



Review Paper

Sensory Processing Measure Tools for Adolescents Aged 12 to 21 Years



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ABSTRACT

Background and Objectives: Impairment in the way of sensory information by the central nervous system can cause functional problems in all areas of an adolescent's activities, including education, self-care, social participation, and leisure. Therefore, in the presence of problems in such activities, it is necessary to evaluate and screen for sensory processing. In the present study, the sensory processing assessment tools that cover the adolescent age group were investigated.

Methods: In this review, PubMed, Science Direct, Google, OTseeker, and Google Scholar databases were searched, and articles published between 2000 and 2022 on sensory processing assessment tools in adolescents and their psychometrics were selected. Keywords used included sensory integration dysfunction (SID), sensory processing disorder (SPD), adolescence, adolescent, assessment, measurement, reliability, validity, psychometry, environment, scale, and instrument.

Results: The assessment tools identified to evaluate sensory processing in the adolescent age group include the "adolescent/adult sensory profile" (AASP), "Glasgow sensory questionnaire" (GSQ), "sensory processing measure (SPM)", "sensory response in autism spectrum" (SR-AS) questionnaire, "sensory processing scale" (SPS), and "SPM-second edition" (SPM-2).

Conclusion: The environment was considered as a factor that needs to be evaluated only in the second version of the SPM among the selected tools. The results of this review also showed that the only tool available in Persian in this field is the AASP, which does not seem to be a suitable tool for use in adolescence because the population studied in the psychometric evaluation of the Persian version was elderly people with dementia. Therefore, it seems necessary to prepare the Persian version and psychometric evaluation of an appropriate assessment tool for evaluating the sensory processing of Iranian adolescents.

Keywords: Sensory processing, Sensory integration, Validity, Reliability, Assessment

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↑ *What is “already known” in this topic:*

Sensory processing assessments are crucial for understanding how adolescents respond to sensory stimuli in their environments. Several standardized tools have been developed specifically for this age group, each with unique features and methodologies. These assessment tools provide valuable insights into sensory processing patterns among adolescents. By utilizing these instruments, practitioners can better understand individual needs and tailor interventions accordingly.

→ *What this article adds:*

After reviewing the sensory processing assessment tools available in adolescence, we came to the conclusion that considering the environment is crucial in clinical reasoning about symptoms of sensory processing disorder. Each tool has its strengths and limitations, making it essential to choose the appropriate assessment based on the specific context and individual requirements. Among the tools were reviewed, the sensory processing measure-2 (SPM-2) is appropriate to examine the details of sensory issues and the impact of the environment on behavioral symptoms of sensory problems.

Introduction

Adolescence is the period of transition from childhood to adulthood. This developmental period is a suitable time for establishing individual health. Currently, the number of adolescents in the world is 1.3 billion, which constitutes one-sixth of the world’s population. 90% of adolescents live in low-income and underdeveloped countries [1].

Sensory processing disorder (SPD) is discussed as how sensory information is processed and integrated by the central nervous system causing functional problems in daily life. According to global statistics obtained in 2017, 5 to 5.16% of individuals have shown symptoms of SPD [2]. Adolescence is a critical period for the individual’s physical, sexual, brain, emotional, cognitive, and social development [3, 4]. Sensory processing or integration problems as one of the functions of the nervous system in adolescents can affect behavioral performance, social-emotional responses, attention level, and the individual’s performance in daily living activities at home, school, and in the community [5].

The etiology of SPD is still unknown. However, SPD is associated with some factors, such as low birth weight, preterm birth, parental stress, alcohol and drug use during pregnancy, specific genetic factors, child exposure to chemicals, and poor sensory stimulation [6]. Based on Miller’s classification, SPD is categorized into three types, sensory modulation disorder, sensory-based motor disorder, and sensory discrimination disorder [2].

SPD can cause behavioral problems, functional weakness, reduced skills for performing daily living activities, decreased competence in performing activities, academic failure, deficits in cognitive functions, high parental stress, reduced family involvement in indoor and outdoor activities, learning disabilities, problems in fine and gross motor skills, lack of planning, distractibility, impulsivity, inadequate sensory-motor development, anxiety, low self-esteem, depression, and gastrointestinal problems in adolescents [6-8]. It is estimated that the likelihood of emotional problems, such as anxiety in individuals with this disorder is 4 times higher than the normal individuals, and the risk of behavioral problems, such as aggression is also 3 times higher [6].

