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Review Article

Sensory profile applications in adolescents and adults in the health care: a narrative review of the literature

Aplicações de perfis sensoriais em adolescentes e adultos em ambientes de saúde: uma revisão narrativa da literatura

Aplicaciones de perfiles sensoriales en adolescentes y adultos en el ámbito de salud: una revisión narrativa de la literatura

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Abstract

Introduction: Understanding the type of sensory information processed and the reactions to various sensory stimuli is critical for neurodevelopmental and psychiatric disorders in adolescents and adults. This literature review explores the different applications of three of the most commonly used instruments for assessing sensory modulation from adolescence. **Objective:** To identify and synthesize the existing information about the applications of the sensory profile for adolescents and adults, as well as the sensory processing questionnaire. **Method:** Narrative review of the literature in which was conducted a sensitivity test to establish keywords and identify relevant data sources. The research was carried out using databases such as WOS, Scopus, SciELO, LILACS, and the Chilean Journal of Occupational Therapy, covering the period from 2002 to January 2023, following predefined inclusion/exclusion criteria. **Results:** A total of 64 articles were analyzed where the findings were that the use of the sensory profile instrument for adolescents and adults is used in more than 20 pathologies and also in healthy

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population. The sensory processing questionnaire is in the initial stage of application and validation of the instrument in several countries. **Conclusion:** This is the first narrative literature review of the three sensory processing assessment instruments available for adolescents and adults. These three clinical instruments are complementary and provide relevant information to the clinician for diagnosing sensory processing and guiding occupational therapy intervention.

Keywords: Occupational Therapy, Adolescent, Adult, Modalities, Sensorial.

Resumo

Introdução: Conhecer que tipo de informação sensorial é processada e a reação a diferentes estímulos sensoriais é relevante para a abordagem de transtornos psiquiátricos e de neurodesenvolvimento em adolescentes e adultos. Este estudo corresponde a uma revisão da literatura sobre as diferentes aplicações de três dos instrumentos extensivamente utilizados para avaliar a modulação sensorial a partir da adolescência. **Objetivos:** Identificar e sintetizar as informações disponíveis sobre as aplicações do questionário de processamento sensorial e do perfil sensorial para adolescentes e adultos. **Método:** Revisão narrativa da literatura, a partir de um teste de sensibilidade para definir palavras-chave e fontes de dados. A pesquisa foi realizada nos bancos de dados Web of Science, Scopus, SciELO, LILACS e na Revista Chilena de Terapia Ocupacional, de 2002 a janeiro de 2023. **Resultados:** Um total de 64 artigos foi analisado e os achados foram que o uso do instrumento de perfil sensorial para adolescentes e adultos é usado em mais de 20 patologias e também na população saudável. O questionário de processamento sensorial está em fase inicial de implementação e validação do instrumento em vários países. **Conclusão:** Esta é a primeira revisão narrativa da literatura sobre os três instrumentos de avaliação do processamento sensorial disponíveis para adolescentes e adultos. Esses três instrumentos clínicos são complementares e fornecem informações relevantes ao clínico para diagnosticar o processamento sensorial e orientar a intervenção da terapia ocupacional.

Palavras-chave: Terapia Ocupacional, Adolescente, Adulto, Modalidades Sensoriais.

Resumen

Introducción: Conocer qué tipo de información sensorial se procesa y la reacción a los diferentes estímulos sensoriales es relevante para el abordaje de los trastornos psiquiátricos y del neurodesarrollo en adolescentes y adultos. Este estudio corresponde a una revisión de la literatura sobre las diferentes aplicaciones de tres de los instrumentos más utilizados que evalúan la modulación sensorial desde la adolescencia. **Objetivos:** Identificar y sintetizar la información disponible sobre las aplicaciones del perfil sensorial para adolescentes y adultos y el cuestionario del procesamiento sensorial. **Método:** Revisión narrativa de la literatura, donde se realizó una prueba de sensibilidad para definir palabras clave y fuentes de datos. Las investigaciones se realizaron en las bases de datos Web of Science, Scopus, SciELO, LILACS y la Revista Chilena de Terapia Ocupacional, desde el año 2002 a enero del año 2023. **Resultados:** Se analizaron 64 artículos en total donde los hallazgos fueron que el uso del instrumento del perfil sensorial para adolescentes y adultos se utiliza en más de 20 patologías y también en población sana. El cuestionario de

procesamiento sensorial está en la etapa inicial de aplicación y validación del instrumento en varios países. **Conclusión:** Esta es la primera revisión narrativa de la literatura que se realiza sobre los tres instrumentos de evaluación del procesamiento sensorial disponibles para adolescentes y adultos. Estos tres instrumentos clínicos son complementarios y proporcionan información relevante al clínico para el diagnóstico del procesamiento sensorial y la orientación de la intervención de terapia ocupacional.

Palabras clave: Terapia Ocupacional, Adolescente, Adulto, Modalidades Sensoriales.

