Australian Government
Australian Institute of Family Studies

Child
Family
Community
Australia

Discovering what
works for families

aifs.gov.au

Supporting children with neurodiversity

CFCA PAPER NO. 64

Sara McLean

Child Family Community Australia | information exchange

Contents

Summary

Neurodiversity is an umbrella term that refers to the diversity in brain functioning associated with a range of developmental conditions and experiences. Evidence suggests that conventional counselling approaches may not be as effective for neurodiverse children, since these individuals may need additional support to learn. This practice paper provides an overview of principles and strategies that can help practitioners to support children with neurodiversity to engage in counselling and reflective learning.

Key messages

- Emerging evidence suggests that a range of developmental conditions and experiences can be associated with neurodiversity.

- A psychological assessment is needed to confirm a child's neurocognitive status, and it can be helpful to support a family to pursue an assessment if this is deemed appropriate.

- Children with neurodiversity may have more difficulty in reflective learning, and in developing behavioural and emotional control.

- Children who experience neurodiversity may need additional supports to help them engage with and benefit from counselling, develop new skills, participate in learning environments, and develop self-regulation.

- Children with neurodiversity can become more engaged with learning in the context of an environment that is characterised by structure and predictability, and that is scaffolded by visual supports and simplified adult–child interactions.

- Children with neurodiversity cannot control their sensory sensitivities and how they respond to the sensory world. They can be supported to understand *how* the sensory world affects them and be taught to use behavioural strategies to manage this impact.

- Children's adaptive functioning can be extended by understanding the barriers that exist for each child as a learner; and using explicit and systematic techniques to gradually improve their independence in manageable increments.

Introduction

The term neurodiversity was first used in relation to people with autism (see Singer, 2017). It is now more widely used to acknowledge the diversity in brain functioning associated with a range of developmental conditions and experiences (Kapp, 2020). These can include autism, intellectual disability, attention deficit hyperactivity disorder, oppositional defiant disorder, fetal alcohol spectrum disorder and early life adversity (Cook et al., 2005; DeLisi & Vaughn, 2011; Dvir, Ford, Hill, & Frazier, 2014; Emerson, 1995; Landsdown, Burnell, & Allen, 2007; McLean, 2016; McLean, 2018; McLean & McDougall, 2014; Reiffe et al., 2011; Sattler, 2014). The concept of neurodiversity is generally associated with placing value on the strengths and benefits that are associated with diversity in brain functioning; and on an accepting and inclusive approach to children who experience this diversity.[1]

Neurodiversity is not always obvious to others and many children with neurodiversity may present to services without a formal diagnosis. Children with neurodiversity may experience difficulty with developing behavioural and emotional control (Cummings, Bettini, Pham, & Park, 2020). This is a common referral issue, although the breadth and severity can vary between children and developmental conditions. As such, many children with behavioural difficulties may have diagnosed or undiagnosed problems associated with neurodiversity.

The effect of neurodiversity may not be well understood by child and family practitioners and other mental health professionals. Conventional counselling approaches may not be as effective in children with neurodiversity and these approaches may need to be adapted to better suit the needs of these children (Cummings et al., 2020; McLean, 2018). Individuals with neurodiversity can be disadvantaged by services, systems and social attitudes that do not recognise their needs (Armstrong, 2015; Lorenz, Reznik, & Heinitz, 2017), and this may include a range of non-specialist child and family services (McLean, 2019). Therefore, it is important for any practitioners who support children with developmental conditions or early life adversities to understand the key developmental domains of neurodiversity.

Children with neurodiversity can find the cognitive, learning and language demands of traditional behaviour management approaches difficult to engage with and, for many of these children, these approaches are beyond their ability (McLean, 2018, 2019). Behaviour management approaches that rely on positive and negative consequences may be more difficult to implement where neurodiversity is present. These approaches rely on a child's ability to self-monitor, anticipate outcomes and reliably link their actions to consequences. These abilities are often compromised in children with neurodiversity (Johnson, 2012; Tranj et al., 2011).

Traditional therapeutic approaches to behaviour management and skill development may be more effective where there is support for the development of key neurocognitive skills before, or alongside, more cognitively demanding approaches (Prock & Fogler, 2018). This highlights the importance of child and family practitioners from a range of backgrounds being aware of neurodiversity and having capacity to accommodate these additional needs.

A transdiagnostic model of support emphasises three common areas of development associated with neurodiversity, and the value of addressing these areas that underpin diverse mental health conditions (see National Institute of Mental Health (NIMH), n.d.). Box 1 outlines these three areas of development, which have implications for children's learning, emotional development and behaviour. It is likely that any child with neurodiversity, irrespective of their particular diagnosis, will experience delays across these areas of development. The nature and extent of any delays will vary depending on the child's condition and their unique developmental experiences (Hagan et al., 2016).

Box 1: Common areas of development associated with neurodiversity

1. **Neurocognitive development**
   This can include a pattern of attentional control and cognitive flexibility that may be less well developed than in other children.

2. **Development of self-regulation**
   This can include a pattern of cueing, recognition and regulation of physiological and behavioural responses that is less efficient than in other children.

3. **Development of adaptive functioning**
   This can include a pattern of inefficient learning, resulting in a delayed ability to attain age-appropriate skills and perform daily living skills in key life domains.

Source: Hagan et al., 2016

---

1   For discussion of the potential benefits of neurodiversity, see counselling.online.wfu.edu/blog/what-is-neurodiversity

This practice paper defines and describes the three areas of development associated with neurodiversity and offers strategies for strengthening neurocognitive development, self-regulation and adaptive functioning (Delgado-Lobete, Pértega-Díaz, Santos-del-Riego, & Montes-Montes, 2020; Pievsky & McGrath, 2018; Scandurra et al., 2019). It describes evidence-based strategies for use with children with common developmental conditions (such as autism, intellectual disability and fetal alcohol spectrum disorder). These strategies may also be effective with children with other problematic developmental histories associated with neurodiversity (such as trauma and early adversity) (McLean, 2018; Peterson et al., 2019).

Strengthening neurocognitive functioning

What is neurocognitive functioning?

Neurocognitive functioning is a collection of cognitive processes that underpin reasoning, learning, self-regulation and behaviour (Goodall et al., 2018). Extensive research on neurocognitive functioning shows variation in the way it is conceptualised. Nonetheless, there is broad agreement about the specific structures, pathways and neurotransmitters that are involved in the development of neurocognitive functioning in children (Chrone & Steinbeis, 2017). Neurocognitive skills[2] involve:

- **the efficient control of attention (attentional control)**: the ability to seamlessly direct (or redirect) and sustain attention to what is important and relevant, and avoid distraction
- **the capacity to engage in flexible, reflective and purposeful behaviours (attentional control and cognitive flexibility)**: the ability to evaluate, prioritise and process information from a range of sources, to adapt behaviour and learning in response to change or feedback; the ability to inhibit, control and monitor one's behaviour, thoughts and emotions; and the ability to organise, plan and initiate actions in order to reach an agreed goal (Dawson & Guare, 2018).

These skills provide the foundation for the collaborative and reflective processes needed in counselling and other forms of reflective learning, including at school. Efficient attentional control and cognitive flexibility underpin, and are prerequisites for, more complex cognitive and language skills needed for reflective learning. The attainment of age-appropriate neurocognitive skills provides a foundation for a child's emerging capacity for concentration, learning, social behaviour and self-regulation (Nooner, Hooper, & De Bellis, 2018; Sachdev et al., 2014; Sattler, 2014).

Common signs of difficulty with neurocognitive functioning in children

Children with neurodiversity frequently present with predictable difficulties in certain settings. Table 1 provides examples of where a child may show difficulties in counselling and school settings.

