World Journal of Current Science
www.currentworldjournal.com
Online ISSN: 3107-8974
Received: 12-12-2025, Accepted: 17-01-2026, Published: 04-02-2026
Volume 2, Issue 1, 2026, Page No. 7-16

Sensory processing, processing speed, and memory across the lifespan

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Abstract
This paper examines the central role of sensory processing (SP) and processing speed (PS) in the development, maintenance, and decline of memory across the lifespan. Sensory systems, including visual, auditory, tactile, olfactory, gustatory, and kinesthetic modalities, constitute the primary pathways through which information enters the brain and underpins the encoding, integration, and retrieval of memories. Efficient and rapid SP in early development facilitates robust memory formation, whereas age-related reductions in sensory acuity and processing speed are associated with memory decline and increased cognitive effort in later life. The paper further explores how atypical sensory integration and slowed PS present in neurodivergent children, particularly those with autism or ADHD, and how these differences influence learning and working memory. It provides a detailed overview of common SP challenges and associated behavioral indicators, including difficulties with sensory discrimination, motor planning, and susceptibility to mental fatigue. In addition, practical observational tools and reference tables are presented to support the identification of sensory- and speed-related difficulties in home and educational settings. The paper underscores the importance of early and targeted interventions (e.g., sensory integration therapy, auditory training, and assistive sensory supports) as well as strategies aimed at promoting cognitive resilience in aging populations. Overall, understanding the dynamic interaction between SP and cognitive function is critical for educators, clinicians, and caregivers seeking to optimize learning, memory performance, and quality of life.

Keywords: Cognitive decline, Memory development, Neurodivergent learners, Processing speed (PS), Sensory processing (SP)

Introduction

The way we sense our environment, especially the world at large, how quickly we respond or react to it, and the speed at which our brain processes information are deeply intertwined with how our memory develops, is maintained, and eventually declines (Keetels & Vroomen, 2012; Mesulam, 1998) [34]. From the first spark of a sensory impression to the richness of long-term memories, our senses and processing speed (PS) shape our entire memory journey (Harris, Petersen, & Diamong, 2001) [16]. In fact, Liu and Xie (2024) [31] have pointed out that the Cattell-Horn-Carroll (CHC) theory of cognitive abilities is incomplete and/or inadequate to cover everything on all the sensory aspects (i.e., Gv, Ga, Gp, Go, Gh and Gk). They argued the need to also look into "Sensory intelligence (SenQ), also known as sensory processing (SP) or sensory integration, … the ability of the brain to receive, interpret, and respond to sensory information from the immediate environment' (p. 36). This is the non-CHC theory of SenQ which offers a crucial role in how individuals perceive, process, and acquire knowledge and experiences from their environment (Lombard, 2007) [32], and involving the ability to use sensory information (e.g., sight, hearing, touch, taste, and smell) to understand and interact with the world. "People rely on their senses to gather information, make sense of their surroundings, and learn from their experiences" (Liu & Xie, 2024 [31], p. 36). The SenQ can vary from individual to individual, impacting the way individuals learn and remember information (Liu & Xie, 2023) [30].

The Foundation: Sensory Inputs and Memory Formation

Our five exteroceptive senses (i.e., sight, sound, touch, smell, and taste) constitute the gateway through which we experience life (Bokarius & Bokarius, 2020; Wilson, 1860, 1881) [3, 51, 52]. These inputs form the raw material of memory. Sensory memory, the initial stage of memory processing, briefly holds large amounts of information for just seconds or fractions of a second. It is a high-capacity, pre-attentive buffer that operates automatically and is specific to each sensory modality:

- Iconic memory (visual): It lasts about 0.25 to 1 second - think of the trail left by a sparkler.
- Echoic memory (auditory): It holds sound for 3-4 seconds, helping us make sense of speech.
- Haptic memory (touch): It stores tactile information for around 2 seconds.
- Olfactory and gustatory memories (smell and taste): They are closely tied to emotions and long-term memory.

Most sensory inputs vanish quickly unless we pay attention. When we do, selected information moves into short-term (working) memory, where it is actively processed. Attention is the key gatekeeper here. Working memory holds information briefly (about 20-30 seconds), and only a small number of items (typically 7±2), but it allows for conscious manipulation, e.g., remembering a phone number just long enough to dial it.