Introduction

Sensory processing is defined as the recognition, organization, and interpretation of sensory information (Ayres, 1972; Miller et al., 2002). This influences learning, behavior and the choice of activities (Ayres, 1972, 2005; Parham, 1998). Their disorders can manifest as hyper-response or hypo-response to a sensory stimulus, which can be observed in people with some neurodevelopmental disorders, especially autism spectrum disorder, or in psychiatric disorders (Ahn et al., 2004; Brown et al., 2002, 2020; Engel-Yeger et al., 2015, 2016a, 2016b, 2021; Passarello et al., 2022; Champagne, 2011).

On the other hand, the evidence agrees that there are few evaluation methods to investigate sensory processing in adults (Serafini et al., 2017a; Rieke & Anderson, 2009). There are mainly three instruments: the adolescent/adult sensory profile (Brown et al., 2002), the sensory processing questionnaire (Blanche et al., 2014) and the Glasgow sensory questionnaire (Robertson & Simmons, 2019).

The adolescent/adult sensory profile identifies four different sensory profiles depending on the neurological threshold and self-regulation strategies (Brown et al., 2002). On the other hand, the sensory processing questionnaire measures the systems that are involved in each quadrant of the sensory profiles (Blanche et al., 2014), while the Glasgow sensory questionnaire is intended, fundamentally, for the adult population with autism spectrum disorders and treats to know the frequency of atypical sensory processing events, specifically hypersensitivity and hyposensitivity to the seven sensory modalities: visual, auditory, gustatory, olfactory, tactile, vestibular and proprioceptive. In recent years it has been validated for the French (Sapey-Triomphe et al., 2018), Dutch (Kuiper et al., 2019) and German (Zeisel et al., 2023) populations.

The sensory profile for adolescents and adults is based on the sensory processing model (Brown et al., 2001). This model of sensory processing allows us to know what sensory preferences are in everyday life, understanding them as stable traits. Describes each quadrant that results from the interaction of the neurological threshold continuum and the behavioral response continuum. Thus, four sensory profiles can be differentiated: sensitive, avoidant, low register or seeker. People who show a sensitive sensory profile are characterized by early detection of sensory stimuli, due to their low neurological threshold, and by showing passive self-regulation strategies. The avoidant sensory profile also shows a low neurological threshold, but the self-regulation strategies used by the person are active, usually with avoidance behaviors and include behaviors that limit exposure to stimuli. People who are characterized by a high neurological

threshold and passive self-regulation strategies show difficulties in registering stimuli at a usual intensity and frequency and not usually detecting them, with delayed or non-existent responses, which is why it has been called a low registration sensory profile. Finally, the sensory-seeking profile is characterized by active self-regulation responses to different sensory stimuli to compensate for a high neurological threshold, such that at a behavioral level a sensation seeking is observed (Dunn, 1994). From this instrument, you can know the sensory history. The instrument evaluates the frequency of adolescents' activities and behaviors according to their perspective (Chan et al., 2016). Some of the advantages of the sensory profile are the ease of administration, considering the daily context relevant (Dunn, 1994), since the evaluation refers to behaviors in the natural environment and allowing the person to be an active participant in the evaluation (Brown et al., 2001). The evaluation is focused on the person's perspective.

The sensory processing model indicates that alterations in sensory processing can be observed in adults, that they are relatively frequent and that an important part of this population maintains them throughout their lives, since it may be due to a late intervention or because due to its intensity, the problem could not be completely solved (Gómez et al., 2016). Assessment of sensory profiles can help develop specific interventions and improve functional/adaptive strategies (Serafini et al., 2017b).

In relation to the above, the objective of this study is to describe the different applications of the adolescent/adult sensory profile, the sensory processing questionnaire and the Glasgow sensory questionnaire in both the clinical population and the healthy population.

Methodology

This study used the methodology of a narrative literature review. Narrative reviews are a type of review that is characterized by being “more or less exhaustive”; they are carried out by “experts on a topic”, the author(s) do not declare the methods they used to obtain and select the information. Therefore, they are ideal for answering “basic” questions (considered these as those that refer to general “aspects” of a condition, for example: what is diabetes?, pathophysiology, classification or general aspects about its diagnosis and rehabilitation). These types of questions can be answered through books and encyclopedias. Narrative reviews, according to the hierarchy of evidence, are found in the last link of the pyramid (exposed to the possibility of presenting a high risk of bias, mainly due to their subjectivity and lack of methodology) (Aguilera Eguía, 2014). Conducting a narrative review is essential in scientific research, as it provides a critical and exhaustive synthesis of the existing literature on a specific topic. This approach allows us to identify knowledge gaps, evaluate the consistency of the findings, and offer a historical perspective of the field of study. Additionally, the narrative review facilitates contextualization of the current results in relation to previous research, providing readers with a more complete and informed understanding. By consolidating and analyzing accumulated evidence, the formulation of new research questions is encouraged and a solid foundation is established for scientific progress in the corresponding discipline.

A sensitivity test was carried out to define keywords using the DeCS/MeSH health sciences descriptors and data sources. The searches were carried out in the Revista

Chilena de Terapia Ocupacional and in the databases WoS, Scopus, SciELO and LILACS.