Given the high prevalence of sensory problems, the variety of symptoms, the possibility of involvement of individuals of all ages, including adolescents, and the comprehensive effects of this disorder on daily life functioning, it is necessary to accurately assess and treat this disorder. Adolescents usually face the greatest risks and obstacles in their lives. The decisions they make and the actions they take during this period can have a significant impact on other aspects of their lives and their future, therefore they need help to maintain their behavioral health. Furthermore, the people who care for adolescents should have complete information about their brain, physical, and psycho-social changes [9, 10].

From a psychological perspective, experiencing sensory processing problems in this age group is accompanied by the onset of anxiety symptoms, unpleasant feelings, hopelessness, and even physical pain; in addition,

the decrease in attention level accompanied by increased anxiety in adolescents will hurt academic performance, self-confidence, and learning ability. The use of accurate screening tools helps in the diagnosis of SPD symptoms and the resulting functional deficits. Therapists can use the evaluation results to plan appropriate therapeutic interventions, educate the client about the primary and secondary problems of the disorder, and use sensory strategies and environmental adaptations to help the adolescent achieve optimal performance in daily activities [5].

Assessment of SPD increases our understanding of the phenotypic differences of individuals to determine homogeneous groups in research, set appropriate therapeutic goals and plans, and increase the family and those around the individual's understanding of his/her specific behavioral and motor responses [11].

So far, no comprehensive consensus has been reached during the selection of the best assessment approaches for sensory processing in adolescents and adults. Since there is sufficient evidence to prove the persistence of sensory symptoms in adolescence and adulthood, and the use of tools specific to children also does not provide functional and contextual results, it is necessary to define standards for assessing sensory processing in this age group. Reports indicate that by 2017, no clinical assessment tool has been designed to examine all aspects of SPD, and each approach has advantages and disadvantages for use in the clinic. The combined approaches are applied in a way that multiple assessment methods, such as observation, self-report questionnaire, parent report questionnaire, interview, and assessment tools are used simultaneously to perform a comprehensive assessment [8]. Due to the variety of sensory symptoms and the variety of available approaches, we must have comprehensive information to select the appropriate clinical assessment.

The self-report questionnaire or close informant report method is the most common approach to assess sensory processing in adolescents and adults, used in 78.8% of studies. The advantages of this method include easy use, obtaining different information about sensory processing in various dimensions, and rapid data collection. The disadvantages of self-report and close informant questionnaires used in the clinic are that they only assess problems related to attention, emotion, perception, and behavioral responses and have a low correlation with the basic sensory processes examined in a controlled laboratory environment. Although all questionnaires focus on the central structure of sensory processing, their

conceptualization is different. Among the most common sensory assessment tools that directly address the identification of SPD symptoms are the sensory profile (SP), the sensory integration and praxis test, the adult/adolescent sensory profile (AASP), the sensory processing measure (SPM), the SPM-preschool, the Glasgow sensory questionnaire (GSQ), the sensory processing scale inventory, the sensory response scale for Autism spectrum (SR-AS), the sensory processing scale (SPS), and the SPM-second edition (SPM-2). Among the aforementioned tools, the AASP, GSQ, SR-AS, SPS, SPM-2, and the sensory processing scale inventory assess the adolescent age group [5, 12, 13].

During adolescence, individuals separate from their families, and unlike previous periods when their environments were typically limited to home and school, they participate in more diverse environments for educational, recreational, and other purposes. Although sensory processing issues may seem unrelated to their behavior, they have a significant impact on the behavior; therefore, paying attention to the appropriate assessment and the referral in this regard is crucial. This study was conducted to identify sensory processing assessment tools for adolescents, determine the tools that are based on the sensory effects of the environment, and their psychometric properties, and identify the available tools for Persian-speaking clinicians.

Literature Review

In the present study, PubMed, Science Direct, Google, OTseeker, and Google Scholar databases were reviewed, and articles published between 2000 and 2022 on sensory processing assessment tools for adolescents and their psychometric properties were selected. The keywords used to search for these articles were sensory integration, sensory integration dysfunction (SID), sensory processing, SPD, adolescence, adolescent, assessment, measurement, reliability, validity, psychometry, environment, scale, and instrument. The following paragraphs describe these studies and report on their psychometric properties.

