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Identifying and Measuring Outcomes in Ayres Sensory Integration®

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ABSTRACT

An important component of the occupational therapy process is identifying and measuring successful participation and positive change in occupational performance areas that are valuable and meaningful to the individual, family, and stakeholders. When the findings of a comprehensive occupational therapy assessment indicate use of a sensory integration framework, it is imperative that the clinician be systematic in their approach and include relevant outcomes, according to available evidence, as part of routine practice. In Ayres Sensory Integration® (ASI), measuring proximal and distal outcomes provides a strategy for linking change in the sensory motor factors addressed by the intervention to performance- and participation-based outcomes. This article discusses using a data-driven decision making process (Schaaf, 2015; Schaaf & Mailloux, 2015) for identifying and measuring proximal and distal outcomes in ASI. Tools for reliably measuring and documenting proximal and distal outcomes throughout the therapeutic process of ASI intervention will also be introduced.

LEARNING OBJECTIVES

After reading this article, you should be able to:

1. Describe the value of outcome measurement as part of routine practice
2. Define and select proximal and distal outcomes as part of the ASI intervention process
3. Identify how data-driven decision making may be used to guide outcome measurement in ASI
4. Select measurement procedures and tools to document an individual's change in proximal and distal outcomes throughout the intervention process when using ASI

INTRODUCTION

Approximately 5% to 16% of school-aged children are reported to have difficulties processing and integrating sensations, affecting their participation in ADLs (Ahn, Miller, Milberger, & McIntosh, 2004; Ben-Sasson, Carter, & Briggs-Gowan, 2009). Children with autism spectrum disorder (ASD) have an even higher incidence, at an estimated 56% to 70% (Baranek, David, Poe, Stone, & Watson, 2006; Ben-Sasson et al., 2007). Current literature supports the relationship between difficulties processing and integrating sensations and performing basic ADLs and IADLs, such as sleeping, dressing, eating, engaging in play, and participating in leisure and school-related activities (Chien, Rodger, Copley, Branjerdporn, & Taggart, 2016; Kuhaneck & Britner, 2013; Mazurek & Petroski, 2015). Ayres Sensory Integration® (ASI) intervention is one of the most frequently used approaches by pediatric occupational therapy practitioners (Mailloux & Smith Roley, 2010) to address the sensory motor factors affecting occupational performance and participation in ADLs. Evidence that ASI improves functional skills and goal attainment is cited in the literature (Schaaf, Burke, et al., 2014; Schaaf, Dumont, Arbesman, & May-Benson, 2017).

Children develop sensory integration by interacting with their world and adapting their bodies and brains through those interactions (Ayres, 1979, 2005). When the body and brain are able to meet the demands of the environment successfully, the child's response is efficient, creative, satisfying, and fun. ASI theory posits that adequate sensory integration is an important foundation for daily life function and participation, and, thus, the focus of ASI intervention is on the sensory motor factors that may be affecting successful occupational performance and participation. The sensory integration process and subsequent adaptive responses are proposed to mediate developing neuroplasticity in the brain as an individual actively engages with the physical and social environments (Ayres, 1972, 1979, 2005). Intervention activities are designed to improve the ability to process and integrate sensation as a basis for enhancing successful participation in daily occupations.

ASI intervention, based on core concepts of the theory and framework for assessment and intervention identified by Ayres (1972, 1979, 1989), involves individually tailored sen-