The following key words were used, "adolescent/adult sensory profile". "Sensory processing questionnaire", "adolescent/adult sensory profile", "adult sensory processing scale" "cuestionario sensorial de Glasgow" "Glasgow sensory questionnaire". Keywords were searched separately in Spanish and English. The inclusion criteria were: 1) scientific articles in which one of the two evaluation instruments was used, regardless of whether they were applied to a healthy clinical population; 2) the study population over 12 years of age; 3) articles published between January 2000 and January 2023; 4) studies related to the evaluation and practice of occupational therapy. Those works that were validations into other languages (Turkish and Arabic), and cultural adaptations of the instruments were excluded. In this search process, two people from the team independently reviewed the articles and selected them. In the case of disagreement, a third evaluator reviewed the articles where there was no agreement between the two reviewers and made the final decision, to resolve the conflict of including it or not in the review. This was the procedure followed in each step of the search carried out both for the selection by title and abstract, as well as for the full text review.

According to the sensory processing assessment methodology, the instruments can be classified into the following types: 1) Self-report and proxy report; 2) psychophysical evaluation; 3) Direct behavioral observation; 4) Qualitative interview techniques; and 5) Neuroimaging/EEG tests (DuBois et al., 2017). In addition, a bibliographic reference manager, Zotero, was used to manage the search results and detect duplicates. A spreadsheet was created with Excel that allowed the studies to be systematized according to the title, authors, year of publication, abstract and the journal in which it was published.

Results

A total of 878 studies in Spanish and English were found from the searches. 175 (20%) works were excluded because they were duplicates. The titles and abstracts of the remaining 715 articles were then read. 527 (75%) of those were eliminated for not addressing any relationship between occupational therapy and the sensory processing of adolescents and adults. 188 studies were included, with 168 (19.13%) articulating in their summaries the themes "occupational therapy" and "adult adolescent sensory processing", and another 20 (2.27%), whose reading of the summaries provided sufficient evidence. to meet the established inclusion criteria, so that reading it fully could provide said evidence. In the next step, with the complete reading of the remaining 188 studies, 120 (13.66%) were excluded for not meeting the criteria regarding instrument validations in other languages, cultural adaptations and four of them (0.45%) because it was not possible to access its full version. Finally, 64 (7.28%) studies were included in this review and classified according to the topics addressed, as presented in Figure 1.

Of the 64 articles, 59 are indexed in WOS and/or Scopus, one article in the Journal of Prevention, Assessment & Rehabilitation, one article in the Scielo database, one article in the journal Psychology, one article without classification, since it is a

presentation at an international conference and an article in the Chilean journal of occupational therapy.