Table 1: Difficulties with neurocognition in the counselling and school settings

Counselling setting	School setting
Difficulty with: - remembering what is being discussed - staying on topic - listening closely to what you say - generating ideas and possible solutions - adapting and changing plans as needed - reporting back on what they are thinking and feeling - forming plans and timelines.	Difficulty with: - getting started on learning activities - keeping track of what they are supposed to be doing - maintaining focus on relevant information - selectively attending to what is important in the learning environment - thinking in abstract ways - adapting to changing routines and transitions - generalising their learning from one setting to another.
(Cummings et al., 2020)	(Gregory & Nichols, 2018)

---

2   The interrelationship between attentional control, working memory, metacognition (cognitive flexibility), executive functioning and inhibitory control is subject to much debate and research. (For further information on conceptual models that outline this interrelationship, see Rubia, 2011; Sattler, 2014; Snyder, Miyake, & Hankin, 2015.) In this paper, neurocognitive skills are discussed in terms of attentional control and cognitive flexibility. The behaviours associated with these areas of development are among the easiest for a child and family practitioner to identify.

A psychological assessment is needed to *confirm* a child's neurocognitive status, and it can be helpful to support a family to pursue an assessment if this is deemed appropriate. Child and family counsellors may often *infer* a child's functioning from their behavioural presentation. In the absence of a formal assessment, these behaviours can serve as warnings that neurocognitive difficulties may be present. Not all children with likely neurocognitive difficulties will display all of these behaviours. However, it is relatively common for children with neurodiversity to have difficulty managing the following situations and settings, due to their underlying difficulties with attentional control and cognitive flexibility.

Unstructured settings

Unstructured situations place a greater burden on a child's cognitive skills. Children with neurocognitive difficulties often prefer highly structured approaches to learning and social interaction and find unstructured social situations at school (i.e. recess or lunch) difficult to manage.

Transitions

Transitions involve the controlled re-direction of attention from one activity to another. They can also often involve re-orientation to a new set of behavioural expectations, which relies on cognitive flexibility. Children with neurocognitive difficulties often struggle with everyday transitions (e.g. leaving home for school, moving from one activity to another or finishing a game when requested). Transitions are a commonly reported trigger for behavioural issues and defiance. In a counselling setting, this may be seen in insistence on routine and difficulty in ending the session on time.

Situations of dynamic demand

Situations that involve frequent change, novelty or are unpredictable can be more difficult for children with neurodiversity. At school, this might involve a change of work groups, a substitute teacher or an unexpected timetable change. Situations with rapid social interchange are also likely to be challenging and these children may be more successful as one-on-one learners and find group interaction difficult. In a counselling setting, this may be seen as children shutting down when the cognitive demand is too great.

Increasing cognitive demand

Many children with neurodiversity find highly reflective, language-based therapeutic approaches difficult and this may mean they disengage from learning. In a school setting, this can present as behavioural avoidance of schoolwork. In a counselling setting, the child may present as inattentive, non-communicative or excessively compliant in the face of social interaction that is difficult to understand.

What supports neurocognitive functioning?

Much of what we know about supporting children with neurodiversity comes from practitioner knowledge rather than empirical research, although research is growing (Kim-Spoon, Deater-Deckard, Calkins, King-Casas, & Bell, 2019; Spruijt, Dekker, Tim, Ziermans, & Swaab, 2020; Spruijt, Dekker, Ziermans, & Swaab, 2018). Supporting a child with neurodiversity typically involves supporting teachers and carers to help with attentional control and cognitive flexibility in children. For both of these, this can be done through creating a structured environment that enables a child to experience success; and by simplifying adult–child interactions to reduce cognitive load.

These approaches can support a child *with* neurocognitive compromise, without disadvantaging or adversely affecting a child *without* neurocognitive impairment. They may be useful in school settings, group settings or unstructured settings (Gregory & Nichols, 2018). Boxes 2 and 3 provide general strategies on the application of these approaches.

Box 2: General strategies to support a child with attentional control difficulties

Create a structured environment that enables a child to experience success

- Minimise environmental distractions, non-essential verbal and visual input, and sensory stimulation (put away unnecessary toys and activities, declutter the room).

- Use strategic seating: seat the child away from doors, corridors or windows to avoid distractions.

- Use physical barriers to reduce unnecessary visual distractions. Use study carousels or cover windows with semi-opaque contact to avoid outside distractions.

- Use regular auditory cues to remind children where their focus should be or to ensure small periods of sustained focus. Use timers, chimes and phone alarms.

- Provide reinforcement for on-task behaviour and effort, rather than outcomes.

- Provide regular movement breaks and take time to re-orient children to tasks following breaks. Visual prompts and visual schedules can help a child to remember what to focus on.

Simplify adult–child interactions to support the child

- Break activities or requests into smaller steps and give instructions for one step at a time. Monitor progress to ensure completion before adding the next step.

- Chunk instructions into manageable bits of information, use short sentences (5–7 words) and visual prompts to assist focus. Use a variety of tones to maintain a child's attention.

- Use simple language that focuses on core concepts (e.g. 'Close your books. Put the books back on the shelf.') Use language to structure expectations and activities (e.g. 'First we will learn about feelings. Then we will match feelings with colours').

- Teach one concept at a time and allow the child time to orient their attention or take up an instruction (count silently to 10).

- Simple visual supports can be used to supplement what you are saying and can help children to focus on important information. Try to avoid visuals that are busy or have bright colours that could distract from important content.

- Sometimes teacher-only input headphones or similar sound-field technology may be needed to help the child screen out background noise.

Adapted from: Dawson & Guare, 2018; Lansdown et al., 2007; McLean, 2018; Spruijt et al., 2018; Spruijt et al., 2020.

Box 3: General strategies to support a child with less cognitive flexibility

Create a structured environment that enables a child to experience success

- Predictable, structured learning environments are easier for the child to manage. Where possible, provide visual schedules to outline expectations and stick to routines. Warn the child of any unexpected changes and rehearse with the child what to do to manage this. Visual reminders may help the child to remember their coping strategies under pressure.

- Transitions can be assisted by providing verbal, visual and auditory warnings, if feasible. Examples of visual prompts include sand timers, paper-chain links, abacuses and digital countdown apps. Auditory cues (e.g. chimes and transition songs) can also be used to signal the impending end of an activity.

- Transitional tasks and transition objects can help the child to re-orient to what you want them to achieve next (e.g. 'Take this to your mum. She's waiting next door').

- Visual prompts and mental maps can assist the child to understand how concepts are related or to unpack the steps in an activity.

- Use tangible objects to assist the child to engage in back-and-forth turn taking in group activities or counselling (e.g. talking stick or soft ball).

Simplify adult–child interactions to support the child

- Give clear feedback and concrete explanations about target behaviours, rather than talking about general concepts like sharing. What actions does it involve? What do you want the child to do?

- Teach and model reflective self-talk (e.g. 'What should I start first? What's the first step? What's next?').

- Teach and model coping self-talk (e.g. 'I can slow down', 'I have lots of good ideas', 'I am feeling stressed', 'I can kick the soccer ball' or 'I can take a shower').

- Prefacing activities with metacognitive questions can help the child to understand what is expected of them (e.g. 'I'll read you a story. See if you can notice what Amir does to feel better').

- Finish any instructions before handing out materials, games or activities.

- Use short, step-by-step instructions to tell the child what you want them to do first and then what the next steps are.

Adapted from: Cummings et al., 2020; Dawson & Guare, 2018; McLean, 2018.

Strengthening self-regulation

Children with neurodiversity commonly present with dysregulation in physiological systems, such as the sleep–wake cycle, dysregulated responses to the sensory environment and dysregulated emotions.

What is self-regulation?

Self-regulation refers to a child's ability to manage and regulate their inner sensations, behavioural or emotional state in response to their social environment. Most descriptions of self-regulation focus on the biological, sensory and physiological processes that contribute to this ability (Hagan et al., 2016). The capacity for smooth regulation of body systems underpins our ability to complete many everyday tasks and activities. Children who are able to self-regulate find it easier to meet social expectations. It is easier for them to adhere to good sleep routines, to engage optimally in learning and to express themselves in socially appropriate ways (McLean, 2018).

Poor self-regulation can drive emotional and behavioural disorders, disorders of arousal, activity levels and sleep–wake cycles (Hagan et al. 2016). Poor self-regulation is believed to lay the foundation for the development of mental health conditions in later adulthood (McCrory, Gerin, & Viding, 2017).