The AASP was designed by Al-Momani et al. (2020) [14], who investigated its psychometric properties. The sample consisted of 560 Jordanian residents aged 11 years and older. They aimed to determine the internal consistency and analyze the relationship between age group, gender, and sensory processing patterns. Twenty-five occupational therapists translated the questionnaire into Arabic. Less than 80% of the expert panel members agreed on the similarity of the translated items to the original version. The Cronbach's α of the Arabic version

was 0.78, and the original version was 0.79. Because Arabic speakers typically score higher on sensory sensitivity and sensory avoidance and lower on sensory seeking in the age groups of 11-17 years, 18-64 years, and 65 years and above, adjustments were made in the scoring. Women scored higher than men in all age groups; in the 11-17 years group, women scored significantly higher on sensory sensitivity, in the 18-64 years group, they scored higher on sensory sensitivity and sensory seeking, and in the 65 years and above group, they scored higher on sensory sensitivity. The limitations of their study were the unequal number of participants in the age and gender groups, and the use of a sample consisting of only healthy individuals [14].

Engel-Yeger investigated the psychometric properties of the AASP in Hebrew and determined sensory preferences according to the participants' age groups and gender. This study was conducted on 882 healthy Israeli adults aged 11 to 94. Factor analysis was performed on the items, and the number of items was reduced from 60 to 48. The Cronbach's α of the Hebrew version was 0.8 for low registration, 0.7 for sensory seeking, 0.73 for sensory sensitivity, and 0.73 for sensory avoidance. Moderate to high Pearson correlation coefficients were recorded for the correlations between the subscales, and the Pearson correlation coefficients of the items within each subscale were also high. Adolescents aged 11-17 years showed a slight tendency towards low registration and sensory seeking, and a strong tendency towards sensory sensitivity and sensory avoidance among the sensory processing patterns. The results showed that the lowest tendency was for sensory seeking and the highest tendency was for sensory avoidance in the age group of 65 years and above, and the lowest tendency was for low registration and the highest tendency was for sensory sensitivity in the age group of 11-17 years. Regarding gender differences, women in the age group of 11-17 years and 18-64 years exhibited higher sensory processing patterns, sensory seeking, sensory sensitivity, and sensory avoidance compared to men, but no significant differences in sensory processing patterns were observed between genders in the age group of 65 years and older. The limitations of this study included the unequal number of participants in the different subgroups (men, women, and age groups), which may have led to sampling bias, and the fact that the sample consisted only of healthy individuals. In conclusion, the Hebrew version was found to be valid and successful in identifying sensory processing difficulties [15].

Brown et al. described the design and psychometric properties of the AASP. The SP and its other versions were designed based on Dunn's model of sensory processing. In this study, experts evaluated the construct validity, Cronbach's α , factor analysis, item-within-subscale correlations, item reliability, and test re-test reliability. The expert panel consisted of 16 members, who were asked to place the written items in one of Dunn's sensory windows; the responses were recorded and categorized with 75% agreement. A total of 615 adults aged 17-79 years completed the questionnaire. The results showed Cronbach's α of 0.81 for sensory sensitivity, 0.66 for sensory avoidance, 0.82 for low registration, 0.79 for sensory seeking, and Pearson correlation coefficients of 0.32 to 0.56 for sensory sensitivity, 0.11 to 0.52 for sensory avoidance, 0.33 to 0.56 for low registration, and 0.26 to 0.5 for sensory seeking. The sensory avoidance window showed poor psychometric properties, therefore they proceeded to revise it. Five individuals with the highest scores on the sensory windows underwent physiological evaluation using skin conductance, and the results confirmed the construct validity of the questionnaire because the scores from the SP and the skin conductance measure were similar. A total of 93 adults aged 18-68 years were selected to determine the discriminative validity of the questionnaire between normal individuals and those with schizophrenia. The new Cronbach's α values (0.78 for sensory sensitivity, 0.77 for sensory avoidance, 0.78 for low registration, and 0.6 for sensory seeking) were recorded. In conclusion, the AASP is a valid assessment tool for applying Dunn's unique theoretical model, which enhances our understanding of sensory processing [16].