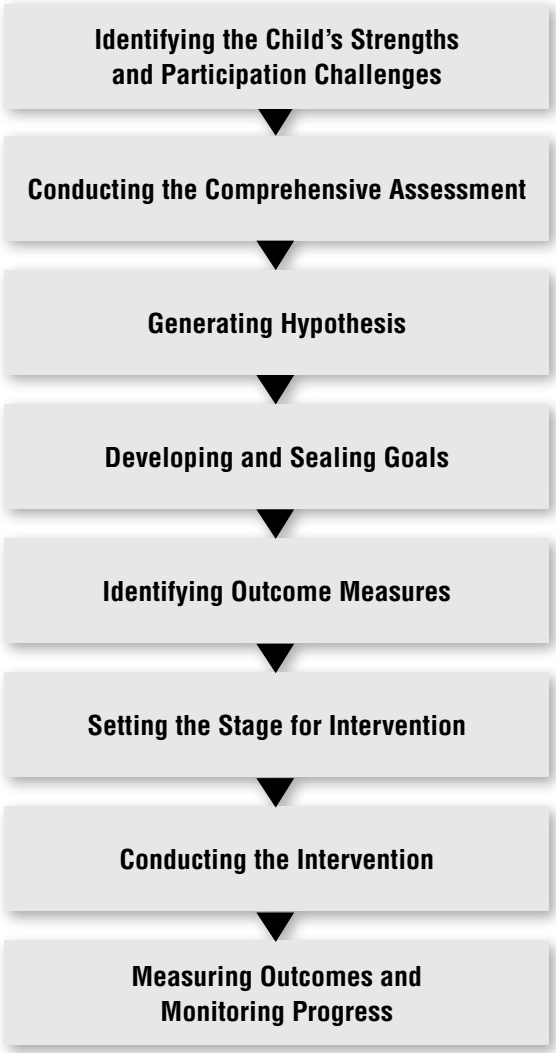
sory-motor activities contextualized in play at the just-right challenge to promote adaptive responses and foster functional skills as a foundation for participation in occupations (Ayres, 2005). The core concepts of the ASI assessment and intervention process are operationalized in the ASI Fidelity Measure (Parham et al., 2011). These components include providing individually tailored, sensory-motor activities focused on the tactile, proprioceptive, and vestibular systems to promote praxis in an environment of play. Individually tailored activities are provided at the just-right challenge that supports the child's ability to self-regulate behavior as well as develop praxis, postural, ocular, and bilateral integration skills. Participation is promoted through collaborating on activity choice with the child and developing a therapist–child therapeutic relationship.

A DATA-DRIVEN DECISION MAKING MODEL FOR ASI

A data-driven decision-making (DDDM) process for ASI (Schaaf, 2015; Schaaf & Mailloux, 2015) provides a framework for using data to guide professional reasoning and decision making when using ASI theory for assessment and intervention. Data gathered through interview, observation, and assessment, as framed within ASI theory, guides goal setting, outcome measurement, and intervention. Using this process, the therapist articulates the relationship between the sensory-motor factors that are hypothesized to contribute to challenges in functional skills or barriers in daily life.

The DDDM process consists of eight steps reflecting the occupational therapy process, which progress from identifying client strengths and needs to measuring, evaluating, and reporting progress (Schaaf & Mailloux, 2015). The first step involves identifying the child's strengths and participation challenges. This step is done as part of the development of the child's occupational profile through interview, intake information, and/or questionnaires, such as sensory histories, and it provides insight into the key areas that will be addressed during intervention. The second step involves conducting a comprehensive occupational therapy assessment based on ASI theory. Assessments are selected based on their diagnostic capability to identify relevant problems in sensory, motor, perceptual, cognitive-emotional, and participation areas of functioning. The third step involves using assessment data to make hypotheses about how sensory-motor factors may be contributing to observed problems in function and occupational performance. These hypotheses, along with caregiver and client input, are used to identify intervention outcomes and to develop goals and objectives to measure attainment of those outcomes. Outcomes are measured at the proximal (e.g., sensory-motor factors hypothesized to be affecting successful functional skills, and occupational performance) and distal (e.g., occupational performance, quality of life, participation in daily activities) levels. Once intervention goals are established, the therapist sets the stage for intervention through identifying the method of intervention (e.g., consultation, direct service); the frequency and duration (e.g., dosage); and the needed therapist training, physical equipment, and facilities. Once these practical issues are considered and identified, the intervention is provided following evidence-based ASI principles. After a pre-determined period of time, outcomes are measured and progress is monitored and assessed. The occupational therapist reports on the client's progress and determines next steps in the occupational therapy process. This DDDM process is represented in Figure 1.

Figure 1. Data-Driven Decision-Making Process for Ayres Sensory Integration®



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Common Outcomes of ASI Intervention

Occupational therapy services are client centered, and the client and/or their family is an integral part of the occupational therapy process. The occupational therapist's role in identifying intervention outcomes is to assist the client in identifying desired areas of function and occupational performance that may be improved through occupational therapy intervention. Outcomes are selected based on the needs identified by the individual, family, or other stakeholders, such as the teacher or caretaker. In the area of ASI intervention, changes in proximal factors, such as foundational sensory and motor skills, are viewed as a means of improving functioning in distal factors, such as occupational performance, quality of life, participation, and occupational engagement. As with most occupational therapy interventions, participation-based distal outcomes are of primary importance.