From Sensory to Long-Term Memory: The Role of Rich Detail

When sensory experiences are vivid, emotional, and multi-sensory, they are more likely to be encoded into long-term memory, as engaging multiple senses strengthens and distributes the neural networks associated with that memory (Craik & Lockhart, 1972; Shams & Seitz, 2008) [7, 43]. For example, a memorable meal is not stored solely through taste but through the combined input of its appearance, aroma, and texture, creating a richer and more durable memory trace (Stein & Stanford, 2008) [46]. Beyond encoding, sensory cues play a critical role in memory retrieval. Familiar smells, songs, or the feel of an object can trigger vivid recollections, a phenomenon known as context-dependent memory, in which being in the same sensory environment as when the memory was formed enhances the ability to recall it (Tulving & Thomson, 1973; Godden & Baddeley, 1975) [13, 48]. Together, these processes highlight how multi-sensory engagement not only strengthens the formation of memories but also facilitates their later retrieval.

Sensory Patterns and Memory Across the Lifespan

Lifespan sensory development can be understood as a continuous trajectory across three interconnected domains: sensory-driven memory development, sensory acuity maintenance, and sensory decline. In early life, rapidly developing sensory systems enable the brain to encode and store memories efficiently through rich and repeated sensory experiences, laying the foundation for memory capacity and complexity. During adulthood, the maintenance of sensory acuity (e.g., clear vision and hearing) becomes essential for sustaining attention, effective learning, and accurate memory retrieval. In later life, sensory decline, often resulting from reduced sensory input or impaired perception, can weaken memory encoding, diminish cognitive engagement, and increase vulnerability to memory deterioration. This lifespan progression underscores the importance of supporting sensory health and processing speed at every stage of life to optimize memory functioning and overall cognitive performance, as illustrated in Figure 1, which depicts the three domains of lifespan sensory development.

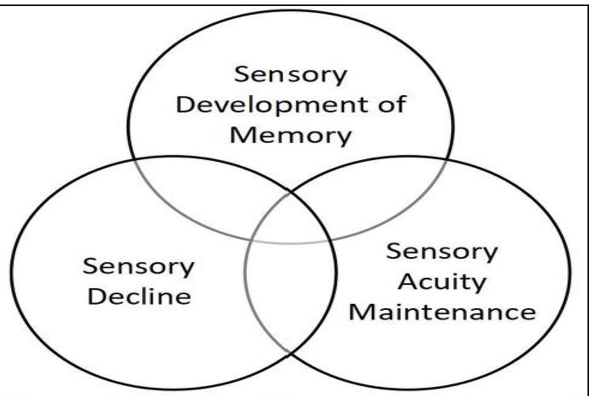

Figure 1. Lifespan Sensory Development

Across the lifespan, sensory processing often plays a pivotal role in shaping one's memory development, maintenance, and decline (Shams & Seitz, 2008; Craik & Bialystok, 2006) [6, 43]. During the childhood development phase, heightened brain plasticity allows repeated exposure to rich and varied sensory experiences to build strong neural pathways that support memory formation, with visual patterns aiding face recognition and auditory patterns facilitating language acquisition (Nelson, 2000; Kuhl, 2004) [27, 36]. Early sensory diversity, therefore, helps to enhance both the capacity and complexity of emerging memory systems (Gogtay *et al*., 2004) [14]. As an individual enters the adulthood development phase, continued sensory engagement helps maintain memory strength, as clear and accurate sensory input supports robust encoding, while diminished sensory acuity can lead to weaker memory traces (Lindenberger & Baltes, 1994) [29]. Engaging multiple senses during learning (for instance, tasting and smelling a fruit while learning its name) can further reinforce memory encoding and retrieval (Shams & Seitz, 2008) [43].

In later life, age-related sensory decline, such as reduced vision or hearing, may indirectly contribute to memory loss by limiting the quality and quantity of information available for encoding (Baltes & Lindenberger, 1997) [2]. However, compensatory supports, including assistive devices and sensory-stimulating activities, can help preserve sensory input and keep memory systems actively engaged, supporting greater memory resilience in older adulthood (Park & Reuter-Lorenz, 2009) [38].

The Speed Factor: Responding and Processing Information

Reaction and processing speed play a central role in how memory develops, is maintained, and eventually declines across the lifespan (Kail & Salthouse, 1994; Salthouse, 1996) [21, 41]. In childhood, fast and efficient responses to sensory stimuli often reflect healthy sensory processing and strong links between perception and memory, as seen when a child quickly recognizes and names a familiar object, demonstrating seamless sensory recognition and rapid memory retrieval (Kail, 2000) [20]. In adulthood, quick reaction times typically signal well-established and deeply encoded memories. For instance, the effortless movements of a musician's fingers or an athlete's rapid reflexes rely on memories that are both highly practiced and readily accessible, with regular repetition reinforcing this efficiency (Ericsson, Krampe, & Tesch-Römer, 1993) [12].