Two common forms of self-regulation difficulties that children can experience are **sensory processing difficulties** and **sleep difficulties**. These can impact significantly on children's capacity to engage in educational, social and community activities (Dubois-Comtis, Cyr, Pennestri, & Godbout, 2016). It can be useful to think of poor self-regulation as *abnormal responses* to internal and environmental cues. Children with self-regulation difficulties have internal responses that are poorly synchronised with the external world (McLean, 2018).

For children with **sensory processing difficulties**, there is disruption in the central pathways of the part of the brain responsible for the seamless filtering, processing and integration of sensory information and sensitivity to sensory input (Little, Dean, Tomchek, & Dunn, 2018). For children with **sleep difficulties**, there is a mismatch between internal regulatory systems responsible for sleep onset and the need to comply with the external cues associated with social demands (e.g. bedtime, wake-up time). This can result in disrupted and poorly regulated sleep rhythms, daytime sleepiness and fatigue.

Strategies for sensory processing difficulties

Sensory processing is thought to occur below the level of conscious awareness. For children with neurodiversity, this processing is effortful and inefficient, leading to fatigue, poor attention and behavioural issues that are attempts to avoid sensory triggers. As these children cannot easily screen, process and integrate competing sensory input, they are easily overwhelmed. This can make it more difficult for them to concentrate and maintain the optimal level of alertness necessary for new learning (McLean, 2018).[3]

---

[3] The assessment of sensory issues is complex and best completed by a professional trained in the assessment of sensory processing and sensory integration difficulties. This practice paper provides a broad outline of the concept of sensory processing and broad principles for addressing sensory difficulties.

The sensory environment can make these children sleepy or over-stimulated and hyper-active. They may need specific sensory regulation strategies to assist them. These sensory processing difficulties also affect a child's capacity for sustained concentration and focus. Children with sensory processing difficulties may find it difficult to sustain focus in one modality (e.g. listening) and may need to engage other forms of input to help them focus.

A child with neurodiversity cannot control their sensory sensitivities and how they respond to the sensory world. However, they can be supported to understand how the sensory world affects them and be taught to use behavioural strategies to manage this impact. This will help them to participate in learning activities and social relationships. Table 2 outlines common signs of difficulty with sensory regulation in children.

Table 2: Difficulties with sensory processing in children

Difficulty with	Behaviour
Over-sensitivity to one or more forms of sensory input	Child avoids forms of stimulation (e.g. touch or sound) and becomes overwhelmed, panicky or susceptible to behavioural outbursts in situations where these sensations cannot be avoided.
Under-reactive to one or more forms of sensory input; may not register sensory information as easily in one or more modalities	Child seeks out engagement with certain sensory experiences as they need more intense sensory input (e.g. always seeking physical contact, needing lots of movement).
Regulating their arousal levels in their environment	Child becomes sleepy or hyperactive, depending on their unique pattern of sensory responsiveness; can have difficulty maintaining the optimal calm and alert state necessary for focus and learning.
Sustaining attention and concentration, particularly when required to sit for prolonged periods	Child requires the use of sensory regulation strategies (e.g. fidget toys) or needs frequent movement breaks to maintain optimal focus.
Recognising and using sensory feedback from the body	Child has difficulty recognising internal body signals for hunger or thirst, leading to difficulty in toilet training or risk of dehydration; difficulty recognising where their limbs are in space, often bumping into things and appearing clumsy and uncoordinated.

Source: Adapted from McLean, 2018

While some practitioners and researchers believe that children are best supported by addressing underlying sensory integration difficulties, others focus on behavioural interventions and environmental accommodations that can help children to participate more fully in learning environments (Bodison & Parham, 2017; Pollock, 2009). Both approaches have a focus on pre-empting sensory triggers and using sensory strategies to help children regulate arousal and attention.

Children can be supported to develop self-regulation by:

- professionals/adults understanding the impact of the environment on the child's inner world – the nature and extent of their difficulty with self-regulation
- modifying the external environment to avoid triggers and facilitate self-regulation
- employing behavioural strategies to manage the impact of self-regulation difficulties and help the child engage in appropriate behaviour in response to social cues (Delgado-Lobete et al., 2020).

Table 3 presents behavioural strategies that may be helpful for children who experience sensory processing difficulties.

Table 3: Behavioural strategies to support children with sensory processing difficulties

Sensory processing difficulty	Behavioural strategy
Heightened by aspects of the sensory environment	Regular calming activities: • repetitive, rhythmic input (e.g. swaying, swinging, rocking) • deep pressure input (e.g. wrapping up tight in a blanket, massage, bear hugs – see note) • heavy work (e.g. squishing play dough or a stress ball, jumping on the trampoline) • taking a break from the environment.
Becomes drowsy and overwhelmed by aspects of the sensory environment	Regular alerting activities: • providing exposure to sensory input that helps a child to maintain alertness (according to the child's preference) • active movement breaks using large muscle groups (e.g. star jumps) • frequent opportunity to change body position.
Difficulty with attention and concentration	Encourage oral and fine motor activities: • using a fidget toy or allowing the child to doodle • allowing the child to chew or suck on sour lollies, or drink through resistance (straw).
Difficulty recognising bodily cues, such as hunger and thirst, or toileting needs	Support recognition of body signals: • creating a visual timetable of regular bathroom or nutrition breaks • teaching habits to avoid toileting accidents (e.g. go to toilet one hour after lunch) • using technology (e.g. mobile phone alarms) to cue attention to bodily signals • engaging in mindful activities that raise awareness of internal body signals (e.g. nostril breathing).

Note: Each child's sensory issues are unique and a comprehensive assessment and support plan should be developed by a suitably qualified professional. The use of deep pressure techniques involving touch (e.g. bear hugs) can be counter-indicated in children who have experienced interpersonal trauma.

Adapted from: Bodison & Parham, 2017; McLean, 2018; Shaaf, Dumont, Arbesman, & May-Benson, 2017.

Box 4: Screening tools

There are many publicly accessible screening checklists[4] for indicating whether a child may have difficulty with sensory processing and may need a professional assessment and support plan.

• The authors of *Raising a Sensory Smart Child* (Biel & Peske, 2005) provide a free sensory checklist, adapted from their book.

• The Star Institute offers a range of resources explaining sensory disorders, including a free symptom checklist.

• Sensory Processing Disorders Australia provides information about the different senses; and a list of possible indicators of sensory difficulties.

For information about professionals who can diagnose children with sensory issues, visit Occupational Therapy Australia.

4 These checklists are not a substitute for assessment by a professional with specialised knowledge about sensory regulation difficulties but can be used by caregivers to build understanding of their child and to determine whether further specialised support is warranted.

Strategies for sleep in children

Sleep disturbances are one of the most frequently reported behaviour problems affecting children. Children with neurodiversity associated with developmental conditions and early adversity are more likely to experience sleep disturbances (Okado et al., 2018; Richdale & Wiggs, 2005). It is estimated that between 44% and 89% of children with neurodiversity have sleep difficulties. This places significant strain on families (Okado et al., 2018; Richdale & Wiggs, 2005).

Children with neurodiversity are more likely to have difficulty in regulating hormones that affect the sleep–wake cycle (e.g. melatonin, cortisol) (Hirotsu, Tufik, & Andersen, 2015; Wilson et al., 2019). This can result in sleep disturbances, reduced sleep quality and reduced sleep duration (Okado et al., 2018; Richdale & Wiggs, 2005). Although the relationship between neurodiversity and sleep disruption is recognised, the association is still not fully understood (Turnbull, Reid, & Morton, 2013).