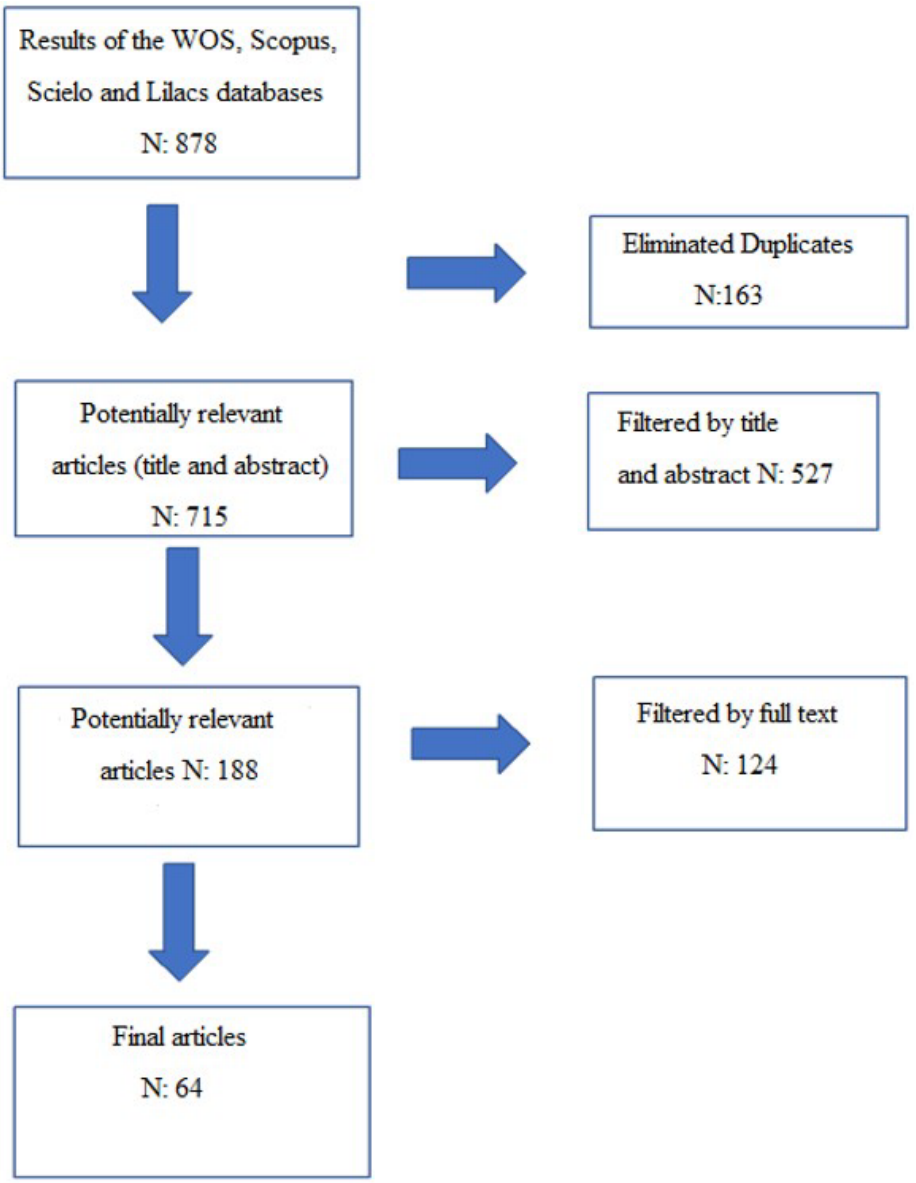

Figure 1. Flowchart.

The results grouped by instrument will be detailed so that they can be separated and understood in better ways, and reviewed their differences, applications and development.

Use of the adolescent/adult sensory profile (Brown & Dunn, 2002)

52 articles were found related to the sensory profile in adolescents or adults.

1. The results are organized in Table 1 by diagnostic condition or pathology, sensory processing problem in adolescents/adults, year of publication and authors. Six articles address differences in sensory processing in adolescents and adults with autism spectrum disorder (Bijlenga et al., 2017; Kuno-Fujita et al., 2020; Donaldson et al., 2017; Karhson & Golob, 2016; Howe & Stagg, 2016; De la Marche et al., 2012). Six articles refer to healthy adults and older people (Metz et al., 2019; Engel-Yeger & Shochat, 2012; Engel-Yeger & Rosenblum, 2017; Hebert, 2016; Brown & Dunn, 2023; Bailliard et al., 2022). Two articles refer exclusively to trait anxiety or anxiety disorders (Clark et al., 2018; Engel-Yeger & Dunn, 2011a), two articles refer to diabetes (Engel-Yeger & Dunn, 2011b; Engel-Yeger et al., 2017), two articles refer to cerebrovascular accidents (Chung & Song, 2016; Demopoulos et al., 2015), two articles refer to unipolar and bipolar disorders (Serafini et al., 2016; Engel-Yeger et al., 2018a), two other articles refer to selective eating habits (Avery et al., 2018; Hebert, 2018), two articles refer to multiple sclerosis with and without cognitive impairment and anxiety (Engel-Yeger et al., 2021; Stern et al., 2021). Two articles refer to post-traumatic stress (Engel-Yeger et al., 2015; Lev-Wiesel, 2015). One article refers to attention deficit hyperactivity disorder (Bijlenga et al., 2017), two articles refer to attention deficit hyperactivity disorder and autism spectrum disorder in the university population compared to the general population (Clince et al., 2016; Grinblat & Rosenblum, 2022). One article refers to major affective disorders such as depression (Engel-Yeger et al., 2017). One article refers to obsessive-compulsive disorder (Rieke & Anderson, 2009). Only one article refers to a skin problem (Engel-Yeger et al., 2011) and another article refers to body mass index (Delahunt & Mische Lawson, 2017). One article refers to youth at high clinical risk for psychosis compared to youth at low risk for psychosis and the general population (Parham et al., 2019). One article refers to the condition of impulsivity (Hebert, 2015). One article refers to drug use (Borges et al., 2017). One article refers to median or ulnar nerve injury (Vikström et al., 2018). One article refers to interpersonal relationships (Ben-Avi et al., 2012). One article refers to the writing process affected by age (Engel-Yeger et al., 2012). One article refers to nonspecific low back pain (Clark et al., 2019). One article refers to adults with autism compared to adults without autism (Top Junior et al., 2019). One article refers to the application of physiological parameters such as blinking, temperature, among others (Agrigoroaie & Tapus, 2018). Finally, an article studied the fear that university students have (Ogawa et al., 2019).

Sensory characteristics and difficulties detected with the Sensory Profile Questionnaire for Adolescents/Adults (Brown et al., 2001) in different processes and pathologies, Scimago ranking. This ranking was used since it plays a crucial role in scientific research by evaluating and classifying scientific journals and research centers. It provides an objective tool to assess the visibility and influence of academic publications, allowing researchers and academics to identify reliable sources and highlight significant contributions. This ranking is based on impact indicators, international collaboration and scientific production, offering a comprehensive overview of the relevance and quality of institutions and publications. By offering a reliable guide, the Scimago ranking facilitates strategic decision making for researchers, institutions and professionals, thus promoting excellence and continuous improvement in the scientific community.

Table 1. Results.