As individuals age, however, processing and response speeds tend to slow, making memory retrieval less efficient even when the information itself remains intact, particularly in situations that require rapid access (Salthouse, 1996, 2010) [41, 42]. Underlying these changes is processing speed, which functions as the engine behind memory throughout life. Fast processing in childhood enables efficient learning and integration of information, supporting stronger long-term memory formation (Kail & Salthouse, 1994) [21]. In adulthood, sustained processing efficiency supports complex thinking, learning, and recall and is closely linked to working memory capacity, which allows information to be actively manipulated in real time (Baddeley, 2003) [1]. With aging, reduced processing speed can impede both the formation of new memories and the retrieval of existing ones and is a key contributor to age-related cognitive decline; nevertheless, continued mental engagement and cognitively demanding activities can help slow this process (Park & Reuter-Lorenz, 2009) [38]. Overall, sensory flow fuels memory "glow" or its fading: from the richness of childhood experiences to the gradual loss of detail in later life, memory is profoundly shaped by sensory input and the speed of neural processing, and maintaining sensory and cognitive engagement remains vital for memory resilience and longevity.

Table 1: The Speed-Related Factors

Speed-Related Factors	Description
Reaction Speed & Memory Development	Fast and efficient responses to stimuli in children often indicate healthy sensory processing and quick memory access. A child quickly naming a familiar toy shows that sensory recognition and memory retrieval are well connected.
Maintenance Through Practice	In adults, quick reactions are signs of well-established memories. A musician's fingers moving effortlessly or an athlete's rapid reflexes both rely on deeply encoded, quickly accessible memory. Regular practice reinforces this connection.
Decline in Response Speed	As processing speed slows with age, so does the ability to quickly access information. The memories may still exist, but slower retrieval can make recall less efficient, particularly in time-sensitive situations.
Processing Speed: The engine behind memory	✧ *Development:* Fast processing = Better learning: A fast-processing brain in childhood allows more efficient learning and encoding. Quick integration of information means better long-term memory. ✧ *Maintenance:* Keeping the engine running: Efficient processing in adulthood supports complex tasks, learning, and recall. It is also associated with a larger working memory capacity, crucial for juggling and manipulating data in real time. ✧ *Decline:* Slower processing, slower memory: With age, reduced processing speed can hinder both memory formation and retrieval. It is a major factor in age-related cognitive decline, affecting working memory and the ability to learn new things. However, staying mentally active and engaging in cognitively demanding tasks can help slow this decline.

In summary, sensory flow truly fuels memory glow … or its fading. From the vivid richness of childhood experiences to the slow unraveling of detail in older age, memory is deeply shaped by our senses and the speed of our brain's responses. The good news? By staying mentally and sensory engaged (e.g., through learning, stimulation, and compensating for sensory loss), we can support our memory's longevity and resilience.

The Important Role of Sensory Processing & Its Processing Speed

Sensory processing, e.g., auditory (aural and oral), visual, touch (haptic), movement (kinesthetic), smell (olfactory), and taste (gustatory), and the speed at which these inputs are processed play a vital role in memory development. These mechanisms also strongly influence cognitive decline later in life (see Figure 2).