Zaree et al. studied the Persian version of the AASP for its psychometric properties on adults with dementia. The sample included 130 patients with dementia and 77 healthy older adults, all aged 65 years and older [17]. Initially, the questionnaire items were translated into Persian, and then the face validity was quantitatively evaluated. The item impact scores ranged from 3.05 to 4.8, indicating that all items received acceptable scores. The Cronbach's α was reported to be between 0.894 and 0.916, with a $P < 0.001$. The test re-test reliability calculated with a two-week interval was excellent for each subscale, with intraclass correlation coefficient (ICC) values between 0.885 and 0.948. Significant statistical differences were observed between healthy older adults and individuals with dementia in the sensory processing windows of low registration and sensory avoidance. The expert panel consisted of 9 members who evaluated the content validity to determine the clarity and necessity of the translated items. The content validity index (CVI) of

the questionnaire in this study was above 0.79. The results for individuals with dementia showed that sensory avoidance was much more frequent in the “much more than most” category, and sensory sensitivity and sensory seeking were similar to the “most” category. Individuals with dementia scored lower on the low registration pattern compared to healthy individuals, and evidence suggested that the inability to receive and process sensory information leads to symptoms, such as anxiety and restlessness. In conclusion, the Persian version of the AASP is valid for the dementia population and can be used [17].

Another tool is the SPM-2, which was designed in 2021 with a version for adolescents. The SPM-2 was developed in 2021 by Parham, Ecker, Kuhaneck, Henry, and Glennon for age groups of infants and toddlers 4 to 30 months, preschoolers 2 to 5 years, children 5 to 12 years, adolescents 12 to 21 years, and adults 21 to 87 years. As a result, the age range assessed in the SPM-2 is more extensive, covering 4 months to 87 years. This tool includes 12 main forms and forms related to 10 environments examined in school and driving environments. Completing each 80-item main form takes 20 to 30 minutes, and each 15 to 18-item environment form takes 10 minutes. The SPM-2 has five forms for the adolescent age group, each completed by a different respondent. The main forms include the home form, school form, and self-report form, which are completed by parents, teachers, and the adolescents themselves in the home and school environments, respectively. Two 18-item forms related to the driving environment are also designed for adolescents with a driver’s license to be completed by the adolescent and the examiner. The scores on this tool are Likert-type, with numbers 1 (never), 2 (occasionally), 3 (frequently), and 4 (always). The internal consistency is 0.86, test re-test reliability is 0.84, alternate form reliability is 0.78, and inter-rater reliability is 0.66 [13].

Quiper et al. investigated GSQ psychometric properties in a sample of 147 individuals aged 18 to 45 years. This questionnaire was specifically designed for the sensory needs of individuals with autism spectrum disorder and is self-reported. It includes 42 items covering 7 sensory modalities, visual, auditory, gustatory, olfactory, tactile, vestibular, and proprioceptive. These items relate to the individual’s behavioral responses to sensory stimuli and determine the overall level of sensitivity, the modality that is impaired, and the individual’s sensory preferences. Responses are on a Likert scale from never (0) to always (4), and the individual’s total score ranges from 0 to 168. The Dutch version of this questionnaire has been validated for its psychometric properties. Correlations between the GSQ and other sensory questionnaires like

the AASP ($r=0.72$) and the sensory sensitivity questionnaire ($r=0.51$ in the autism spectrum disorder group and $r=0.56$ in the healthy group) were examined. The Cronbach’s α and test re-test reliability of the questionnaire were reported to be 0.91, and 0.92 in the autism spectrum disorder group and 0.90, and 0.83 in the healthy group, respectively. The internal consistency of the modalities ranged from slightly unacceptable to good, which can be justified by the small number of items within each modality. The GSQ has also been translated into French and Japanese, with Cronbach’s α values above 0.92 in both versions. The limitations of this tool include not examining sensory perception, not applying to individuals with intellectual disabilities, and lacking a form for close relatives or direct observation [18].

Sapey-Triomphe et al. investigated the psychometric properties of the GSQ in 245 participants aged 18 to 65 years in France. Ninety-five participants had a diagnosis of autism spectrum disorder, and 145 did not. In this study, participants completed a demographic questionnaire, the GSQ, and the Autism-spectrum quotient (AQ). The correlation between the GSQ and AQ test was 0.78 in the English version and 0.81 in the French version, close to the original version. The mean scores of the 42 items in the French version showed a high positive correlation with the English version ($r=0.83$). Cronbach’s α for internal consistency was 0.95 for the 42 items and 0.94 for the 14 subscales. The French version of this questionnaire is valid and usable. Another result of the mentioned study was the confirmation of a strong relationship between autistic traits and the degree of unusual sensory experiences in affected individuals [19].