Pathology/Condition	Sensory problem from the adolescent/adult sensory profile	Source	Ranking Scimago
1. Atopic dermatitis	Sensory hypersensitivity	Engel-Yeger et al. (2011)	Q1
2. Characteristics of trait anxiety and anxiety disorder.	Central and processing sensitization. Extreme sensory reactivity.	Clark et al. (2018)	Q2
		Engel-Yeger & Dunn (2011a)	Q2
3. Autism spectrum disorder.	These studies show abnormal sensory sensitivity. hyper and hyposensitivity. It shows that people with ASD who react abnormally to sensory stimuli also exhibit atypical brain activity when recognizing faces. Abnormal sensory processing may partly explain the difficulty people diagnosed with ASD have identifying others' faces. The results showed that the responses that the children provided on the four AASP subscales of parents with multiple ASD children differed significantly from those of parents with typically developing children. Parents responded to a survey to describe their children's behavior.	Bijlenga et al. (2017)	Q1
Sensory processing atypicalities may share genetic influences with autism spectrum disorder.	The findings suggest specific neural mechanisms for greater perceptual ability and better bottom-up processing of sensory stimuli in people with autism.	Kuno-Fujita et al. (2020)	Q1
Atypical sensory reactivity in people with autism spectrum disorders (ASD)	Participants reported difficulties in at least one sensory domain, with hearing affecting them most. Content analysis revealed sensory sensitivity to affect participant learning and that sensory experiences were largely negative. The results suggest that schools need to create sensory profiles for each individual with autism spectrum status.	Donaldson et al. (2017)	Q1
	These results confirm the presence of atypical sensory processing in adolescents with ASD. We argue that reduced sensation seeking could be a candidate for an intermediate phenotype.	Karhson & Golob (2016)	Q1
		Howe & Stagg (2016)	Q1
		De la Marche et al. (2012)	Q2
4. Attention deficit hyperactivity disorder.	Abnormal sensory sensitivity. hyper and hyposensitivity.	Bijlenga et al. (2017)	Q1
5. Major affective disorder such as depression.	Sensory hypersensitivity affecting sleep efficiency and related daytime dysfunction.	Engel-Yeger et al. (2017)	Q1
6. Obsessive compulsive disorder	Evidence of differences in sensory processing compared to the general population.	Rieke & Anderson (2009)	Q1
7. Diabetes	Difficulties in sensory processing and their impact on quality of life.	Engel-Yeger & Dunn (2011b)	Q2
		Engel-Yeger et al. (2017)	Q1
8. Cerebrovascular accident	Early intervention from the sensory point of view. Auditory System.	Chung & Song (2016)	No ranking
		Demopoulos et al. (2015)	Q1
9. Posttraumatic stress	A higher prevalence of extreme sensory sensitivity, avoidance, and low registration was found among the study group. These patterns were significantly correlated with the deterioration of emotional responses associated with intimacy. Low registration and group membership increase the likelihood of having fears of intimacy.	Engel-Yeger et al. (2015)	Q2
	The presence of sensory modulation challenges may help explain the symptoms of hyperarousal, avoidance/desensitization, and Criterion E cited in the Association Diagnostic and statistical manual of mental disorders (5th ed.) (DSM-5-TR) regarding post-traumatic stress disorder	Kimball (2023)	Q4

Table 1. Continued…

Pathology/Condition	Sensory problem from the adolescent/adult sensory profile	Source	Ranking Scimago
10. Body Mass Index in adolescents.	The greater the body mass, the greater the sensory problems affecting adolescents' participation in activities.	Delahunt & Mische Lawson (2017)	Q2
11. ADHD and ASD University students and general population.	Sensory problems between ADHD and ASD are similar but compared to the general population they differ substantially.	Clince et al. (2016)	Q1
	The ADHD group had significantly worse body functions, sensory processing (i.e., low registration, sensory sensitivity, and sensation avoidance patterns), sleep quality, and work performance compared to the control group. For adults with ADHD, sensory sensitivity accounted for 10.9% and sleep quality for 22.0% of the variance in their work performance compared to the control group.	Grinblat & Rosenblum (2022)	No ranking
12. Young people High clinical risk for psychosis.	Active avoidance, increased sensitivity, reduced seeking and reduced registration of sensations in everyday life. Compared with young people at low clinical risk for psychosis and the general population.	Parham et al. (2019)	Q2
13. Unipolar and Bipolar Disorders.	Lower registration of sensory stimuli and hypersensitivity correlate with childhood traumatic events.	Serafini et al. (2016)	Q1
	Sensory profile in people with unipolar and bipolar affective disorders.	Engel-Yeger et al. (2018a)	Q1
14. Impulsivity.	The results suggest that individuals with low registration are more impulsive. When helping clients manage impulsivity, occupational therapists should consider their sensory processing patterns and use interventions that address this aspect.	Hebert (2015)	Q2
15. Healthy adults and older people	Dunns model of sensory processing: An investigation of the axes of the four-quadrant model in healthy adults.	Metz et al. (2019)	Q3
	Sleep quality was significantly correlated with sensory processing patterns characterized by hypersensitivity. These patterns manifested in specific modalities (tactile, visual, and auditory), which significantly predicted sleep quality.	Engel-Yeger & Shochat (2012)	Q1
	Better recording of sensory information and greater sensory seeking were related to greater occupational participation.	Engel-Yeger & Rosenblum (2017)	Q2
	People whose sensory processing patterns are characterized by low sensory registration and sensitivity have poor awareness experience more wandering and distraction in daily life.	Hebert (2016)	Q2
	The resulting subscales (sensitivity, avoidance, registration, and search) had good internal consistency and correlated moderately with the corresponding Adolescent/Adult Sensory Profile subscale and her (Brown & Dunn, 2023) A/ASP subscales. The results provide preliminary support for the internal consistency and concurrent validity of interoception (SPI).	Brown & Dunn (2023)	Q1
	It establishes a specific connection between sensory processing patterns and participation in meaningful activities. This research topic demonstrates that sensory processing patterns differ between groups and individuals and that these differences impact their participation in meaningful activities.	Bailliard et al. (2022)	Q2