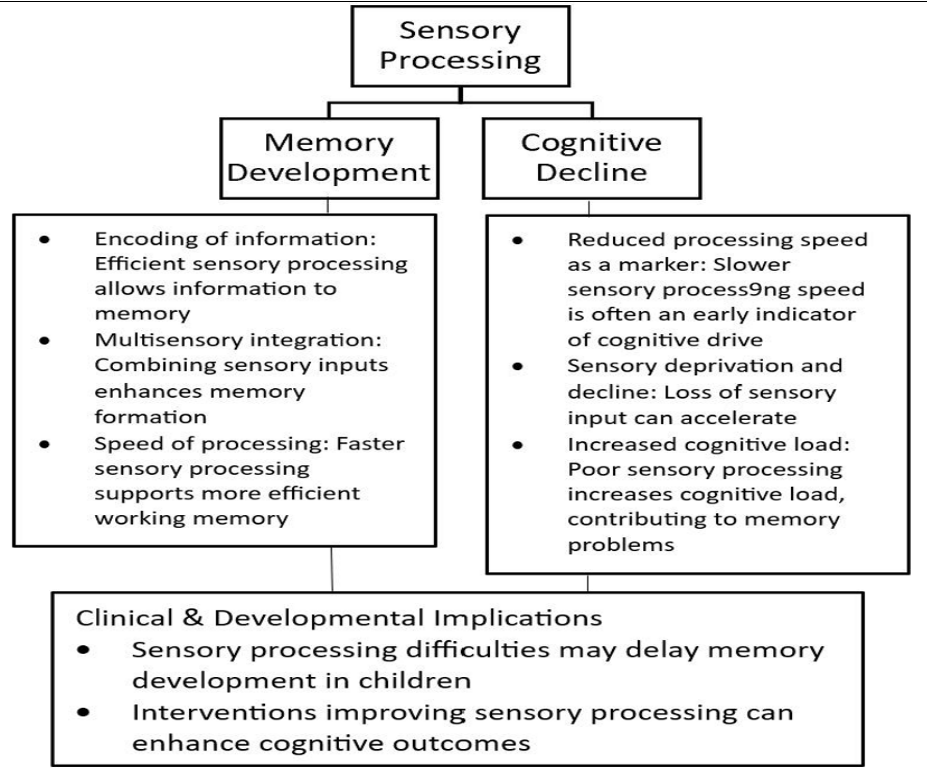

Figure 2. The Key Role of Sensory Processing & Its Processing Speed

Our senses are the brain's front-line data collectors. From early childhood through old age, the efficiency, clarity, and speed with which sensory inputs are processed directly shape how well we form, store, and retrieve memories. The way sensory systems function does not just affect memory quantity, but also its richness, accuracy, and emotional salience.

In fact, these sensory-related mechanisms are deeply interconnected and can be discussed through two main lenses: memory development and cognitive decline.

Sensory Processing & Memory Development

There are three key sub-processes involved in how sensory processing supports memory development: Firstly, the encoding of information: Sensory input forms the raw material for memory. Efficient and accurate sensory processing allows the brain to encode information more clearly and quickly. For instance, a child who effectively processes visual or auditory stimuli is more likely to form accurate and lasting memories, e.g., recognizing faces, learning new words, or navigating spaces. Next, the integration of multiple sensory inputs: Memory becomes stronger when multiple senses are engaged. Multisensory learning (e.g., seeing, touching, and tasting a fruit while learning its name) creates more robust and retrievable memory traces. Children who can integrate sensory information effectively tend to show better learning and memory retention (Murphy, Moore, & Schochat, 2015) [35]. Thirdly, the speed of processing: Faster sensory processing allows for quicker encoding and greater working memory efficiency. A fast-processing brain can better manage real-time interactions, like keeping up in conversations or completing multi-step academic tasks. Processing speed is closely linked to attention and working memory capacity, which are two core elements of learning (see Figure 3).

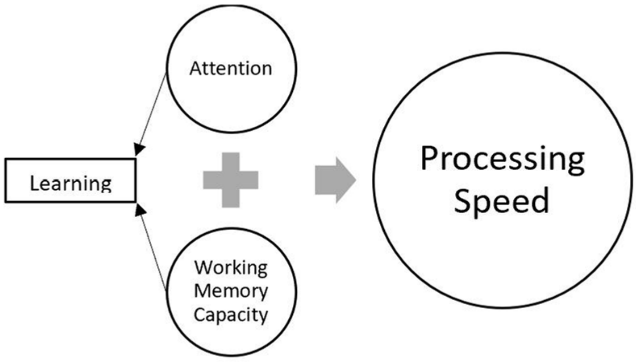

Figure 3. The 2 Core Elements of Learning

4.2 Sensory Processing & Cognitive Decline

As individuals age, changes in sensory functioning can be early indicators of cognitive decline (Deary, Johnson, & Starr, 2010) [8]. The three notable features in the model of Sensory Processing Decline (see Figure 4) are briefly described as follows (also see Table 2 for a summary of sensory aspects in memory development and cognitive decline:

