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Introduction

The Sensory Processing Measure, Second Edition (SPM-2) is a revision and expansion of the Sensory Processing Measure (SPM; Parham et al., 2007) and the Sensory Processing Measure–Preschool (SPM-P; Ecker et al., 2010), two norm-referenced assessments of sensory processing, praxis, and social participation in children. The SPM-2 expands the age range downward to include infants and toddlers and upward to include adolescents and adults. The rating forms in these new age levels, in conjunction with revisions of previously existing forms, provide measurement of sensory functioning, praxis, and social participation across the lifespan in home, school, and community environments.

Background

Like the SPM and the SPM-P, the SPM-2 is anchored in Ayres Sensory Integration® theory. Developed by A. Jean Ayres, this theory postulates that how the central nervous system integrates and responds to sensations, from outside and within one's own body, influences physiological, regulatory, emotional, motor, and adaptive functioning. Thus, if the integration of sensation is not efficient or effective, a person may be unable to learn efficiently, regulate their emotions, or function at an expected level in daily activities. Additionally, difficulties at the level of integrating sensation often affect higher level functions such as *praxis* (the ability to plan and

organize movement) and social participation. As discussed in *Occupational Therapy Practice Guidelines for Children and Youth with Challenges in Sensory Integration and Sensory Processing* (Watling et al., 2018), a variety of terms have been used to describe the organization and use of sensory information for everyday functioning. The current term, *sensory integration and processing*, reflects the contributions of Ayres and others who have continued studying and researching Ayres' original work. Within this manual, therefore, the terms *integration* and *processing* will be used interchangeably and jointly (see Chapter 4 for more discussion of Ayres' theory).

Ayres' theory delineates principles for the assessment of sensory function, many of which are embodied in the SPM-2. Three key dimensions of measurement are integrated into the structure of the SPM-2:

1. *Assessment of sensory systems:* The SPM-2 *T*-scores provide norm-referenced indexes of function in the visual, auditory, tactile, olfactory, gustatory, proprioceptive, and vestibular sensory systems, as well as in the integrative functions of praxis and social participation.

2. *Assessment of sensory integration vulnerabilities:* The SPM-2 items provide descriptive clinical information on processing vulnerabilities within each sensory system, including under- and over-reactivity, sensory-seeking behavior, and difficulties with perception.

3. *Assessment across multiple environments and raters:* The forms at each age level of the SPM-2 are designed for maximum flexibility in choosing and comparing among environments and raters, such as multiple caregivers.

SPM-2 Forms

The SPM-2 forms are designed to assess clients across the lifespan, with unique forms in each of five age levels: Infant/Toddler, Preschool, Child, Adolescent, and Adult. At each level, forms may be used independently or jointly to provide an overview of a client's sensory functioning across multiple environments and raters.

The 12 main forms each consist of 80 Likert-type items rated in terms of the frequency of a specific behavior (*Never, Occasionally, Frequently, Always*) and require about 20 to 30 minutes to complete. The 10 School Environment and Driving Environment Forms are 15–18 items each and take about 10 minutes to complete. Chapter 2 gives detailed information on the selection, administration, and scoring of each SPM-2 form.

Infant/Toddler Age Level (4 to 30 Months)

Parents and caregivers rate an infant or toddler and also rate themselves on their own sensory integration and processing function.

- **Infant Form:** Completed by parents or caregivers to rate infants ages 4 to 9 months
- **Toddler Form:** Completed by parents or caregivers to rate toddlers ages 10 to 30 months
- **Caregiver Self-Report Form:** A self-rating completed by the parents or caregivers of infants or toddlers

Preschool Age Level (2 to 5 Years)

Parents, caregivers, and school staff rate a preschool-aged child within the home and school environments.

- **Home Form:** Completed by parents or other caregivers who live with the child
- **School Form:** Completed by the child's main preschool teacher or day care provider

Child Age Level (5 to 12 Years)

Parents, caregivers, and school staff rate a school-aged child within the home and school environments.

- **Home Form:** Completed by parents or other caregivers who live with the child
- **School Form:** Completed by the child's main classroom teacher or aide
- **School Environment Forms:** Briefer forms with items keyed to specific environments
 - **Art (ART) Form:** Completed by an art teacher or assistant
 - **School Bus (BUS) Form:** Completed by a school bus driver or assistant
 - **Cafeteria (CAF) Form:** Completed by a cafeteria supervisor or assistant
 - **Music (MUS) Form:** Completed by a music teacher or assistant

- **Physical Education (PHY) Form:** Completed by a P.E. teacher, assistant, or coach
- **Recess/Playground (REC) Form:** Completed by a playground supervisor or assistant

Adolescent Age Level (12 to 21 Years)

Adolescents rate themselves, and parents, caregivers, and school staff rate the adolescent within the home and school environments.