The SPS is another tool to assess the sensory processing of adolescents, designed by Schoen et al. (2016) as a parent-report questionnaire for individuals aged 4 to 18 years to allow parents to determine their child’s sensory modulation pattern. The sample of this study consisted of 407 parents, 267 of whose children were clinically diagnosed with sensory modulation disorder and 140 were parents of typical children. Advantages of this scale include the ability to inform about the client’s behavior in different contexts and support a family-centered approach. This tool examines sensory processing challenges in the visual, auditory, tactile, olfactory, gustatory, vestibular, and proprioceptive domains based on the classification of sensory modulation disorder (sensory under-responsiveness, sensory over-responsiveness, and sensory seeking). Each item is scored 0 or 1, with 0 if the stated sentence is applicable and 1 if it is not. This scale has 96 items and takes 10 minutes to complete. The Cronbach’s α for the subscales of sensory over-respon-

siveness was 0.89, sensory under-responsiveness was 0.88, and sensory seeking was 0.93. Differential validity was calculated separately for each subscale, and based on the significant difference in the obtained values, the differential validity of this scale is acceptable. The limitations of this scale include not examining coping strategies used, not observing client performance, not examining all 8 sensory domains in the three patterns of sensory modulation disorder, and not addressing questions about postural control, praxis, and sensory discrimination [20].

The SR-AS questionnaire is a tool for late adolescence and beyond, developed in Swedish by Elwin et al. This self-report questionnaire is completed by adults aged 18 to 65 years with high-functioning autism spectrum disorder. The purpose of designing this questionnaire is to screen, determine differential diagnoses, adapt the environment, and use compensatory strategies for the client. The study was conducted on 233 adults (71 patients with autism spectrum disorder and 163 randomly selected). The Cronbach's α of the questionnaire was 0.96, the content validity was 0.82, and the differential validity was 0.925. Four main factors of over-response, under-response, strong sensory interests and sensory-motor factors are examined in this 32-item questionnaire, which showed high correlations. The response format is a Likert scale from strongly disagree (0) to strongly agree (3). The sensory-motor factors subscale does not match the diagnostic criteria for autism spectrum disorder in diagnostic and statistical manual of mental disorders, 5th edition (DSM-5). One of the limitations of this questionnaire is its self-report nature, which makes it unsuitable for individuals with intellectual disabilities or those who lack reading skills; its lack of use for the population and lack of test re-test reliability are also considered its limitations [21].

The SPS was designed by Schoen et al. to assess the sensory modulation ability of individuals aged 4 to 19 years. The present study was conducted on 128 participants, 63 healthy adolescents and 65 with autism spectrum disorder. The first version of the test was published in 2008, and the second version in 2014. It examines the three behavioral patterns of sensory over-responsiveness, sensory under-responsiveness, and sensory seeking in response to sensory stimuli that the individual also encounters in real life. This assessment is conducted by the therapist through direct observation of the behavior, which quantifies the examiner's observation. This tool includes 27 subscales and 72 items that assess the modulation or lack thereof of seven sensory modalities. Several activities and games similar to what the individual experiences in daily life are designed for each domain. According to the scoring criteria, the examiner selects one of the options ("yes, observed" or "no, not

observed") regarding the performance of each activity in each of the 6 existing behavioral categories at three-time points (during the activity, 15 seconds after, and when the individual attempts the next activity). The internal consistency of the items was 0.94, and the internal consistency between the items was strong. This tool is performance-based and structured, and has specific scoring criteria, so it can interpret normal and abnormal behaviors when encountering sensory stimuli and identify the sensory modulation pattern of a wide range of disorders. The limitations of the practical use of this tool include not addressing questions about postural control, praxis, and sensory discrimination, the limited age range, lack of a form based on informant information, and lack of examination of the relationship between social, cognitive, emotional, behavioral outcomes and adaptive functioning with the individual's sensory pattern [11].