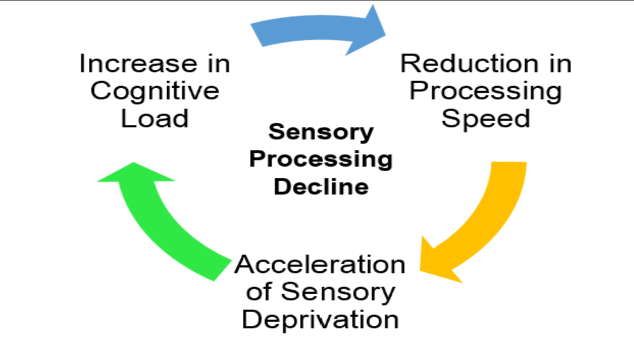

Figure 4. The Model of Sensory Processing Decline

Firstly, the reduced processing speed as a hallmark of decline. Slower sensory processing is common in aging and neurodegenerative conditions like Alzheimer's and vascular dementia. When the brain takes longer to process sensory inputs, it struggles to encode new information effectively. Often, this slowing appears before clear memory issues (Deary, Johnson, & Starr, 2010) [8]. Next, the sensory deprivation (Korshnyak *et al*., 2021; Sahoo *et al*., 2021) [25, 40] accelerates decline. Hearing or vision loss leads to a reduction in sensory input. This under-stimulation of the brain has been shown to correlate with increased risk of cognitive deterioration. Studies have found that untreated hearing loss can significantly increase the likelihood of dementia, reinforcing the importance of sensory health in aging. Thirdly, an experience of increased cognitive load is noted. In other words, when sensory inputs are weak, distorted, or slow, the brain must exert more effort to make sense of them. This extra processing effort diverts cognitive resources away from memory and executive functioning. Known as the Cognitive Load Hypothesis (see Sweller, 2011 [47], for details), it explains why individuals with poor sensory processing may appear forgetful, mentally fatigued, or slow to respond.

Table 2: A Summary of Sensory Aspects in Memory Development & Cognitive Decline

Aspect	Memory Development	Cognitive Decline
• Processing Speed	Faster speed helps encoding and working memory	Slower speed is often an early marker of cognitive decline
• Sensory Integration	Multisensory input strengthens memory formation	Impaired integration can reduce engagement and cognition
• Input Quality	Clear, organized sensory input supports learning	Sensory loss (e.g., hearing and vision) can accelerate decline
• Cognitive Load	Efficient sensory processing frees cognitive resources	Inefficiency increases mental load, reducing capacity for memory and reasoning
• Intervention Potential	Sensory integration therapy, augmentative and alternative communication (AAC), and structured input can help to enhance memory in children	Sensory aids and cognitive training can help delay or reduce cognitive deterioration.

In summary, our senses are not just passive receivers of information. They are dynamic systems that determine how information gets encoded into memory. The speed and quality of sensory input, and how well the brain processes it, affect not only early learning but also long-term cognitive health. Maintaining sensory clarity and processing efficiency (see Vance, 2021) [50] - whether through therapy in children or compensatory aids in older adults - can protect and even enhance memory performance throughout life.

Sensory Processing Difficulties

While sensory processing and processing speed are key to memory and cognitive function, they are also areas where many children and adults face challenges. These issues are especially prominent among neurodivergent populations, such as individuals with Autism Spectrum Disorder (ASD) (Kojovic *et al*., 2019) [24] with or without peripheral sensory nerve pathology (Collins, 2020) [5], Attention-Deficit/Hyperactivity Disorder (ADHD) (Pfeiffer *et al*., 2015) [39], or Sensory Processing Disorder (SPD) (also see Kranowitz, 2006; Li, 2010).

Children with sensory processing difficulties often struggle to efficiently encode sensory input, leading to delayed memory development and difficulties with attention, learning, and behavior (Li, 2010). These issues can overlap with slow processing speed, making tasks seem more difficult or effortful. However, targeted educational therapy (EdTx), including interventions like sensory integration therapy, auditory training, and movement-based strategies, can help strengthen sensory discrimination and improve cognitive outcomes. Similarly, in aging adults, hearing aids, visual supports, and cognitive training focused on sensory discrimination can slow or delay memory decline.