Table 1. Continued…

Pathology/Condition	Sensory problem from the adolescent/adult sensory profile	Source	Ranking Scimago
16. Drug use.	Relationship between sensory processing, resilience, attitudes and drug use in Portuguese adults.	Borges et al. (2017)	SCIELO
17. Injury to the median or ulnar nerve.	Atypical sensory processing pattern after median or ulnar nerve injury.	Vikström et al. (2018)	Q2
18. Relationships	Patterns of extreme sensory processing are strongly related to distress and psychological difficulties	Ben-Avi et al. (2012)	No ranking
19. Selective Eating Habits	The results suggest that taste reactivity increases in self-reported process instruments.	Avery et al. (2018)	Q1
	Sensory processing styles and eating behaviors.	Hebert (2018)	Q2
20. Writing Process Affected by Age	Age significantly affects sensory processing and writing pressure, as well as temporal and spatial measures. Both writing time and spatial organization of the written product were predicted by sensory search.	Engel-Yeger et al. (2012)	Q2
21. Nonspecific Low Back Pain	Extreme trait sensory profiles and personality types are related to the extent of pain.	Clark et al. (2019)	Q1
22. Adult with and without Autism	The autism group showed an atypical sensory profile. Processing in the four domains measured from the sensory profile of adolescents and adults including: sensory sensitivity, sensory seeking, sensory avoidance and low registration	Top Junior et al. (2019)	Q1
23. Application of physiological parameters such as blinking, temperature, among others	The main result shows that blinking is the main physiological parameter that varies in the non-stressful task of news reading.	Agrigoroaie & Tapus (2018)	No ranking
24. College students afraid of the dentist	Extreme sensory processing patterns appear to be associated with a high level of fear of dental care; Therefore, the difference in sensory processing could play an important role in fear of the dentist.	Ogawa et al. (2019)	Q2
25. Adolescents with persistent pain	This study shows that atypical sensory sensors and modulation patterns are associated with poorer function in adolescents with persistent pain, suggesting that individualized sensory input in interventions may facilitate participation in daily activities and improve quality of life.	Sinclair et al. (2019)	Q1
26. Multiple sclerosis with and without cognitive deficiencies. Multiple sclerosis and anxiety	People with Multiple Sclerosis have sensory processing difficulties regardless of their cognitive abilities, which negatively affect their functional behavior.	Engel-Yeger et al. (2021).	Q1
	Sensory processing patterns were significantly associated with trait anxiety and health-related quality of life. Direct and indirect effects of sensory processing patterns identified quality of life related to physical health, and indirect effects were identified in quality of life with mental health.	Stern et al. (2021)	Q2
27. Functional neurological disorder	Most patients reported sensory processing tendencies toward low registration, sensory sensitivity, and avoidance of sensation.	Ranford et al. (2020)	Q1
28. Depression and anxiety	We can conclude that the neurological threshold of individuals based on the sensory profile could be considered one of the factors related to anxiety and depression.	Khodabakhsh et al. (2020)	Q3
29. Severe dementia units in municipal nursing homes	It is a relevant and useful tool to use when behavioral challenges arise among residents living with dementia.	Ravn et al. (2018)	Q2
30. Adolescents with and without ASD	The results show that high-risk infants and adolescents with ASD exhibit a higher than normal prevalence of unusual sensory behavior patterns.	van Etten et al. (2017)	Q2

Table 1. Continued…

Pathology/Condition	Sensory problem from the adolescent/adult sensory profile	Source	Ranking Scimago
31. Examined hatha yoga on combat stress symptoms in deployed military personnel, compared their anxiety and sensory processing to civilians in the United States	We found positive correlations between all test measures except sensory search. Sensory search was negatively correlated with all measures except low registration, which was insignificant. Results Support the Use of Sensory-Enhanced Hatha Yoga for Proactive Combat Stress Management in a Group of U.S. Soldiers	Stoller et al. (2012)	Q1
32. We explored in adults the relationships between sensory modulation and health-related quality of life (HRQoL), social supports, and symptoms of anxiety and depression in mental health.	Several analyzes exploring the relationships between the variables evaluated suggest that sensory response style, whether comparing excessive sensory response and non-excessive sensory response groups or exploring the correlation of the response quadrants of the adolescent/adult sensory profile, appears to be related significantly and differentially with affective mental health symptoms and quality of life indicators, including social participation.	Kinnealey et al. (2011)	Q1
33. Kinesiophobia and sensory processing in patients with fibromyalgia.	Among participants, sensory sensitivity scores of 65.85% and sensation avoidance scores of 40.24% were higher than those of the general population. The sensation seeking scores of 48.78% of the subjects were lower compared to the general population. A significant and weak positive correlation was found between kinesiophobia scores and sensory sensitivity and sensation avoidance responses.	İnal et al. (2020)	Q4
34. Anorexia nervosa in adolescents	Sensory sensitivity in anorexia nervosa may be a "scarring" symptom due to chronic starvation and may be considered a symptom of the health condition.	Kitajima et al. (2022)	Q2

Source: Own elaboration.