There is a strong evidence base for behavioural approaches to childhood sleep difficulties (Mindell, Kuhn, Lewin, Meltzer, & Sadeh, 2006; Wilson et al., 2019). A behavioural approach involves first understanding the nature of the sleep disturbance; and then using behavioural strategies to anchor the child's circadian rhythms and support more efficient regulation of the sleep–wake cycle. The use of behavioural strategies may be more complicated in children with neurodiversity due to additional complexities:

- Many children with neurodiversity have co-existing medical issues that can contribute to disrupted sleep, such as eyesight difficulties, respiratory problems and muscle or joint stiffness. Additionally, some prescribed medications can reduce sleep quality (Jan et al., 2010). A paediatrician may recommend the use of medication, in conjunction with behavioural interventions, to overcome some of these difficulties and to promote sleep onset or sleep duration. Melatonin is commonly prescribed for children to enhance sleep onset (Jan et al., 2010; Lord, 2019).

- Children with neurodiversity can have difficulty developing and maintaining good sleep routines (sleep hygiene) and sleep onset due to sensory issues (sensitivity to body position, tags on clothes, textures, room temperature, etc.). If a child has cognitive and learning difficulties, they may need more repetition and predictability. They may have difficulty in establishing new routines, adapting to change and understanding concepts of time. These issues can make it more difficult for children to internalise bedtime routines and screening out sensory distractions (Jan et al., 2010).

- Parents of children with neurodiversity can be subject to higher levels of stress and physical exhaustion due to prolonged periods of disrupted sleep. This can make it more difficult for them to follow through with behavioural sleep interventions such as extinction or stimulus control, despite their best intentions (Jan et al., 2010). This can sometimes lead to poor sleep compliance being unintentionally reinforced and strengthened.

To help children with sleep difficulties, it is important to understand the nature of any sleep difficulties the child may be experiencing (i.e. which of the three broad types of sleep difficulties the child is experiencing, as detailed below) (Jan et al., 2010). This typically involves taking a background history that explores the nature, chronicity and onset of any sleep difficulties (Medalie & Gozal, 2018; Owens & Moore, 2017).

Sleep onset difficulties

Sleep onset refers to difficulty falling asleep at socially appropriate times. This can reflect:

- negative emotions associated with bedtime due to past events
- problematic parent–child interactions surrounding bedtime
- difficulty with learning to self-soothe and settle
- lack of sleepiness at bedtime due to daytime naps
- delayed sleep–wake cycle due to exposure to blue light devices in the evening.

Children with neurodiversity may find it more difficult to establish independent sleep routines and to form associations between going to bed and going to sleep. This means they may need much more consistency in routines than other children to learn this association. Visual aids and visual schedules may help children manage time, learn bedtime routines and develop good sleep hygiene (Medalie & Gozal, 2018; Owens & Moore, 2017).

Addressing sleep onset difficulties involves building consistent night-time routines (sleep hygiene); managing anxiety and negative parent–child interactions; and stimulus control therapies (ensuring bed is only associated with sleep and not other activities; Medalie & Gozal, 2018; Owens & Moore, 2017). See Table 4 for a list of

behavioural therapies typically used to address this type of sleep difficulty. For children with neurodiversity, where conventional behavioural approaches haven't been successful, pharmacological interventions (such as melatonin) may also be prescribed to reduce the time taken to fall asleep (also known as sleep onset latency).

Behavioural approaches involve supporting the family to implement:

- keeping to a regular night-time routine. Parents can use parental supervision and visual schedules where necessary to support the child to learn and adhere to bedtime routines. Parents should eliminate screen and blue-light-emitting devices and stimulating activities one hour before bedtime.

- improving parent–child interactions. Where anxiety and/or unhelpful parent–child interactions contribute to problems with sleep onset, any unintended reinforcement of these interactions should be addressed. Parents can be taught to gradually remove themselves from bedtime routines (graduated extinction), and to reward the child for adherence to bedtime routine. Later bedtimes should not be used as a reward for good behaviour.

- strengthening the child's association between being in bed and sleeping by ensuring the child only uses their bed for sleep. Parents should ensure the child goes to bed only when tired. This may involve pushing bedtime back by 15 minutes if the child is not tired at their allocated bedtime. Parents can use stimulus control procedures to strengthen the child's association between being in bed, feeling tired and going to sleep. This is done by asking the child to get out of bed if they are not asleep after 15 minutes and engage in a low-stimulus activity (e.g. reading) until they are ready to return to bed.

- enforcing a consistent wake-up time to ensure the child does not oversleep. Parents can increase natural light first thing in the morning to suppress melatonin production (e.g. bright light alarms, eat breakfast outside, walk the dog).

Table 4: Behavioural approaches for sleep onset difficulties

	Behavioural options
Sleep onset difficulties	Sleep hygiene
	Extinction
	Graduated extinction
	Incremental delay in bedtime
	Sleep restriction
	Stimulus control
	Relaxation and cognitive therapy (older child)

Sources: Medalie & Gozal, 2018; Owens & Moore, 2017; Owens et al., 2005

For more information on implementing these behavioural options, see Medalie & Gozal, 2018, Table 1: pdfs.semanticscholar.org/c186/3f2f630d59a2e8d201a8f1facd2dc4ab69cd.pdf

Sleep maintenance difficulties

Sleep maintenance refers to difficulty staying asleep throughout the night. This may reflect:

- disordered sleep cycles
- parasomnias (such as sleepwalking)
- disability-related physical symptoms (such as sleep apnoea, bedwetting or night-time pain).

Children with neurodiversity may be more likely to experience disrupted and poor-quality sleep (Jan et al., 2010; Lord, 2019; Richdale & Wiggs, 2005), including sleep terrors, sleepwalking and bedwetting, sleep-related breathing disorders, and sleep-related movement disorders (Esbensen & Schwichtenberg, 2016). They may also be more easily roused from deep sleep by background noises (Jan et al., 2010).

Children with neurodiversity may also experience medical conditions that affect sleep quality such as painful muscles or joints or reflux conditions, leading to frequent wakening and fractured sleep (Esbensen & Schwichtenberg, 2016).

Addressing sleep maintenance difficulty typically involves changing reinforcement patterns and addressing problematic parent–child interactions that may be reinforcing difficulties with sleep maintenance (Esbensen & Schwichtenberg, 2016; Lord, 2019).

- Frequent wakening can be managed by returning the child to bed, with minimal interaction, in conjunction with a planned ignoring (extinction) protocol (Esbensen & Schwichtenberg, 2016). Parents can be taught the principles of extinction and graduated extinction to manage frequent night-time wakening. For younger children, this might mean getting a hug from a parent then returning to bed. Over time, parental involvement can be systematically reduced (graduated extinction) and the child can be rewarded for successive steps towards independently returning to bed. Slightly older children can be taught to use digital clocks to indicate what time they are allowed out of bed. Older children's behaviour can be reinforced for time spent in bed during the night (i.e. self-settling and not seeking out an adult). The aim is to increase a child's ability to self-soothe and return to sleep, while simultaneously decreasing parental involvement over time, so that parents can obtain adequate sleep themselves and can be more consistent in their responses.

- For children who are awakened easily by background noise, white-noise screening or earplugs can be worn during sleep (Jan et al., 2010).

Pharmacological support may also be indicated, under medical supervision, where behavioural approaches have been trialled unsuccessfully or where a short-term 'circuit breaker' is needed (e.g. clonidine). However, it is recommended that behavioural approaches are used as the first-line treatments (Wilson et al., 2019).

Table 5: Behavioural approaches for sleep maintenance difficulty

	Behavioural options
Sleep maintenance difficulty	Sleep hygiene
	Sleep restriction
	Extinction/graduated extinction
	Pre-emptive (scheduled) waking (parasomnias)
	Chrono therapy (morning)

Sources: Medalie & Gozal, 2018; Owens & Moore, 2017; Owens et al., 2005; Wilson et al., 2019

For more information on implementing these behavioural options, see Medalie & Gozal, 2018, Table 1: pdfs.semanticscholar.org/c186/3f2f630d59a2e8d201a8f1facd2dc4ab69cd.pdf

Delayed sleep–wake cycles

Delayed sleep–wake cycles refer to difficulty waking at a socially appropriate time. This may reflect:

- inadequate sleep duration
- a delayed sleep cycle
- poor-quality sleep (less time spent in the deep-sleep phase of the sleep cycle).