Sensory Processing Problems

The term 'sensory processing' refers to how the brain receives, interprets, and responds to input from the senses: sight, sound, touch, movement, body awareness, smell, and taste (Clark, Choi, & Douglas, 2018 [4]; Denham & Tarassenko, 2003) [10]. Difficulties in sensory processing (Kranowitz, 2006; Li, 2010) can take various forms as shown in Table 3 below:

Table 3: Typical Problems of Sensory Processing

Problem	What it is	Example
Over-responsivity (Hypersensitivity)	The person feels sensations too intensely.	Covering ears at normal sounds, hating certain textures of clothes or foods.
Under-responsivity (Hyposensitivity)	The person barely notices sensations that most people easily detect.	Not reacting to pain, not noticing their name being called.
Sensory Seeking (Craving)	Actively seeking intense sensory input.	Constantly jumping, crashing into things, spinning, touching everything.
Sensory Discrimination Problems	Difficulty telling differences between similar sensations.	Not noticing the difference between objects in their pocket or bumping into things because they misjudge distances.
Sensory-Based Motor Problems	Trouble with movement planning (praxis) or coordination.	Clumsiness, trouble with fine motor skills like using scissors.

5.2 Processing Speed Problems

The term 'processing speed' refers to how quickly the brain interprets and responds to information. Nolin *et al*. (2025) [37] defined processing speed as "the speed with which cognitive processes, such as reasoning and memory, can be executed (Sliwnski & Buschke, 1997) [44]" (p. 2). Even when sensory input is accurate, slow processing can disrupt memory, attention, and communication. In fact, Salthouse (1996) [41] suggested that cognitive aging is linked to declines in processing speed, which may trigger a chain reaction of age-related impairments in various cognitive abilities. Given the strong connection between processing speed and numerous cognitive functions, understanding how to preserve it in older adults is essential (Nolin *et al*., 2025) [37]. Table 4 below shows the typical problems of processing speed.

Table 4: Typical Problems of Processing Speed

Problem	What it is	Example
Slow Cognitive Processing	Takes a long time to think through information.	Struggling to answer questions quickly even when they know the answer.
Slow Motor Output	Body is slow to respond even if the brain understands.	Taking a long time to start moving after a prompt.
Slow Language Processing	Delay in understanding spoken words or formulating speech.	Long pauses before answering, difficulty following fast conversations.
Mental Fatigue	Getting tired quickly because slow processing makes everything more effortful.	Zoning out, giving up on tasks after a short time.

Overlap Between Sensory & Speed Issues

Sensory awareness (Harris & Guillemin, 2012; Hurlbut & Heavey, 2009; Klima, 2017) [15, 19, 23] refers to the ability to detect, interpret, and respond to sensory stimuli, and is closely linked to sensory processing: i.e., the way the brain organizes and makes sense of input from the senses (see Harris & Guillemin, 2012 [15], for detail). It also depends on processing speed (Ho *et al*., 2012), which affects how quickly and accurately the brain can register and react to sensory information. Together, these functions determine how effectively an individual perceives and engages with their environment. It is important to note that these two areas, i.e., sensory processing and processing speed, often overlap. For instance, a child overwhelmed by noise may also seem 'slow' to respond, not because they do not understand, but because their brain is busy filtering out all kinds of sensory distractions, that can come from within or internal as well as external sources.

Sensory distractions (as mentioned above; see Higginbotham & Bartling, 1993 [17], for detail) can arise from both internal and external sources (Turoman & Vergauwe, 2024) [49], disrupting one's focus and cognitive processing. One the one hand, external distractions, which include environmental stimuli such as loud noises, flickering lights, strong smells, or physical discomfort, can overwhelm the exteroceptive senses and interrupt one's attention. On the Other hand, internal distractions stem from within an individual, e.g., intrusive thoughts, emotional stress, anxiety, or physical sensations like hunger or pain. Both types of sensory distractions (see Figure 5) can compete for cognitive resources (see Turoman & Vergauwe, 2024 [49], for detail), making it harder for the individual to encode or retrieve information and increasing mental fatigue, especially in those with sensory processing problems (see Table 4 for a summary of specific sensory problem types).

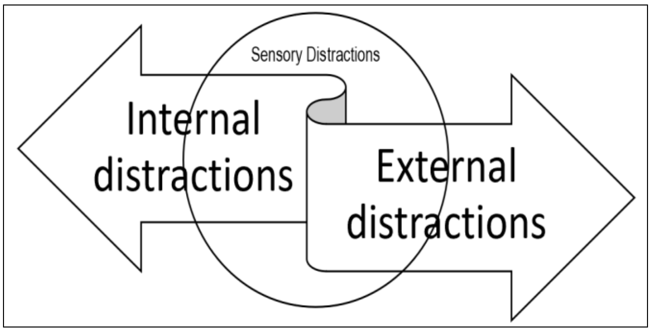

Fig 5: Sensory Distractions: Internal & External

Table 5 shows a list of selected common types of specific sensory problems that can be observed in individuals with sensory challenges.