Client-centered research in occupational therapy has explored what families of individuals with sensory challenges consider important outcomes of ASI intervention. Cohn, Miller, and Tickle-Degnen (2000) examined the hopes and desires of parents with children who had difficulty modulating responses to sensation and were receiving ASI intervention. She identified three important themes from parent interviews. First, parents desired that their children demonstrate improved social participation, self-regulation, and perceived competence. They wanted their children to have friends, feel good about themselves, and be able to control their behavior. Second, these parents wanted to learn strategies to support their child's self-regulation and participation so that family routines and relationships could safely and easily be maintained. They also wanted validation that they were doing the best they could. They wanted the therapist to understand the challenges they experienced when parenting a child with sensory challenges. This study supported the need for intervention outcomes that addressed both child and parent needs.

Cohn (2001) supported these findings with another study of children with difficulty modulating responses to sensation, which examined the outcomes parents actually found beneficial after their child's participation in ASI intervention. She found that parents identified objective and observable improvements in the child's foundational abilities, such as motor skills and hand-eye coordination, as beneficial. Parents further identified increased engagement and participation in desired social (e.g., structured activities and play) and personal (e.g., personal care) activities. The most important change cited by parents, however, was the child's improved sense of self-worth, happiness, risk taking, and perceived social competence. Parents stated they had developed a greater understanding of their child's problems, which allowed them to better support and advocate for their child.

More recently, Cohn, Kramer, Schub, and May-Benson (2014) examined parent descriptions of why they sought ASI intervention services for their child with challenges processing and integrating sensations. They found that parents expressed similar concerns involving problems with the child's ability to self-regulate, participate in and complete skilled motor activities, and be confident and have self-esteem. Parents particularly highlighted the desire for their child to have a better frustration tolerance and be able to control behavior in socially acceptable ways.

Although previous studies examined outcomes in relation to children whose participation challenges were related to difficulty regulating responses to sensation, Schaaf and colleagues (2015) and Schaaf, Toth-Cohen, Johnson, Outten, and Benevides (2011) examined outcomes of importance to families of children with ASD. Schaaf and colleagues (2011) found that behaviors associated with challenges in processing and integrating sensations in children with autism limited the family's ability to participate in desired work, family, and leisure activities. Caregivers identified six major themes. First, there was the need for constant flexibility on the part of the family to accommodate and meet the needs of their child, regardless of desired plans. Second, families found managing their child to be easier in familiar environments than in unfamiliar environments. Predictable routines and materials were accessible at home, but not outside the house. Third, families identified difficulty completing family routines and activities. Routine activities, such as bathing, were often stressful, and family vacations or outings were often impossible. Fourth, the parents' need to constantly attend to the child with autism often negatively affected siblings through less parental attention, their inability to engage in outside activities, and sibling feelings of being second best. Fifth, parents reported the need to be constantly vigilant about their child's behavior so objects were not destroyed and the child was kept safe. Lastly, families developed strategies to cope with and facilitate participation in daily activities as much as possible. This study highlighted that, although many needs and desires of parents of children with autism were the same as those of other children with challenges processing and integrating sensations, there were some unique differences that occupational therapists need to consider with this population.

Schaaf and colleagues (2015) also examined the intervention goals of parents of children with ASD who received ASI intervention. They found that parents identified goals in multiple areas of functioning as identified by the International Classification of Functioning (ICF; World Health Organization, 2001) and the *Occupational Therapy Practice Framework: Domain*

and Process (3rd ed.; *Framework*; American Occupational Therapy Association, 2014). They found that 47% of the goals examined identified desired improvement in participation, and 50% identified desired activity performance. The occupational performance areas of ADLs, social participation, play, education, and rest and sleep were most frequently cited. The 3% of the functional goals reflecting body functions and structures included areas of sensory reactivity, somatopraxis, sensory perception, and vestibular bilateral integration. This study highlights the need for therapists using the ASI approach to focus on outcomes at the activity and occupational performance levels of the ICF while addressing the sensory motor challenges that may be affecting them.

The proposed sensory integrative factors affecting the various areas of activity and participation above were also identified. Rest and sleep were affected most by sensory perception and reactivity. Play and social participation were affected by sensory reactivity and perception, somatopraxis, and vestibular bilateral integration. This study demonstrated not only desired need areas of families with children with autism but also that proximal sensory motor factors affected performance of these occupations.