Children with many forms of neurodiversity appear to have atypical melatonin profiles and associated changes in sleep–wake cycles, leading to misalignment between the child's endogenous circadian rhythm and the sleep–wake schedule required to meet educational and social goals (Rigney et al., 2018). This free-floating and poorly anchored circadian rhythm means it is more difficult for children with neurodiversity to comply with socially acceptable bedtimes (and therefore also waking times). Delayed sleep–wake cycles can lead to excessive daytime sleepiness and difficulty in waking at the appropriate time (Esbensen & Schwichtenberg, 2016), which can cause reduced daytime functioning and lower quality of life.

Excessive daytime sleepiness can be addressed using a range of related strategies aimed at strengthening the association between going to bed and sleep onset, and between morning wakening and alertness (Mindell et al., 2006; Owens & Moore, 2017; Rigney et al., 2018; Wilson et al., 2019):

- The same behavioural principles suited to sleep onset and sleep maintenance difficulties can be beneficial for children who have difficulty waking at a suitable time (e.g. sleep hygiene, sleep restriction, stimulus control therapy, and cognitive therapy for excessive rumination – see Table 4).

- When difficulty in morning wakening occurs in conjunction with a later than acceptable bedtime and sleep onset, this is likely to reflect an advanced sleep–wake cycle. This can be addressed by exposure to bright light first thing in the morning, coupled with good sleep hygiene measures, particularly the elimination of blue-light devices before bedtime, sleep restriction and an enforced set time and routine for morning wakening (Owens & Moore, 2017).

- Difficulty in morning wakening could also reflect poor-quality sleep. Sleep movement disorder, parasomnias and sleep apnoea should be explored. In this case, pharmacological support may also be indicated (Wilson et al., 2019). Where parasomnias such as sleepwalking are present, pre-emptive (scheduled) awakenings can be used to wake a child prior to the usual time of onset.

Table 6: Behavioural approaches for delayed sleep–wake cycle

	Behavioural options
Delayed sleep–wake cycle	Sleep hygiene
	Enforce regular wake time
	Bright light therapy (morning)

Sources: Medalie & Gozal, 2018; Owens & Moore, 2017; Owens et al., 2005

For more information on implementing these behavioural options, see Medalie & Gozal, 2018, Table 1: pdfs.semanticscholar.org/c186/3f2f630d59a2e8d201a8f1facd2dc4ab69cd.pdf

Strengthening adaptive functioning

What is adaptive functioning?

Adaptive functioning refers to the necessary skills for a child to effectively navigate the everyday demands of their environment, and to participate in social and community life (Panerai, Tasca, Ferris, D'Arrigo, & Ella, 2014; Petrenko & Alto, 2017; Ray-Subramanian, Huai, & Ellis Weismer, 2011). In most cases, adaptive functioning is assessed by a caregiver report. Caregivers are asked about the child's ability to:

- communicate and express their thoughts to others
- undertake daily living skills (personal hygiene, self-care skills)
- use appropriate social skills, such as forming reciprocal friendships
- engage with a range of community activities.

Adaptive behaviour refers to a child's competence and ability to experience success in a range of independent daily living activities. An assessment of adaptive functioning is a key part of a psychologist's overall assessment of intellectual disability, as it reflects the impact of a child's cognitive ability on their daily life. Specific teaching methods that are tailored to a child's current level of functioning can help children to build age-appropriate adaptive functioning.

A child with delayed adaptive functioning is less able to experience age-appropriate independence. Delays in social communication are particularly likely to impact children's social and emotional wellbeing (Price, Morris, & Costello, 2018). For example, an eight year old who cannot use three-word sentences will experience limited opportunities to develop friendships and may experience social exclusion.

Strategies for adaptive functioning development

The evidence base for supporting the development of adaptive functioning in children is largely based on research on individuals with an intellectual disability and, to a lesser extent, on children with other forms of neurodiversity associated with delayed adaptive functioning, such as autism or fetal alcohol syndrome disorder (FASD) (Cooper et al., 2014; Harrison & Oakland, 2015).

Teaching a child with neurodiversity new skills and behaviours generally involves creating a structured, predictable environment rich in visual supports and using specialised teaching methods to build skills in a systematic way.

Generally, the greater the cognitive impairment a child experiences, the more intensively these methods need to be used to support a child's learning. It can be helpful to consult with a psychologist to understand the child's cognitive functioning and what approach might work best to help the child develop new life skills.[5]

Structured and predictable environments rich in visual supports

Children with neurodiversity manage better in environments that are structured and predictable, with the use of visual supports and simplified interactions. Structured environments reduce cognitive burden, minimise distractions and make it easier for children to direct their attention to relevant information (Armstrong, 2012; Dawson & Guare, 2010).[6] Visual supports also reduce cognitive and language burden and are frequently used to scaffold a child's developing skills (Curtin & Long, 2021; Meadan, Fettig, Ostrosky, Michna, & Triplett, 2011).

Visual supports can be used to:

- convey essential information to the child, to help them to appropriately direct their attention and to help them make decisions
- outline the individual sequence of steps involved in completing a task and, when used in this way, provide a road map for the child and their learning
- support a child to understand what is expected of them in social environments and assist them to make good choices under pressure
- build a child's independence and self-efficacy by gradually reducing their reliance on the presence of an instructing adult
- offer the flexibility of being able to meet a child's current level of functioning and developmental need while being easily adapted in response to a child's growing skill level.

For guidance on how to select and use visual supports, see resources from The Center on the Social and Emotional Foundations for Early Learning, Vanderbilt University (e.g. csefel.vanderbilt.edu/modules/module3b/handout2.pdf).

Specialised teaching methods to support learning

Adaptive behaviour can be taught in a variety of specialised ways. There are three broad approaches to teaching adaptive skills to children with neurodiversity. Typically, these approaches emphasise:

- maximising opportunities for initial success by setting tasks at an appropriate level
- building task expectations and complexity in a graduated and incremental way over time
- using high levels of task exposure, repetition and extended learning to help consolidate learning.

The choice of approach is largely determined by considering what is already known about a child's developmental level and preferred learning style. It can be useful to ask the following questions when considering which approach might be most effective:

- Is the child socially oriented and, therefore, motivated by social reinforcement through wanting to please important others and maintain positive relationships?
- Has the child shown they can and want to learn by receiving correction and feedback from adults?
- Can the child learn through trial and error – by making mistakes and self-correcting?
- Does the child have limited experience as a successful learner?

The responses will help determine how willing and easily a child might be able to learn new skills and how much structure and oversight might be needed to support their learning. The nature of a child's relationship with the instructor and the child's intellectual functioning are also key considerations.[7]

---

5   Delays in adaptive functioning can arise due to lack of *opportunity* rather than *primary neurocognitive difficulties*. For example, a child who has experienced extreme neglect may not have had opportunities to engage in social interaction, or to develop the skills of daily living, such as self-care and personal hygiene. In this case, the provision of missed developmental opportunities in the context of safe, nurturing caregiving may be sufficient to return the child to a normative developmental trajectory (Humphreys et al., 2018). In many cases, however, explicit teaching may still be necessary.

6   For more information on the research and process of creating structured learning environments, see www.autismcrc.com.au/knowledge-centre/resource/structured-teaching

7   The term 'instructor' is intended as a general term for the adult who is conducting explicit and systematic teaching using the methods outlined briefly here, but could be used interchangeably with teacher, responsible adult or caregiver, depending on the context and learning environment.

The three broad approaches to teaching adaptive functioning are:

1. Modelling and rehearsal
2. Task analysis and chaining
3. Errorless learning.

1. Modelling and rehearsal

Modelling teaches children new skills where the instructor provides a verbal or visual explanation of the task before demonstrating. The child can repeatedly rehearse this skill until the instructor is satisfied that the skill has been mastered. Modelling can be used as an appropriate strategy when:

- The child does not have a significant intellectual disability.
- The child is motivated by social relationships and social rewards.
- The child has the ability to complete the task (there are no physical or cognitive barriers).
- The child has the potential to carry out this skill (has performed similar tasks of comparable difficulty).