Use of the sensory processing questionnaire in adults

Two articles were found regarding the sensory processing questionnaire:

1. Sensory process in Chilean adults and the English population.
2. Concurrent validity of the sensory processing scale in adults and the adult/adolescent sensory profile.

Table 2 shows the results of the research, highlighting the condition or pathology, sensory problem in adolescents/adults classified by the instrument, year of publication and authors. One article refers to adolescents with persistent pain (Sinclair et al., 2019). One article refers to functional neurological disorder (Ranford et al., 2020). Considering the sensory processing questionnaire, its development is incipient with respect to the sensory profile of the adolescent and adult.

Table 2. Sensory characteristics and difficulties detected with the Use of the Sensory Processing Questionnaire in Adults (Blanche et al., 2014), in different processes, pathologies, Scimago ranking.

Title	Sensory Processing Questionnaire/Adult	Source	Ranking Scimago
1. Sensory process in Chilean adults and the English population.	11 factors represent hypo or hyper response in sensory systems	Gómez et al. (2016)	No ranking
2. Concurrent validity of the adult sensory processing scale and the adult/adolescent sensory profile.	Sensory integration theory describes how individuals receive, organize, and respond to sensory experiences in the environment. Although much research has been done on children, few studies have been done on sensory processing in adult populations.	Chan et al. (2016)	Q1
Assessment of adult sensory processing	It provides useful information about adults' current sensory thresholds along a continuum, possibly informing interventions.	Gómez & Medallón (2022)	Q3

Source: Own elaboration.

Use of the Glasgow sensory questionnaire

6 articles were found regarding the sensory processing questionnaire:

1. Creation of the sensory processing instrument in 2019 (Robertson & Simmons, 2013). Instruments for assessing autistic traits and abnormal sensory experiences in adults. (Horder et al., 2014). Application of the instrument in atypical sensory sensitivity as a shared trait between synesthesia and autism. (Ward et al., 2017). Subjective sensitivity to exteroceptive and interoceptive processing in highly sensitive people (Ujiie & Takahashi, 2024). Application of the instrument in oral dysesthesia associated with autistic traits: retrospective review of medical records (Uezato et al., 2019). Application of the instrument on associations between self-reported avoidance of social contact, hypersensitivity, and autistic traits: Results of a questionnaire among typically developing adults (Ujiie & Takahashi, 2024).

Table 3 shows the results of the research, highlighting the condition or pathology, sensory problem in adolescents/adults classified by the instrument, year of publication, authors and scimago ranking. One article refers to the creation of the instrument (Robertson & Simmons, 2013). Several articles used this instrument to assess autistic traits and anomalous sensory experiences in adults (Horder et al., 2014), to assess atypical sensory sensitivity as a shared trait between synesthesia and autism. (Ward et al., 2017), evaluate subjective sensitivity to exteroceptive and interoceptive processing in highly sensitive people. (Ujiie & Takahashi, 2024), application of the instrument in oral dysesthesia associated with autistic traits: retrospective review of medical records. (Uezato et al., 2019), application of the instrument in associations between self-reported avoidance of social contact, hypersensitivity and autistic traits. (Ujiie & Takahashi, 2024).

Table 3. Sensory characteristics and difficulties detected with the Use of the Glasgow Sensory Questionnaire (Robertson & Simmons, 2019), in different processes, pathologies, Scimago ranking.

Title	Glasgow Sensory Questionnaire	Source	Ranking Scimago
1. Creation of the Instrument	The Glasgow Sensory Questionnaire is a 42-item measure that captures self-rated hypersensitivity and hyposensitivity to stimuli in seven sensory domains.	Robertson & Simmons (2013)	Q1
2. Autistic traits and abnormal sensory experiences in adults	Autistic traits were significantly correlated with the instrument. This relationship was linear across the entire range of instrument scores and was observed in both people with and without an ASD diagnosis.	Horder et al. (2014)	Q1
3. Atypical sensory sensitivity as a shared trait between synesthesia and autism	It is concluded that atypical sensory sensitivity is an important characteristic shared between autism and synesthesia.	Ward et al. (2017)	Q1
4. Subjective sensitivity to exteroceptive and interoceptive processing in highly sensitive people	The findings suggest that sensory processing sensitivity levels reflect a subjective sensitivity to exteroceptive sensory processing independently of sensory domains and closely to interoceptive sensory processing.	Ujiie & Takahashi (2024)	Q2
5. Oral dysesthesia associated with autistic traits: retrospective review of medical records	In conclusion, an abnormal sensation of squeezing or pulling in oral regions without a somatic basis was associated with autistic traits and could be highlighted as a specific abnormality in sensory processing in autism spectrum disorder.	Uezato et al. (2019)	Q2
6. Associations between self-reported avoidance of social contact, hypersensitivity, and autistic traits: Results from a questionnaire among typically developing adults.	Our study is the first that corroborate the assumptions of previous studies, indicating that a higher level of hypersensitivity in people with autism spectrum disorder can cause tactile defensiveness and avoidance of social contact. This implies that problems in processing sensory information may underlie difficulties in social interaction between people with autism spectrum disorder.	Ujiie & Takahashi (2024)	Q1

Source: Own elaboration.