Although these studies clearly identified desired outcomes from the parent viewpoint as well as the importance of identifying outcomes for both the child and the family, outcomes actually used in ASI intervention efficacy research have not always reflected stakeholder concerns.

In the past 10 years, there has been considerable effort by researchers to address this issue. May-Benson and Koomar (2010) conducted a systematic review of existing literature on sensory integration interventions. They identified inconsistent positive outcomes in areas of sensory processing, fine and gross motor performance, behavior regulation, academic and psychoeducational performance (including math and reading skills), and individualized changes in occupational performance. They determined that the greatest outcome changes were found in individualized occupational performance measures such as Goal Attainment Scaling (GAS; Miller, Coll, & Schoen, 2007) or the Canadian Occupational Performance Measure (Law et al., 2014) and pointed to a need to be more explicit in identifying and measuring outcomes.

A more recent systematic review by Schaaf and colleagues (2017) showed that positive outcomes of ASI intervention used with children with ASD included decreased autistic behaviors; decreased caregiver assistance needed for completing ADLs and socialization; and improved play, language, sensory-motor, perceptual, and cognitive skills. They also found strong evidence to support the efficacy of ASI intervention for children with autism in improving outcomes on individualized goals of functioning and participation as measured by GAS. They determined that the best evidence was for outcomes that focus on areas of functioning and participation that are meaningful to parents and families, such as performance or participation in areas such as play, sleep, ADLs, and social skills.

Measuring Proximal and Distal Outcomes of ASI Intervention

The ICF and the *Framework* are two complementary frameworks that may be used to examine and articulate the relationships between and among the various levels of functioning that may reflect change when using ASI intervention. These various factors may include functions at the body structure and function levels (e.g., ability to process and integrate sensation or praxis); the activity level, which includes performance-based skills (e.g., dressing, feeding, playing games); and participation in desired occupations (e.g., attending school or family events, playing with friends). In addition to these areas of functioning, desired areas of change identified in the literature may be divided into foundational problems and participation-related problems.

Outcomes are considered those areas of performance challenge that change as a result of the intervention provided. When using the ASI approach, proximal factors are those that address the body function and structure and sensory motor functions that support participation and engagement in activities. They might include functions such as the ability to integrate vestibular, tactile, proprioceptive, and visual inputs; specific sensory-motor skills, such as praxis; and posture, balance, and/or gravitational security. Distal outcomes are "related to the child's specific participation challenges identified by the family and/or client and are closely aligned with the participation and functional goals identified during goal setting" (Schaaf & Mailloux, 2015, p. 89). Distal outcomes may be viewed as the end products and ultimate outcomes of ASI intervention and may include specific skills, such as the ability to complete dressing tasks independently for participating in the morning routine, organize behavior for participating in learning activities, demonstrate self-control for participating in peer interactions, and/or demonstrate confidence and self-esteem for participating in social activities.

An important part of outcome measurement is determining specific measures that may be used to monitor change in designated outcomes. Practitioners should recognize that an initial assessment tool may not be useful as an outcome measurement tool. Many assessment measures are developed as diagnostic tools and may have inadequate reliability, validity, or sensitivity for use as an outcome measures. For example, the Sensory Profile 2 (Dunn, 2014) and the Sensory Processing Measure (Parham & Ecker, 2007) are two highly used self- or parent-report measures to assess sensory reactivity and related behavior. However, these

measures were not designed as outcome measures and may have limited sensitivity to capture meaningful change. Similarly, for measures of sensory motor functions, such as post-rotary nystagmus, the Sensory Integration and Praxis Tests (Ayres, 1989) may have adequate test-retest reliability but have not been validated as outcome measures. Thus, therapists should determine the psychometric properties of an assessment tool to determine whether it can be reliably used as an outcome measure.

Although few validated proximal outcome measures of sensory and motor functions exist, distal outcomes may be easier and more reliably measured. For example, the Pediatric Evaluation of Disabilities (PEDI; Haley, Coster, Ludlow, Haltiwanger, & Andrellos, 1992) and the PEDI-CAT (Haley, Coster, Dumas, Fragala-Pinkham, & Moed, 2012) are norm referenced measures designed to monitor progress in functional performance, and thus are validated outcome measures that address functional participation and performance. Another way to measure performance or participation-based outcomes is to identify specific activities identified by stakeholders as goals and then measure these through behavior counts, incidence of observance, or other similar methods of objective observation (Clark, 2010). These data can then be charted and evaluated to view change. Outcome questionnaires and inventories that examine consumer satisfaction, quality of life, longitudinal effects, cost effectiveness, and caregiver and societal burden may also be used, provided they show adequate sensitivity for detecting change.