- **Home Form:** Completed by parents or other caregivers who live with the adolescent
- **School Form:** Completed by the adolescent's teacher
- **Self-Report Form:** Completed by the adolescent

- **Adolescent Driving Environment Forms:** Brief Self-Report and Rater Report Forms with items keyed to the driving environment

Adult Age Level (21 to 87 Years)

Adults rate themselves, and spouses, partners, parents, other adult family members, or caregivers rate the adult within the home and community environments.

- **Rater Report Form:** Completed by the adult's family or care providers
- **Self-Report Form:** Completed by the adult
- **Adult Driving Environment Forms:** Brief Self-Report and Rater Report Forms with items keyed to the driving environment

SPM-2 Scales

The 80-item main forms include each of the following scales. The Environment Forms are composed of 15–18 items based on these same scales within a particular environment.

- **Vision (VIS):** Items measure a range of visual processing challenges, including over- and under-reactivity to visual stimulation, excessive seeking of visual input, difficulties with perception, and ocular-motor difficulties.
- **Hearing (HEA):** Items measure auditory processing challenges, such as over- and under-reactivity, auditory-seeking behaviors, and perceptual problems.
- **Touch (TOU):** Items measure tactile perception, over- and under-reactivity to tactile stimulation, and tactile-seeking behaviors.
- **Taste and Smell (T&S):** Items measure over- and under-reactivity to smells or tastes, active seeking of taste or smell stimuli, and perception of taste or smell sensations.
- **Body Awareness (BOD):** Items measure body awareness, or *proprioception*, the ability to sense precisely both the static position of the body and dynamic changes in body position.
- **Balance and Motion (BAL):** Items measure balance and equilibrium, or *vestibular* function, and assess perception and over- or under-reactivity to sensations of moving through space.
- **Sensory Total (ST):** The ST is a composite of the six sensory scales (VIS, HEA, TOU, T&S, BOD, and BAL), each of which assesses the ability to process direct sensory inputs. The Planning and Ideas and Social Participation scales (described below), on the other hand, do not contribute to the ST because they represent higher level integrative processes influenced by cognitive, contextual, and multisensory information.
- **Planning and Ideas (PLN):** The PLN items measure planning and ideas, or *praxis*, the ability to conceptualize, plan, and organize movements in order to complete novel motor tasks.
- **Social Participation (SOC):** The SOC items measure participation in social activities in the home, community, or school, including the ability to get along with friends, parents, teachers, and other significant adults and peers.

SPM-2 Scores

SPM-2 items employ a rating scale based on how frequently behaviors occur. Each item is rated *Never, Occasionally, Frequently, or Always*. A number is assigned to each rating (one through four), with higher scores representing more problematic behavior. Raw scores are calculated by summing the item scores associated with each scale. Therefore, a higher raw score on any SPM-2 scale always indicates a higher level of difficulties. In this way, the scoring format of the SPM-2 is consistent with that of most other clinical behavior rating scales.

SPM-2 raw scores for each of these scales are converted into normalized *T*-scores, a type of standard score, which have a mean of 50 and a standard deviation of 10. A standard score enables an individual's test results to be compared with a reference group, such as a normative sample of typically developing individuals. A standard score also allows for comparison of scores across scales with different characteristics, such as different numbers of items, different psychometric properties, or different constructs.

SPM-2 standard scores are used in conjunction with an analysis of item responses to develop an interpretation of a client's functioning. Similar to other

tests in which higher scores indicate greater difficulties, *T*-scores in the range of 40 to 59 represent Typical functioning; *T*-scores in the range of 60 to 69 represent Moderate Difficulties in functioning; and *T*-scores of 70 or above represent Severe Difficulties in functioning. Note: The briefer School Environment and Driving Environment Forms are interpreted via cutoff scores, indicating whether a client is experiencing more problems in that setting than 90% of the participants in the normative sample for that age group.

SPM-2 standard scores are also used to calculate the Difference (DIF) score, which allows clinicians to compare sensory functioning across any two forms. A DIF score can reveal, for example, whether a child's behavior at home is markedly different from their behavior at school, or whether an adolescent's self-perception is substantially different from a teacher or parent's perceptions. It can also provide a starting point for examining sensory integration and processing differences between individuals, for example, between two spouses or a parent and child.

Complete, detailed information on administration, scoring, and interpretation can be found in Chapters 2 and 3.