The steps of modelling:

1. The skill is explained in simple language along with a brief rationale. For example, 'I'm going to teach you how to brush your teeth. We need to clean our teeth after eating breakfast. This keeps them healthy.'
2. The steps are explained in the correct sequence (visual supports can be used to support verbal instructions where appropriate).
3. The skill (and component steps) is modelled by the instructor.
4. The child practises (rehearses) these steps, under supervision, until the instructor is satisfied the skill has been understood and can be carried out independently.
5. The instructor monitors compliance with this skill and provides reminders and minor corrections where necessary. Instructor involvement can be reduced over time as the child is able to demonstrate the skill independently.

An extension of the modelling approach can be used to support children to internalise self-monitoring of their behaviour. For example, the instructor might talk aloud when modelling the task, articulating their internal dialogue: 'What do I do next? Oh yes, next I put the toothpaste on.'

2. Task analysis and chaining

Task analysis is a method of breaking down a complex task into its component steps in a sequenced chain (Spooner, McKissick, & Knight, 2017). Task analysis results in a behavioural chain – a sequence of behaviours that must happen in a particular order and where one behaviour in the sequence acts as a signal for the next behaviour in the chain (this is known as chaining).

This chain of behaviours can be used to plan and organise a child's learning and skill development in a hierarchical and methodical way, starting with simpler skills and gradually introducing increasingly complex skills (Kok, Van der Waa, Klip, & Staal, 2015; McConomy, Root, & Wade, 2021). Task analysis and chaining allow adults to set appropriate learning goals for a child's functioning; and to extend their learning incrementally, minimising the risk of failure or frustration.

Simple multi-step task analysis is usually sufficient when the target skill is within, or just beyond, a child's current behavioural repertoire (Kok et al., 2015; McConomy et al., 2021). A simplified task analysis will be sufficient for most children with neurodiversity who do not have a significant intellectual disability.

Complex task analysis is typically used for teaching children skills that are well beyond their current level of ability. Complex task analysis is typically undertaken and monitored by a psychologist or positive behaviour support practitioner. A complex task analysis may be required for children with significant neurocognitive difficulties, who may require more overt, explicit, repetitive and systematic teaching methods.

Task analysis and chaining can be used in two ways: to teach *more complex or advanced behaviour* than the child is currently able to complete; or to encourage *more desirable behaviour* than what the child is currently engaging in.

Teaching more complex or advanced behaviour using forward chaining: The complex skill is broken down into steps and these are sequenced. The child receives reinforcement for demonstrating successive components, but in a particular way. Initially, the child is rewarded for completing the first behaviour in the sequence (behaviour A). The instructor might then prompt the child to complete the remaining steps. Next, the child is rewarded *only*

for completing the first and second steps (behaviour A followed by behaviour B). Behaviour A acts as a cue to complete behaviour B in the chain of behaviours. Behaviours A and B are reinforced together, forming a behaviour chain. The instructor then supports the child with the remaining steps. This process is continued until the complete behavioural chain is learnt.

Encouraging more desirable behaviour: A task analysis identifies a series of behaviours that represent successive approximations to the more desired (goal) behaviour. The aim is to identify steps that increasingly resemble the behaviour or skill the child ultimately needs to learn. The child is then encouraged and reinforced for behaviours that reflect successive steps towards the desired outcome. Instructors may wish to focus on behaviours that make the child more independent, increase safety for the child, or support the child to behave in more socially acceptable ways.

For guidance on task analysis and chaining, see PsychCentral or websites focusing on Applied Behaviour Analysis, such as How to ABA.

3. Errorless learning

Errorless teaching ensures that children who are learning a new skill *will always respond correctly*. This is achieved by closely linking the delivery of task instructions (a request) with prompts for desired behaviour, and then providing immediate positive reinforcement. This approach is typically used to shape closer and closer approximations to the adaptive skill that the child needs to learn (the desired behaviour) and ensures the child doesn't receive corrective feedback.

Errorless learning can be useful for children who:

- are discouraged by failure or previous failures (and don't benefit from feedback about mistakes)
- are unable to consistently learn from feedback about their behaviour (such as children with Fetal Alcohol Spectrum Disorder or other forms of memory impairment)
- have a tendency to persist with behaviour that is undesirable despite feedback (such as children with autism)
- have behavioural outbursts that are caused by the frustration or shame of making mistakes (and avoid the possibility of experiencing these feelings by avoiding making mistakes)
- have difficulty in independently generating and choosing a behavioural response (e.g. due to significant intellectual disability or other cognitive impairment).

Errorless teaching may be more appropriate for children with significant cognitive and memory impairment (Haslam, 2017).

In errorless teaching, an instructor might say, 'It's time to say goodbye' (request). The instructor might then *immediately* assist the child to wave their arms in the appropriate way (prompt). The instructor would then praise the child, 'Good job waving goodbye!' (reinforcement). The child's reliance on the instructor is gradually reduced over time as new skills are learnt (fading out) (Haslam, 2017; Sattler, 2014). Two examples of fading out are outlined below.

Increasing time-delay to prompting: The instructor gradually increases the time between the request and the prompt until the child can complete the desired behaviour without prompting. This provides the child with a brief window of time to initiate the desired behaviour without being prompted. An instructor might ask the child to wave goodbye (instruction), then mentally count two seconds before assisting the child (prompt), then praising the child (reinforcement). This delay can then be increased to three seconds, and so on until the child can complete the new behaviour without prompting and the instructor has been faded out.

Reducing support using most to least prompting: In this method, the instructor systematically reduces the invasiveness of the prompts they provide over time. The instructor may initially prompt the child by physically assisting them to wave their arm. In the next stage, the instructor may prompt the child by lightly holding the child's arms to prompt them to wave goodbye. At a later stage, the instructor may only place their hand on the child's shoulder as a prompt. In this way, the instructor is gradually faded out of the process.

In both examples, the instructor is setting up a no-fail way to gradually increase the child's independent functioning, without the child experiencing constant frustration or failure. Although typically conducted by a psychologist or developmental educator, errorless learning can also be used by counsellors and caregivers to encourage independence. For more information about errorless learning, see: www.fau.edu/education/centersandprograms/card/documents/errorlessteaching.pdf

Conclusion

This practice paper outlined three areas that may be effective in enhancing support for children with neurodiversity (Delgado-Lobete et al., 2020; Hagan et al., 2016; Scandurra et al., 2019; Pievsky & McGrath, 2018). A child with neurodiversity can become more engaged with learning in the context of an environment that is characterised by structure and predictability, and that is scaffolded by visual supports and simplified adult–child interactions.

A child's self-regulation can be supported by adults' understanding of the impact of environment on the child's self-regulation and using behavioural approaches to build coping skills. A child's adaptive functioning can be extended by understanding the barriers that exist for the child as a learner; and using explicit and systematic techniques to gradually improve a child's independence in manageable increments.

While research in relation to supporting children with neurodiversity generally is still emerging, many of the practice principles outlined in this paper have been drawn from evidence-based approaches with specific populations (e.g. autism or intellectual disability), and could help children with neurodiversity to participate in learning.

Author and acknowledgements

Dr Sara McLean (BSC. Hons; M. Clin Psych., PhD) is a registered psychologist who works in the area of child and adolescent psychology.

References

Armstrong, T. (2012). *Neurodiversity in the classroom: Strength-based strategies to help students with special needs succeed in school and life*. Alexandria, VA: Association for Supervision and Curriculum Development.

Armstrong, T. (2015). The myth of the normal brain: Embracing neurodiversity. *AMA Journal of Ethics*, *17*(4), 348–352. doi:10.1001/journalofethics.2015.17.4.msoc1-1504

Biel, L., & Peske, N. (2005). *Raising a sensory smart child: The definitive handbook for helping your child with sensory integration issues*. New York: Penguin Books.