Table 5: A Summary of Specific Sensory Problem Types

Specific Problem Type	Common Behaviors One Might See
Sensory Over-responsivity	Covers ears to normal sounds, refuses certain clothes, picky eating, avoids crowded places.
Sensory Under-responsivity	Does not notice being called, does not react to pain, seems 'in their own world.'
Sensory Seeking	Constant jumping, spinning, touching objects, making loud noises for stimulation.
Sensory Discrimination Problems	Trips over things, can't tell how hard they are gripping a pencil, mixes up similar sounds.
Sensory-Based Motor Problems	Clumsy walking, difficulty copying shapes, struggles with fasteners like zippers or buttons.
Slow Cognitive Processing	Long pauses before answering, trouble switching tasks, needs extra time to 'get it.'
Slow Motor Output	Understands instructions but acts slowly, delayed start in physical activities.
Slow Language Processing	Needs more time to understand speech, often says "what?" or asks for repetition.
Mental Fatigue from Slow Processing	Looks tired easily, stops engaging after a short time, needs frequent breaks.

Table 6: Signs of Sensory Problems at Home

Problem Type	Behaviors One Might See at Home
Sensory Over-responsivity	Meltdowns during hair washing, tooth brushing; refuses certain clothes; avoids noisy appliances (like vacuum cleaner).
Sensory Under-responsivity	Doesn't notice name being called; doesn't react to small injuries; ignores strong smells (like cooking smells).
Sensory Seeking	Jumps on furniture, crashes into couches, spins around, bangs doors loudly.
Sensory Discrimination Problems	Spills drinks often; struggles finding things by touch (e.g., finding toys in a box without looking).
Sensory-Based Motor Problems	Trouble learning to tie shoes; messy eater (food falling off utensils).
Slow Cognitive Processing	Needs lots of reminders to complete routines (getting dressed, packing bag); slow to respond when asked questions.
Slow Motor Output	Moves very slowly to start tasks (getting up, coming to dinner).
Slow Language Processing	Needs instructions repeated multiple times; gives blank stare when spoken to quickly.
Mental Fatigue from Slow Processing	Acts cranky or shuts down after long outings; tired easily by busy family events.

5.4 Signs at Home and School

Sensory and processing speed issues can show up in different ways depending on the setting (DeLuca & Kalmar, 2013 [9]; Edwards *et al.*, 2005 [11]; Ho *et al.*, 2012). These settings can be home, classroom or school canteen, public playground, garden or park, restaurant or cafe … and the list can go on. Understanding these signs can help caregivers and teachers provide better support for their children with such challenging issues of concern. In this paper, the authors have chosen to focus on two common settings: (1) home, and (2) school, as shown in Tables 6 and 7, respectively.

For examples of signs of sensory problems at home (see Kranowitz, 2006 [26]; Li, 2010), i.e., with sensory processing and processing speed, they can include the following: frequent meltdowns in response to everyday noises, textures, or lights; difficulty transitioning between activities; or being unusually clumsy or uncoordinated. Children with Sensory challenges may exhibit features of distress with routine tasks like hair brushing, wearing certain clothes, or eating foods with specific textures. In addition, slow sensory response times when following directions or completing simple tasks can also indicate difficulties with processing speed. These sensory-related behavioral traits often appear inconsistent or puzzling, especially in familiar home environments.

Table 7: Signs of Sensory Problems at School

Problem Type	Behaviors One Might See at School
Sensory Over-responsivity	Covers ears in noisy classrooms; distracted by overhead lights; avoids messy play (glue, paint).
Sensory Under-responsivity	Doesn't notice being called during roll call; slow to respond to classroom activities.
Sensory Seeking	Fidgets constantly; taps pencils loudly; gets out of seat often to move around.
Sensory Discrimination Problems	Poor handwriting; bumps into desks or classmates; difficulty copying from board.
Sensory-Based Motor Problems	Struggles with cutting, pasting, coloring neatly; difficulty keeping up with PE or sports drills.
Slow Cognitive Processing	Needs extra time for tests; slow to start or complete worksheets; overwhelmed by multi-step instructions.
Slow Motor Output	Last to pack up or transition between activities; moves slowly in group games.
Slow Language Processing	Misunderstands instructions; needs simple, clear, slow speech from teachers.
Mental Fatigue from Slow Processing	Loses focus easily; zoning out by mid-morning; needs more frequent breaks than peers.