SPM-2 Improvements

The SPM-2 is a revision and update of two well-established instruments in wide use throughout the United States and around the world. While the essential characteristics of the SPM and the SPM-P remain unchanged, the SPM-2 revision includes the following improvements:

- An expanded age range that encompasses the lifespan, from 4 months to 87 years
- New and revised forms across five age levels: Infant/Toddler, Preschool, Child, Adolescent, and Adult
- New clinical validity studies, including sensory processing disorders, autism spectrum disorders, speech-language pathologies, intellectual and developmental disorders, attention-deficit/hyperactivity, and other mental health disorders

- Updated norms based on a new nationally representative standardization sample

In addition to administration and scoring using paper forms, the SPM-2 offers the option of electronic administration and scoring. The WPS® Online Evaluation System™ (OES), a platform for online testing, allows administration of the SPM-2 on any computer with Internet access. Raters may complete the SPM-2 form remotely or on the professional's local device. When administered to the same rater multiple times, the form can be scored and integrated into a Form Comparison Report. Multiple forms on the same client can be scored and integrated into a combined report. For more information, visit platform.wpspublish.com.

Summary of Standardization and Technical Properties

The SPM-2 was standardized on 3,850 typically developing participants, ranging in age from 4 months to 87 years. Separate demographically representative normative samples were collected for each age level: Infant/Toddler ($n = 697$), Preschool ($n = 606$), Child ($n = 840$), Adolescent ($n = 985$), and Adult ($n = 722$). Separate norms are provided for each age level, and within two age levels (Infant/Toddler and Preschool), the norms are further stratified by age to control for developmental differences between the younger and older children. A separate sample of 639 participants receiving clinical services was used to verify that the SPM-2 differentiates between typically developing participants and those with certain clinical disorders.

Across all forms, the SPM-2 showed strong psychometric properties. Evidence supporting reliability included median estimates of internal consistency of .86, test–retest reliability of .84, alternate-forms reliability of .78, and interrater reliability of .66. Likewise, comprehensive development procedures, concurrent administration of key measures, and findings from clinical groups yielded evidence supporting content validity, construct validity, and criterion-related validity. Complete, detailed information on the standardization and validation of the SPM-2 can be found in Chapters 4 and 5.

Principles of Use

The SPM-2 is intended to support the identification and treatment of those with sensory integration and processing difficulties. The SPM-2 was developed by occupational therapists, but the information it provides will also be of value to other professionals, including school psychologists, clinical psychologists, social workers, counselors, physical therapists, speech and language pathologists, early intervention specialists, psychiatrists, pediatricians, and nurses.

The SPM-2 may be used alone as a screening instrument or in conjunction with other instruments as part of a comprehensive battery. Like any instrument, however, the SPM-2 should never be used in isolation to make diagnostic or treatment decisions. Instead, it should be used in concert with other data, such as information derived from concurrent or former assessments of sensorimotor function; additional standardized assessment instruments; developmental, school, work, or medical records; occupational profiles; direct observations; and interviews with parents, teachers, school staff members, and (when appropriate) the client.

Standards of practice that determine which professionals may engage in assessment vary greatly within and among countries, states, and localities. Only professionals with relevant training, knowledge, and experience in basic principles of assessment, test

interpretation, and sensory integration and processing are qualified to be professional users of the SPM-2. In particular, users should review the recommended training qualifications for interpretation of item-level sensory integration vulnerabilities, found in Chapter 3 of this manual.

WPS authorizes individuals to purchase assessment materials based on the purchaser's stated education and experience, or the stated education and experience of the purchaser's direct supervisor. In the case of institutional purchasers (e.g., a school district purchasing on behalf of its professional employees), it is expected that the purchase is for use by individuals with the relevant education and experience.

In addition to possessing the authorization required to purchase an assessment, each potential assessment user must also ensure that they are working within the scope of their practice in a competent, legal, and ethical manner. It is the responsibility of each assessment user to determine their own competence by evaluating an assessment's principles of use in light of their training and experience, the intended scope of use (e.g., in a research or applied setting; for diagnostic or treatment planning purposes), and the guidelines set forth by relevant professional organizations and licensing boards.

Professional users may also supervise other adequately trained service providers who assist in administering and scoring the SPM-2. Professional users are responsible for ensuring that other service providers have adequate training and supervision in administration and scoring, know when to refer questions to the professional users, and follow legal and ethical standards and other requirements.

Before administering the SPM-2 for the first time, professional users should read this manual and review the rating forms to become familiar with administration, scoring, and interpretation procedures for the SPM-2; its psychometric properties; and the theoretical, empirical, and practical concepts that support its efficacy as a reliable assessment of sensory integration and processing.

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