Table 1. Goal Attainment Scaling (GAS) Process

GAS Steps
Step 1: Interview parents and identify specific problem areas and/ or objectives that are of concern.
Step 2: Specify behaviors or events that will indicate improvement in each area identified.
Step 3: Identify the expected level of outcome performance considering the child's level of function and expected change. This process involves careful consideration of the child's current level and the targeted re-assessment period. Making this prediction includes taking into account the background information, assessment findings, the intervention planned, and the frequency and duration of the intervention.
Step 4: Scale goals across 5 levels by specifying the Expected Level of Outcome Performance for the intervention period, then specify the Somewhat More/Less and Much More/Less levels of performance (one goal must fall within each of the five ICF categories)
Step 5: Check goals for technical quality.
Step 6: Validate with parent agreement with the correctness and appropriateness of scaled objectives.
Step 7: Provide intervention for designated intervention period.
Step 8: Follow up progress on goals by interviewing parents and rating level of goal attainment.

GAS as an ASI Outcome

The literature suggests that GAS is a desirable goal-writing methodology for establishing these individualized family-centered goals and objectives (Mailloux et al., 2007). With GAS, objectives are scaled to permit statistical comparison with other goals and/or objectives (Kiresuk, Smith, & Cardillo, 1994). This methodology has the advantage of allowing therapists to write outcome goals that are meaningful to the child and family, capturing small increments of change, and allowing therapists to combine them with other goals to obtain a standardized score. GAS, which is an acceptable outcome measure for autism interventions (Ruble, McGrew, & Toland, 2012), also has the advantage of being able to capture partial progress toward a goal rather than the achieved/not achieved dichotomy of most goal writing systems.

In GAS, each goal is scaled into five levels to reflect various increments of goal achievement. The desired goal outcomes are determined based on the probability that a client will achieve a particular pre-determined level of achievement on a given goal after a designated amount of intervention. The goal outcomes are then scaled based on the probability of a bell curve at 1 and 2 standard deviations around that initial projected level of performance. An overview of the GAS process is outlined in Table 1.

At the time of goal writing, the occupational therapist projects what the client's progress is likely to be over a specified period of time. For example, Keisha determines that her client José will be able to don a shirt independently in 6 minutes after a treatment period of 12 weeks. This expected level of performance serves as a "0" point. From there, Keisha determines what the progress would be if José made "somewhat more" (e.g., able to don shirt independently in 4 to 5 minutes) or "somewhat less" (e.g., able to don shirt independently in 7 to 8 minutes) progress than expected. These levels are identified as "+1" and "-1" levels. Keisha then determines what the level of progress would be if José made "much more than expected" (e.g., able to don a shirt independently in 1 to 3 minutes) and "much less than expected" progress (e.g., able to don a shirt independently in 9 to 10 minutes). These levels are identified as "+2" and "-2" levels. This scaling provides a continuous scale of possible performance, which is then assessed after a pre-determined number of weeks

of intervention. Table 2 on page CE-6 describes each level of goal attainment.

One way to use GAS is to write five goals for each client that represent areas based on the literature, the *Framework*, and the ICF, to ensure adequate coverage of possible outcome areas. One goal is written for each of five functional areas of performance. Specific goals in each area are determined in conjunction with the client and family. The areas include body parts and functions, activities, participation, environment and/or accommodations, and family. Body parts and functions goals include those goals associated with areas such as sensory processing, muscle tone, postural control, or praxis. The activities goals are performance based and include areas such as ADLs, handwriting, or sports skills performance. The participation goals include aspects of engagement in activities, such as attending parties or eating in a cafeteria. The environment/accommodations goals reflect those environmental or interpersonal interaction adaptations or accommodations that need to occur for the individual to function. These may include strategies such as approaching a child from the front, and introducing self-regulation strategies, pencil grips, or Move-n-Sit cushions. The family goals reflect the changes that occur within the family or individuals in the family as the client's performance changes. They may include outcomes such as increased parental understanding of the child's needs, increased parental use of strategies to support the child, the parents' ability to sleep alone as the child sleeps in their own bed, the ability to go on family outings, or siblings' ability to engage in desired activities that were not possible before because of the client's needs.