Discussion

In this study, the available tools to assess the sensory processing of adolescents were reviewed. As mentioned above, the AASP, the GSQ, the SPM scale, the SR-AS questionnaire, the SPS, and the SPM-2 are used to assess sensory processing in the adolescent age group. By determining the impaired sensory domains, the causes of many problems, including deficits in occupational performance, poor quality of daily activities, anxiety, poor academic performance, lack of social participation in stimulating environments, and other issues arising from SPD, can be identified, and treatment planning can be done. Targeting and therapeutic planning require a precise and comprehensive assessment, therefore the results of these assessments can also be used to determine intervention methods.

Based on what was said about the importance of the impact of sensory stimuli received from the environment in the examination of SPD, it seems that the use of a tool that provides information about the behavioral manifestation of the adolescent's SPD in different environments becomes a priority for a therapist. In the SPM-2, it is possible to compare the individual's sensory performance in different environments. This tool includes forms to assess the sensory processing of adolescents in home, school, and driving environments. Among the tools reviewed, the SPM-2 seems to examine the individual's sensory challenges by determining the characteristics of the environment and its interaction with the state of the nervous system's processing; as a result, it can also be used for assessment during treatment or final evaluation to determine the extent to which the client's performance has changed in the home, school, and driving environments after receiving therapeutic intervention [13].

Given that therapeutic interventions for sensory issues may lead to long-term behavioral changes, it seems that adapting the environment to an individual's sensory processing characteristics may be a faster way to improve their performance. Each environment an individual encounters differs in terms of sensory stimuli; therefore, the assessment used by therapists needs to examine the symptoms of SPD to the type of environment [7].

The SPM-2 was designed to assess sensory processing characteristics across all age ranges. This tool examines individuals' sensory challenges by identifying the environment and provides a more comprehensive evaluation compared to other available tools. The sensory processing assessment tools for adolescents reviewed in this study are typically administered by a single evaluator, without considering the individual's behavior in different environments and within a limited age range. Moreover, most assessments focus solely on sensory processing and the resulting behavioral patterns, without examining higher-level functions that are influenced by SPDs, such as planning and social participation [13].

The SPM-2, on the other hand, is designed for a wide age range, with forms completed by multiple evaluators in different contexts. It also examines higher-level functions that are affected by SPDs, such as praxis and social participation. Given the presence of adolescents in various environments, the SPM-2 appears to be the most comprehensive tool for assessing sensory processing issues across diverse settings [13].

The SPM-2 evaluates the performance of sensory systems (visual, auditory, tactile, olfactory, gustatory, proprioceptive, and vestibular), the integration of function in praxis, social participation, and processing deficits in the sensory systems, including over-responsiveness, under-responsiveness, sensory seeking, and perceptual issues. The visual, auditory, tactile, olfactory, and gustatory subscales, as well as body awareness, balance and motion, planning and ideas, and social participation, are assessed in appropriate environments for the individual's age [13].

In Iran, the only validated and reliable tool for the adolescent age group is the AASP. However, this tool has limitations, such as the lack of a detailed examination of sensory-seeking behaviors and other cognitive and social aspects that influence an individual's behavioral patterns, the inability to determine the behavioral pattern in each sensory modality separately, the use of self-report responses from a single respondent, the application of the same items for a wide age range of 11

years and above, and the lack of consideration for different life contexts. Most importantly, the Persian version's psychometric evaluation was conducted on a population of individuals over 65 years old with dementia, making it unsuitable for assessing adolescents without medical diagnoses or disorders [16].

Conclusion

In the present study, we recognized the critical importance of comprehensive and contextually relevant assessment tools to evaluate sensory processing in the adolescent population. This age group faces unique challenges as they navigate the complex and dynamic environments of school, home, and community. Sensory processing issues often impact their learning, emotional regulation, performance in daily activities, and higher-level functions, such as praxis and social participation.

The review of various sensory processing assessment tools for adolescents highlights both the strengths and limitations of the currently available measures. While self-report tools, such as the AASP and the GSQ provide valuable data, their reliance on a single informant and limited consideration of environmental context may fail to capture the nuanced and situational nature of sensory processing in this population. The SPM-2 stands out as a more comprehensive assessment, incorporating multiple informants and evaluating sensory processing across diverse settings. This holistic approach aligns with the occupational therapy perspective, which emphasizes the dynamic interplay between the individual, their sensory experiences, and the demands of the environment. By examining higher-level functions, the SPM-2 also acknowledges the far-reaching implications of sensory processing challenges on adolescents' overall functioning and quality of life (QoL).