Discussion

The objective of the present review was to describe the application that is being carried out of the instruments for assessing sensory processing in adolescents and adults

currently available (Brown et al., 2001), (Robertson & Simmons, 2013), (Gómez et al., 2016). The first of these instruments, the Sensory Profile for Adolescents and Adults (Brown et al., 2001), was created in 2002 and is widely used in various contexts, cultures, and populations, both clinical and non-clinical. Furthermore, it has an established relationship with Dunn's (1994) model of sensory processing, which allows for a solid theoretical interpretation of its results, in contrast to the other two instruments, the Glasgow Sensory Questionnaire (Robertson & Simmons, 2013) and the Adult Sensory Processing Questionnaire (Gómez et al., 2016), are of more recent creation, with less than 10 years of existence, where they have had a more limited use, and their validity is still being explored in different languages and contexts (Horder et al., 2014; Engel-Yeger et al., 2018b). They have not established a solid relationship with a sensory processing model since its creation (Gómez et al., 2016; Robertson & Simmons, 2013), unlike the sensory profile of the adolescent/adult, which has had it since its creation (Brown et al . . ., 2001).

Most of the studies that have been carried out with the adolescent/adult sensory profile instrument (Brown et al., 2001) have focused on the field of mental health, which highlights the importance of sensory characteristics in the mental health of adolescents and adults. (Sanchís-Asensi et al., 2023; Serafini et al., 2016; Engel-Yeger et al., 2018b), on the other hand, the other two instruments are in the initial phases of translation into different languages, contexts, and healthy populations and incipient exploring populations with mental and physical health problems. (Ujiie & Takahashi, 2024; Sapey-Triomphe et al., 2018; Takayama et al., 2014; Gómez & Medallón, 2022).

These results are significant not only for evaluation, but also for occupational therapy, since they provide valuable information for the development of clinical and preventive interventions aimed at improving the quality of life of this population (Sanchís-Asensi et al., 2023)., in contrast to the Glasgow Sensory Questionnaire, which is mainly used in the population with autism spectrum disorder (Ujiie & Takahashi, 2024), and the Adult Sensory Processing Questionnaire has been applied mainly in the healthy population (Robertson & Simmons, 2013).

Despite the existence of these instruments, it is important to highlight that the evidence and studies available on their application are limited (Ujiie & Takahashi, 2024). The Glasgow Sensory Questionnaire is specific to the population within the autism spectrum and is available in several languages, which makes it a valuable tool in that context (Robertson & Simmons, 2013). On the other hand, the Sensory Processing Questionnaire is more general and can be applied to various populations. Its main contribution lies in the detection of affected sensory systems that the adolescent/adult sensory profile that would not detect (Gómez et al., 2016).

However, it is essential to highlight that the Sensory Processing Questionnaire (Blanche et al., 2014) is a tool in development and lacks exhaustive studies that support its application. Therefore, additional research is required to determine its usefulness and validity in different contexts (Blanche et al., 2014). In contrast to the other two instruments that have more developments in their respective areas, autism spectrum disorder (Robertson & Simmons, 2013), and mental health (Serafini et al., 2016; Engel-Yeger et al., 2018b).

Among the main strengths of this review is the analysis of the best available databases. The review was in English and Spanish. It is a contribution to the discipline of Occupational Therapy and others that use these instruments and obtain a quick access summary to review under what conditions these instruments have been developed and under which it is still a field to explore.

Conclusions

This review of the state of the literature found that the adolescent/adult sensory profile instrument is the main instrument used to know the characteristics of sensory processing in daily life, regardless of pathology or health status.

The main conclusion of the sensory processing questionnaire, which does not include the sensory profile of the adolescent and adult, is that we can identify which systems are altered in the detected sensory profile, therefore the intervention can be more precise and provides the clinician with more information for the treatment.

The main conclusion of the Glasgow sensory questionnaire is its validation in different languages and its increase in its use since its creation in 2019, also its specific use in people with autism spectrum disorders.

Limitations

This study has some limitations, such as the possibility of team bias, since the structure of a systematic review is not followed and the review protocol is not registered on official platforms to be able to review it in detail. There are no comparisons about which pathologies or health conditions it is most useful. The methodologies of each investigation are not detailed to compare them.

Future projections

Within the projections, the use of the three instruments in some mental or physical health conditions can be highlighted, to investigate in depth their complementarity, since until now only the complementarity has been developed from its theories, differences and results that could deliver. These three instruments could be used in adolescent and adult populations in conflict with justice, migrants, LGBTIQ+, displaced people and other conditions not explored to date.

The team reports that it has no conflict of interest.

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Author's Contributions

Rodrigo Fernando Goycolea Martinic participated in the conception of the text, organization of the sources, analysis of the results, writing of the text and revision. Camila Betzabet Sepúlveda Angulo and Camila Fernanda Silva Henríquez will participate in the conception of the text, organization of sources and writing of the text. Dulce María Romero-Ayuso participated in the analysis of the results, writing of the text and review. All authors approved the final version of the text.

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