A second way to use GAS is to identify the top areas or goals that the family wishes to address in the intervention, regardless of whether each goal fits into a specific ICF framework category. In this case, the therapist writes goals that are of primary concern to the family and then scales them according to GAS procedures (Schaaf & Mailloux, 2015).

Documenting Outcomes for ASI Intervention

Outcomes are identified and measured, and data is organized graphically to assist in monitoring and modifying the intervention plan accordingly. However, reviewing outcomes alone is not sufficient for best practice. The results of outcome review should be shared with appropriate stakeholders. Data should be prepared for presentation in a manner that is easily understood and in a way that progress, or lack thereof, is easily observed. Thus, as part of DDDM, the occupational therapist needs to document and measure outcomes through a systematic plan for outcome measurement.

This process of monitoring progress involves several steps. The therapist must first identify what outcomes to measure as well as the time frame and frequency of data collection. Data collection forms must be developed and it must be determined how and where data will be collected. After data is collected, the occupational therapist must determine how to present outcomes in a visual format (e.g., charts, line or bar graphs, tables). This information will then be used to analyze the child's progress, revise hypotheses regarding the relationship of sensory processing foundations to proximal and distal outcomes, and revise the intervention plan as needed. Examples are provided in Schaaf and Mailloux (2015) and Clark (2010).

Table 2. Description of GAS Goal Scaling Levels

GAS Scale	Outcome Level	Potential Level of Performance
-2	Much Less than Expected Outcome	This level of performance reflects that the child made very little progress toward their expected goal. It is expected that this level of performance would occur rarely. This level can reflect performance that ranges from regression to no change to a very minor change.
-1 Seldom	Somewhat Less than Expected Outcome	This level of performance indicates that the child did not achieve the expected outcome but made definite progress toward that goal that was somewhat less than expected.
0	Projected Performance Expected by End of Measurement Period.	This level of performance indicates that the child made progress to the extent anticipated at the initiation of treatment for the given measurement period. (i.e., if the measurement period is 20 sessions, marking this level would indicate that the child progressed as much as anticipated for that period of time).
+1	Somewhat More than Expected Outcome	This level reflects that the child achieved their expected outcome plus made somewhat more progress than expected during the measurement period.
+2	Much More than Expected Outcome	This level reflects performance that is unusual to achieve in the measurement period and would indicate that the child made considerably more progress than expected during the measurement period.

Application to Practice

Thoughtful selection of outcome measures and rigorous research methods are paramount in advancing existing evidence and practice related to ASI, and additional studies focused on measuring proximal and distal outcomes will serve to further the body of evidence used in clinical application (Parham et al., 2011; Watling & Hauer, 2015). More recent randomized control trials reflect this trend (Pfeiffer, Koenig, Kinnealey, Sheppard, & Henderson, 2011; Schaaf, Benevides, et al., 2014). Assessment and outcome measurement tools directly related to occupational performance and participation are emerging. These tools can be used in future studies to systematically measure the changes in performance (distal outcomes) associated with the hypothesized targeted mechanisms of change (proximal outcomes) in ASI intervention. Salient participation outcomes for the individual with sensory challenges, and their families, continues to require further investigation.

A systematic approach to measuring and reporting outcomes is a necessity within our current health care system. Integrating outcome measurement into daily practice is essential for clinicians, and not designated solely for occupational therapy scientists conducting research. As new evidence continues to expand and evolve occupational therapy practice, DDDM and GAS are consistently being used as systematic, practical tools relevant to clinical application of ASI intervention. Clinicians are better equipped with the data needed to guide intervention planning and monitor progress in daily practice. Through identifying, measuring, and reporting meaningful proximal and distal outcomes relevant to families of children with sensory challenges, clinicians can address occupational performance and participation needs more efficiently and effectively.

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D. On successful completion of the exam (a score of 75% or more), you will immediately receive your printable certificate.

