3 above, the point is emphasized that students with TBI and associated impulsiveness and attention problems may not change their behavior effectively in the long run as a result of the consequences they receive for their behavior. Nevertheless it is important to live in a world in which positive behaviors have natural positive consequences (e.g., praise, special privileges) and negative behaviors have natural negative consequences. For example, if the student trashes his room, he should be expected to clean it up after a cooling-down period. If he fails to do his homework, he should be made to do it at a later time. This may not change future behavior, but it does help to teach lessons about how a predictable and organized world operates.
7. **Self-Regulation Programs:** Attention disorders have recently been characterized as executive function/self-regulation disorders, with impulse-control problems being at their core. With this as

background, all of the intervention and support procedures that fall under the heading, self-regulation/executive functions, are relevant for this group of students. See  **Tutorials on [Self-regulation/Executive Function Routines](#); [Goal Setting](#); [Inhibition](#); [Initiation](#); [Self-Monitoring](#); [Problem Solving](#).**)

8. **Self-Viewing on Video Tape:** Self-viewing on video with students with attention disorders has been used effectively for two distinct purposes: (1) Observing a group activity and charting positive and negative behavior has been used to increase self-awareness of and reduce the frequency of negative (e.g., off-task) behavior. (2) Self-observation of videos, possibly edited to include only positive behavior, has been used to increase positive behavior and self-concept.

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