In class, signs and symptoms of sensory problems may include difficulty focusing due to background noise, trouble following multi-step instructions, or becoming easily overwhelmed by bright lights or crowded spaces. Children with such sensory-related challenges might also work more slowly than peers or appear withdrawn during group activities (see Kranowitz, 2006 [26]; Li, 2010).

Generally, children (even those who are bright or gifted) with both sensory and processing speed issues may appear to be 'daydreaming,' 'defiant,' or 'lazy' (Lovecky, 2023; Sorscher, 2025) [33, 45]. In reality, they are often overwhelm44444ed, fatigued, or simply processing at a different pace. Understanding their underlying needs can help reframe the behaviour more accurately, and, more importantly, compassionately (Kranowitz, 2006) [26].

Table 8A: Sensory Processing & Processing Speed Quick Checklist: Part A-Sesnory Processing

(A) Sensory Processing	
Items	**Observed? [√]**
1) Covers ears at everyday sounds	☐
2) Avoids certain textures (clothes, food, materials)	☐
3) Seeks movement (jumping, spinning, crashing)	☐
4) Touches everything constantly	☐
5) Does not notice name being called	☐
6) Does not react to minor injuries	☐
7) Trips or bumps into things frequently	☐
8) Struggles to copy from the board	☐
9) Clumsy with fine motor tasks (cutting, buttoning, tying)	☐

Table 8B: Sensory Processing & Processing Speed Quick Checklist: Part B-Processing Speed

(B) Processing Speed	
Items	**Observed? [√]**
1) Long pause before answering questions	☐
2) Needs extra time to start tasks	☐
3) Needs repeated instructions to understand	☐
4) Struggles to follow fast-paced conversations	☐
5) Zoning out or appearing tired easily	☐
6) Slow moving between activities	☐
7) Finishes work slower than peers	☐
8) Gives up quickly after mental effort	☐
Other Notes:	
a) When is it worse? (e.g., end of day, after noisy activities?)	
b) When is it better? (e.g., calm environment, small group work?)	
c) Any strategies that seem to help? (e.g., visual supports, movement breaks?)	

A Short Observation Checklist

The authors of this paper have created a quick checklist (based on information derived from grey literature [1] relevant to the sensory and processing speed issues) that parents, teachers, or educational therapists as well as other allied professionals can use during informal observation in home, school, or therapy settings. There are two parts to the checklist: Part A-Sensory Processing (see Table 8A) and Part B-Processing Speed (see Table 8B).

Named as Sensory Processing & Processing Speed Quick Checklist (SPPS-QC), the authors' aim of developing the checklist is to offer a practical observational tool designed to help teachers, caregivers, and educational therapists quickly identify signs of sensory processing difficulties and reduced processing speed in children and adolescents. The informal checklist includes key behavioral indicators, such as sensitivity to noise or touch, difficulty following instructions, slow task completion, frequent fatigue, and challenges with attention or motor planning.

Personally, the authors feel that the SPPS-QC is essential because early identification of these issues allows for timely intervention and support. For children and adolescents with sensory or cognitive processing challenges, e.g., those with autism spectrum disorder (ASD), ADHD, or learning differences, the SPPS-QC can help ensure that their needs are recognized and addressed in both home and school settings, ultimately promoting better learning outcomes and emotional well-being.

The instruction for the check on the SPPS-QC list of items is: just mark [√] if YES during home, classroom, or therapy observations.

Conclusion

In conclusion, the paper underscores the fundamental role of sensory processing and its speed as cornerstones of memory function throughout the human lifespan. From childhood development to cognitive aging, the efficiency of sensory flow deeply influences how memories are formed, maintained, or lost. Disruptions in sensory integration (whether due to developmental differences or age-related decline) can significantly hinder memory and learning, increasing mental fatigue and cognitive load. The authors have also developed the Sensory Processing & Processing Speed Quick Checklist (SPPS-QC) as a quick screening tool to help in identifying signs of sensory processing difficulties and reduced processing speed in children and adolescents. By identifying and addressing these sensory challenges early through SPPS-QC and proper design of intervention plans, teachers, therapists, and caregivers can better support individuals' cognitive health and adaptive functioning. Ultimately, fostering awareness of the sensory-memory connection paves the way for more inclusive, supportive environments that enhance learning and quality of life across all stages of development.

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