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Final Exam

Article Code CEA0218

Identifying and Measuring Outcomes in Ayres Sensory Integration®

February 2018

To receive CE credit, exam must be completed by February 29, 2020

Learning Level: Intermediate

Target Audience: Occupational therapists and occupational therapy assistants

Content Focus: Category 1: Domain of occupational therapy; Category 2: Occupational therapy process

1. **Which of the following represents the correct order of steps in Ayres Sensory Integration® (ASI) data-driven decision making?**
   - A. Identify the child's strengths and participation challenges, conduct a comprehensive assessment, generate hypothesis, identify outcome measures, develop and scale goals, set stage for intervention, conduct intervention, measure and monitor progress
   - B. Identify the child's strengths and participation challenges, conduct a comprehensive assessment, generate hypothesis, measure and monitor progress, develop and scale goals, identify outcome measures, set stage for intervention, conduct intervention
   - C. Identify the child's strengths and participation challenges, conduct a comprehensive assessment, generate hypothesis, develop and scale goals, identify outcome measures, conduct intervention, measure and monitor progress
   - D. Identify the child's strengths and participation challenges, conduct a comprehensive assessment, generate hypothesis, develop and scale goals, identify outcome measures, set stage for intervention, conduct intervention, measure and monitor progress

2. **Which of the following is not a possible distal outcome to measure as related to ASI?**
   - A. Riding a tricycle
   - B. Participating in a play activity without becoming upset
   - C. Improved praxis and vestibular-proprioceptive processing
   - D. Staying seated during mealtime

3. **It is essential to identify, link, and measure proximal and distal outcomes because this process:**
   A. Provides analysis used to plan, adjust, or refocus the intervention plan
   B. Is required by AOTA's practice guidelines for ASI
   C. Is often clearly understood by families before it's completed with their clinician
   D. Is applicable in clinical practice, but not necessarily for research

4. **According to the research on family hopes/desires/outcomes of children with sensory challenges and the outcomes research in ASI, which are common, overlapping themes?**
   A. Social skills, play, and social participation
   B. Handwriting and fine motor skills
   C. Cognition and IQ
   D. Language

5. **All of the following are part of the Goal Attainment Scaling (GAS) process except:**
   A. Validate appropriateness and correctness of scaled objects with family
   B. Set the stage to conduct intervention and provide family education
   C. Interview families to identify problem areas
   D. Specify behaviors and/or events that will indicate improvement in identified areas

6. **Potential levels of GAS performance for a 0 represent:**
   A. Much less likely (<5%)
   B. Somewhat less likely (5%–25%)
   C. Expected level (26%–74%)
   D. Somewhat more likely (75%–94%)

7. **If Jake, who presents with poor postural control, poor tactile perception, and tactile hyper-reactivity (proximal outcomes), will typically sit at the table for about half of the time it takes for his family to complete their meal, and the family wants him to sit for the full duration of the meal—approximately 30 minutes (distal outcome)—a GAS example of the level "0" in question 6 (above) would be:**
   A. Jake will sit at the table for less than 1½ minutes of mealtime with his family
   B. Jake will sit at the table for 22 to 27 minutes of mealtime with his family
   C. Jake will sit at the table for 28 to 32 minutes of mealtime with his family
   D. Jake will sit at the table for 33 to 38 minutes of mealtime with his family

8. **Which of the following is not a reason for using data-driven decision making as it relates to ASI?**
   A. To use data to evaluate the effects of intervention and guide decisions related to intervention
   B. To better link participation-based outcomes to the mechanism by which they are hypothesized to change
   C. To justify discharge because the family's insurance coverage has ended
   D. To measure outcomes using charts of observed behaviors

9. **The Sensory Processing Measure and Sensory Profile were designed to evaluate sensory factors affecting behavior and function but may not have adequate sensitivity as an outcome measure**
   A. True
   B. False

10. **Which distal outcome and corresponding hypothesized proximal outcome is not relevant when using ASI intervention?**
    A. Poor balance, postural control, and bilateral integration and a child's difficulty participating in active play with neighborhood peers
    B. Tactile hyper-reactivity and difficulties with grooming at home
    C. Poor proprioceptive and tactile perception, postural control, and difficulty with ability to self-feed neatly with a utensil
    D. Poor handwriting and wrist range of motion and a low score on a child's report card

11. **How can you measure and/or chart changes on distal outcomes when using ASI?**
    A. Create a chart of the child's attendance in therapy sessions
    B. Report GAS scores
    C. Report how often the caregiver complied with a home exercise program
    D. Create a table that includes components of the ASI Fidelity Measure used during intervention

12. **Examples of the "family" International Classification of Functioning category and specific areas of GAS goal writing would include:**
    A. Engagement in activities and ADL performance
    B. Sensory processing and postural control
    C. Parents sleeping alone and siblings able to participate in desired activities
    D. Self-regulation strategies and IADLs