The limited availability of validated and contextually appropriate sensory processing assessment tools for the adolescent population in certain regions, such as Iran, underscores the need for continued research and adaptation efforts. Clinicians and researchers should carefully consider the unique needs and characteristics of adolescents when selecting or developing assessment tools, ensuring cultural relevance and sensitivity. Occupational therapists must advocate for and contribute to the advancement of sensory processing assessment practices that empower adolescents to thrive in their daily lives. This may involve adapting existing measures or creating novel tools that capture the complexities of this transitional stage of life, in collaboration with the adolescent community [16].

In summary, assessing sensory processing in adolescents is a critical component of understanding and supporting their unique needs. The tools reviewed provide a valuable starting point, but there remains a need for more holistic and contextually relevant assessment approaches. As occupational therapy professionals, we must continue to prioritize the development and implementation of comprehensive sensory processing assessment practices that address the diverse needs of the adolescent population.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of [Iran University of Medical Sciences](#) (Code: IR.IUMS.REC.1401.927).

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Authors' contributions

Conceptualization, supervision and methodology: Samaneh Karamali Esmaili and Mehdi Alizadeh Zarei; Investigation and writing the original draft: Kimiya Taheri; Review, editing and final approval: All authors.

Conflict of interest

The authors declared no conflict of interest.

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مطالعه مروری



ابزارهای اندازه گیری پردازش حسی برای نوجوانان ۱۲ تا ۲۱ ساله

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چکیده

مقدمه: اختلال در پردازش حسی توسط سیستم عصبی مرکزی می تواند باعث ایجاد مشکلات عملکردی در تمام زمینه های فعالیت نوجوان از جمله آموزش، مراقبت از خود، مشارکت اجتماعی و اوقات فراغت شود. بنابراین در صورت وجود مشکلات در این گونه فعالیت ها، ارزیابی و غربالگری مشکلات پردازش حسی ضروری است. در پژوهش حاضر ابزارهای ارزیابی پردازش حسی که گروه سنی نوجوانان را پوشش می دهد مورد بررسی قرار گرفت.

مواد و روش ها: در این بررسی، پایگاه های اطلاعاتی Google Scholar، PubMed، Science Direct، Google، OTseeker جستجو شدند و مقالات منتشر شده بین سال های ۲۰۰۰ تا ۲۰۲۲ در مورد ابزارهای ارزیابی پردازش حسی در نوجوانان و روان سنجی آن ها یافت شدند. کلیدواژه های مورد استفاده شامل یکپارچگی حسی، بدکارکردی یکپارچگی حسی، اختلال پردازش حسی، نوجوانی، نوجوان، ارزیابی، اندازه گیری، پایایی، روایی، روان سنجی، محیط، مقیاس و ابزار بود.

یافته ها: ابزارهای ارزیابی شناسایی شده برای ارزیابی پردازش حسی در گروه سنی نوجوانان شامل (نیمرخ حسی نوجوان/بزرگسال (AASP))، (پرسشنامه حسی گلاسکو (GSQ)) و (آکنش حسی در طیف اوتیسم (SR-AS))، (مقیاس پردازش حسی (SPS)) و (مقیاس پردازش حسی (SPM)) و (مقیاس پردازش حسی-ویرایش دوم (SPM-2)) بودند.

نتیجه گیری: نتایج این بررسی نشان داد که تنها ابزار موجود به زبان فارسی در این زمینه، AASP است که به نظر نمی رسد ابزار مناسبی برای استفاده در دوره نوجوانی باشد، زیرا جامعه مورد مطالعه در ارزیابی روان سنجی نسخه فارسی، سالمندان مبتلا به زوال عقل بنابراین تهیه نسخه فارسی و ارزیابی روان سنجی ابزار سنجش مناسب برای ارزیابی پردازش حسی نوجوانان ایرانی ضروری به نظر می رسد. محیط به عنوان عاملی در نظر گرفته شد که تنها در نسخه دوم سنجش پردازش حسی از میان ابزارهای انتخاب شده نیاز به ارزیابی دارد.

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پردازش حسی،
یکپارچگی حسی،
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