Bodison, S., & Parham, D (2017). Specific sensory techniques and sensory environmental modifications for children and youth with sensory integration difficulties: A systematic review. *The America Journal of Occupational Therapy*, *72*. doi:10.5014/ajot.2018.029413

Cook, A., Spinazzola, J., Ford, J. D., Lanktree, C., Blaustein, M., Cloitre, M. et al. (2005). Complex trauma in children and adolescents. *Psychiatric Annals, 35*(5), 390–398.

Cooper, V., Emerson, E., Glover, G., Gore, N., Hassiotis, A., Hastings, R. et al. (2014). *Early intervention for children with learning disabilities whose behaviour challenges: Briefing paper* (Working paper). Challenging Behaviour Foundation. Retrieved from kar.kent.ac.uk/id/eprint/49229

Crone, E., & Steinbeis, N. (2017). Neural perspectives on cognitive control development during childhood and adolescence. *Trends in Cognitive Sciences*, *21*, 205–215. doi:10.1016/j.tics.2017.01.003

Cummings, M., Bettini E., Pham, A., & Park, J. (2020). School-, classroom-, and dyadic-level experiences: A literature review of their relationship with students' executive functioning development. *Review of Educational Research*, *90*, 47–94. doi:10.3102/0034654319891400

Curtin, A., & Long, S. (2021). Using visual schedules to support children with autism spectrum disorder. *Learn: Journal of the Irish Learning Support Association*, *42*, 61–70. Retrieved from ilsa.ie/wp-content/uploads/2021/03/Learn-Journal-2021.pdf#page=62

Dawson, P., & Guare, R. (2010). *Executive skills in children and adolescents: A practical guide to assessment and intervention* (2nd ed.). New York: Guilford Press.

Dawson, P., & Guare, R. (2018). *Executive skills in children and adolescents: A practical guide to assessment and intervention* (3rd ed.). New York. Guilford Press.

DeLisi, M., & Vaughn, M. G. (2011). The importance of neuropsychological deficits relating to self-control and temperament to the prevention of serious antisocial behaviour. *International Journal of Child, Youth and Family Studies*, *1 & 2*, 12–35.

Delgado-Lobete, L., Pértega-Díaz, S., Santos-del-Riego, S., & Montes-Montes, R. (2020). Sensory processing patterns in developmental coordination disorder, attention deficit hyperactivity disorder and typical development. *Research in Developmental Disabilities*, *100*. doi:10.1016/j.ridd.2020.103608

Dubois-Comtis, K., Cyr, C., Pennestri, M., & Godbout, R. (2016). Poor quality of sleep in foster children relates to maltreatment and placement conditions, *Sage Open*, *6*(4). doi:10.1177/2158244016669551

Dvir, Y., Ford, J. D., Hill, M., & Frazier, J. A. (2014). Childhood maltreatment, emotional dysregulation, and psychiatric comorbidities. *Harvard Review of Psychiatry*, *22*(3), 149–161. doi:10.1097/HRP.0000000000000014

Emerson, E. (1995). *Challenging behaviour: Analysis and intervention in people with learning disabilities*. Cambridge: Cambridge University Press.

Esbensen, A., & Schwichtenberg, A. (2016). Sleep in neurodevelopmental disorders. *International Review Research in Developmental Disabilities*, *51*, 153–191. doi:10.1016/bs.irrdd.2016.07.005

Goodall, J., Fisher, C., Hetrick, S., Phillips, L., Parrish, E., & Allot, K. (2018). Neurocognitive functioning in depressed young people: A systematic review and meta-analysis. *Neuropsychology Review*, *28*, 216–231. doi:10.1007/s11065-018-9373-9

Gregory M., & Nichols E. (2018). From the outside in: Using a whole-school paradigm to improve the educational success of students with trauma histories and/or neurodevelopmental disabilities. In J. Fogler, & R. Phelps (Eds.), *Trauma, autism, and neurodevelopmental disorders* (pp. 241–268). Cham, Switzerland: Springer. doi:10.1007/978-3-030-00503-0_12

Hagan, J., Balachova, T., Bertrand, J., Chasnoff, I., Dang, E., Fernandez-Baca, D. et al. (2016). Neurobehavioral disorder associated with prenatal alcohol exposure. *Pediatrics*, *138*(4), doi:10.1542/peds.2015-1553

Harrison, P., & Oakland, T. (2015). *ABAS 3 Intervention Planner*. Torrance, CA: Western Psychological Services.

Haslam, C. (2017). The application of errorless learning in child rehabilitation. In K. Hasslam, & R. Kessells (Eds.), *Errorless learning in neuropsychological rehabilitation* (chapter 4). London: Routledge. Retrieved from www.taylorfrancis.com/books/edit/10.4324/9781315660738/errorless-learning-neuropsychological-rehabilitation-catherine-haslam-roy-kessels

Hirotsu, C., Tufik, S., & Andersen, M. L. (2015). Interactions between sleep, stress, and metabolism: From physiological to pathological conditions. *Sleep Science*, *8*(3), 143–152. doi:10.1016/j.slsci.2015.09.002

Humphreys, K., Miron, D., McLaughlin, K., Sheridan, M., Nelson, C., Fox, N. et al. (2018). Foster care promotes adaptive functioning in early adolescence among children who experience severe early deprivation. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *59*(7), 811–821. doi:10.1111/jcpp.12865

Jan, J., Asante, K., Conry, J., Fast, D., Bax, M., Ipsiroglu, O. et al. (2010). Sleep health issues for children with FASD: Clinical considerations. *International Journal of Pediatrics*. doi:10.1155/20101/639048

Johnson, M. (2012). Executive function and developmental disorders: The flip side of the coin. *Trends in Cognitive Science*, *16*(9), 454–457, doi:10.1016/j.tics.2012.07.001

Kapp, S. K. (2020). Introduction. In S. Kapp (Ed.), *Autistic community and the neurodiversity movement* (pp. 1–19). Singapore: Palgrave Macmillan. doi:10.1007/978-981-13-8437-0_1

Kim-Spoon, J., Deater-Deckard, K., Calkins, S. D., King-Casas, B., & Bell, M. A. (2019). Commonality between executive functioning and effortful control related to adjustment. *Journal of Applied Developmental Psychology*, *60*, 47–55. doi:10.1016/j.appdev.2018.10.004

Kok, L., Van der Waa, A., Klip, H., & Staal, W. (2015). The effectiveness of psychosocial interventions for children with a psychiatric disorder and mild intellectual disability to borderline intellectual functioning: A systematic literature review and meta-analysis. *Clinical Child Psychology and Psychiatry*, *21*, 156–171. doi:10.1177/1359104514567579

Lansdown, R., Burnell, A., & Allen, M. (2007). Is it that they won't do it, or is it that they can't? Executive functioning and children who have been fostered and adopted. *Adoption and Fostering*, *31*(2), 44–53.

Little, L., Dean, E., Tomchek, S., & Dunn, W. (2018). Sensory processing patterns in autism, attention deficit hyperactivity disorder, and typical development. *Physical and Occupational Therapy in Pediatrics*, *38*, 243–254. doi:10.1080/01942638.2017.1390809

Lord, C. (2019). Taking sleep difficulties seriously in children with neurodevelopmental disorders and ASD. *Pediatrics*, *143*(3). doi:10.1542/peds.2018-2629

Lorenz, T., Reznik, N., & Heinitz, K. (2017). A different point of view: The neurodiversity approach to autism and work. In M. Fitzgerald, & J. Yip (Eds.), *Autism: Paradigms, recent research and clinical applications* (chapter 1), InTech. doi:10.5772/65409

McConomy, A., Root, J., & Wade, T. (2021). Using task analysis to support inclusion and assessment in the classroom. *Teaching Exceptional Children*, doi:10.1177/00400599211025565

McCrory, E., Gerin, M. L., & Viding, E. (2017). Annual research review: Childhood maltreatment, latent vulnerability and the shift to preventative psychiatry. The contribution of functional brain imaging. *The Journal of Child Psychology and Psychiatry*, *58*(4), 338–357.

McLean, S. (2016). *The effect of trauma on the brain development of children: Evidence-based principles for supporting the recovery of children in care*. Melbourne: Child Family Community Australia, Australian Institute of Family Studies. Retrieved from aifs.gov.au/cfca/publications/effect-trauma-brain-development-children

McLean, S. (2018). *Parenting the traumatized child with developmental differences*. London: Jessica Kingsley.

McLean, S. (2019). *Systems and service supports for children and families living with fetal alcohol spectrum disorder*. Adelaide: Emerging Minds Australia. Retrieved from emergingminds.com.au/resources/systems-and-service-supports-for-children-and-families-living-with-fetal-alcohol-spectrum-disorder-fasd

McLean, S., & McDougall, S. (2014). *Fetal alcohol spectrum disorders: Current issues in awareness, prevention and intervention* (CFCA Paper no. 29). Melbourne: Australian Institute for Family Studies. Retrieved from aifs.gov.au/cfca/publications/fetal-alcohol-spectrum-disorders-current-issues-awareness-prevention-and

Meadan, H., Ostrosky, M., Triplett, B., Michna, A., & Fettig, A. (2011). Using visual supports with young children with autism spectrum disorder, *Teaching Exceptional Children*, *43*(6), 28–35.

Medalie, L., & Gozal, D. (2018). Pediatric insomnia: Update and future directions. *Journal Child Science*, *8*, e172–180.

Mindell, J. A., Kuhn, B., Lewin, D. S., Meltzer, L. J., & Sadeh, A. (2006). Behavioral treatment of bedtime problems and night wakings in infants and young children. *Sleep*, *29*(10), 1263–1276.

National institute of Mental Health (NIMH). (n.d.). *Research domain criteria initiative*. Bethesda, MD: NIMH. www.nimh.nih.gov/research/research-funded-by-nimh/rdoc/index.shtml

Nooner, K. B., Hooper, S. R., & De Bellis, M. D. (2018). An examination of sex differences on neurocognitive functioning and behavior problems in maltreated youth. *Psychological Trauma: Theory, Research, Practice, and Policy*, *10*(4), 435–443. doi:10.1037/tra0000356

Okada, M., Otaga, M., Tsutsui, T., Tachimori, H., Kitamura, S., Higuchi, S. et al. (2018). Association of sleep with emotional and behavioral problems among abused children and adolescents admitted to residential care facilities in Japan. *PLOS One*, *13*(6), e0198123. doi:10.1371/journal.pone.0198123

Owens, J. & Moore, M. (2017). Insomnia in infants and young children. *Pediatric Annals*, *46*(9), e321–e326.

Owens, J., Babcock, D., Blumer, J., Chervin, R., Ferber, R., Goetling, M. et al. (2005). The use of pharmacotherapy in the treatment of pediatric insomnia in primary care: Rational approaches. A consensus meeting summary. *Journal of Clinical Sleep Medicine*, *1*(1), 49–59.

Panerai, S., Tasca, D., Ferri, R., D'Arrigo, V., & Elia, M. (2014). Executive functions and adaptive behaviour in Autism Spectrum Disorders with and without Intellectual Disability. *Psychiatry Journal*, 2014. doi: 10.1155/2014/941809

Peterson, J. L., Earl, R., Fox, E. A., Ma, R., Haidar, G., Pepper, M. et al. (2019). Trauma and Autism Spectrum Disorder: Review, proposed treatment adaptations and future directions. *Journal of Child and Adolescent Trauma*, *12*(4), 529–547. doi:10.1007/s40653-019-00253-5

Petrenko, C. L., & Alto, M. E. (2017). Interventions in fetal alcohol spectrum disorders: An international perspective. *European Journal of Medical Genetics*, *60*(1), 79–91. doi.org/10.1016/j.ejmg.2016.10.005

Pievsky, M., & McGrath, R. (2018). The neurocognitive profile of attention-deficit/hyperactivity disorder: A review of meta-analyses. *Archives of Clinical Neuropsychology*, *33*(2), 143–157. doi:10.1093/arclin/acx055

Pollock, N. (2009). Sensory Integration: A review of the current state of the evidence. *Occupational Therapy Now*, *11*(5), 6–11.

Price, J., Morris, Z., & Costello, S. (2018). The application of adaptive behaviour models: A systematic review. *Behavioral Sciences*, *8*, 11. doi:10.3390/bs8010011

Prock, L., & Fogler, J. M. (2018). Trauma and neurodevelopmental disorder: Assessment, treatment, and triage. In J. Fogler, & R. Phelps (Eds.), *Trauma, Autism, and Neurodevelopmental Disorders* (pp. 55–71). Cham, Switzerland: Springer. doi:10.1007/978-3-030-00503-0_4

Ray-Subramanian, C., Huai, N., & Ellis Weismer, S. (2011). Brief report: Adaptive behavior and cognitive skills for toddlers on the autism spectrum. *Journal of Autism & Developmental Disorders*, *41*(5), 679–684. doi:10.1007/s10803-010-1083-y

Reiffe, C., Oosterveld, P., Terwogt, M., Mootz, S., van Leeuwen, E., & Stockmann, L. (2011). Emotion regulation and internalizing symptoms in children with autism spectrum disorders. *Autism*, *15*(6), 655–670. doi:10.1177/1362361310366571

Richdale, A., & Wiggs, L. (2005). Behavioral approaches to the treatment of sleep problems in children with developmental disorders: What is the state of the art? *International Journal of Behavioral and Consultation Therapy*, *1*(3), 165–190.

Rigney, G., Ali, N., Corkum, P., Brown, C., Constantin, E., Godbout, R. et al. (2018). A systematic review to explore the feasibility of a behavioural sleep intervention for insomnia in children with neurodevelopmental disorders: A transdiagnostic approach. *Sleep Medicine Reviews*, *41*, 244–254.

Rubia, K. (2011). "Cool" inferior frontostriatal dysfunction in attention-deficit/hyperactivity disorder versus "hot" ventromedial orbitofrontal-limbic dysfunction in conduct disorder: A review. *Biological Psychiatry*, *69*(12), e69–e87. doi:10.1016/j.biopsych.2010.09.023

Sachdev, P., Blacker, D., Blazer, D., Ganguli, M., Jeste, D. V. Paulsen, J. S. et al. (2014). Classifying neurocognitive disorders: The DSM-5 approach. *Nature Reviews Neurology*, *10*(11), 634–642. doi:10.1038/nrneurol.2014.181

Sattler, J. (2014). *Foundations of behavioural social and clinical assessment of children* (6th ed.). San Diego, CA: Pro-Ed Australia.

Scandurra, V., Gialloreti, L. E., Barbanera, F., Scord, M. R., Pierini, A., & Canitano, R. (2019). Neurodevelopmental disorders and adaptive functions: A study of Children with Autism Spectrum Disorders (ASD) and/or Attention Deficit and Hyperactivity Disorder (ADHD). *Frontiers in Psychiatry*, *10*, 673. doi:10.3389/fpsyt.2019.00673

Shaaf, R., Dumont, R., Arbesman, M., & May-Benson, T. (2017). Efficacy of occupational therapy using Ayres sensory integration: A systematic review. *American Journal of Occupational Therapy*, *72*, 7201190010. doi:10.5014/ajot.2018.028431

Singer, J. (2017). *Neurodiversity: The birth of an idea*. United Kingdom: Judy Singer.

Snyder, H. R., Miyake, A., & Hankin, B. L. (2015). Advancing understanding of executive function impairments and psychopathology: Bridging the gap between clinical and cognitive approaches. *Frontiers in Psychology*, *6*, 328. doi:10.3389/fpsyg.2015.00328

Spooner, F., McKissick, B., & Knight, V. (2017). Establishing the state of affairs for evidence-based practices in students with severe disabilities. *Research and Practice for Persons with Severe Disabilities*, *42*(1), 8–18. doi:10.1177/1540796916684896

Spruijt, A., Dekker, M., Tim, B., Ziermans, T., & Swaab, H. (2020). Educating parents to improve parent–child interactions: Fostering the development of attentional control and executive functioning. *British Journal of Educational Psychology*, *90*, 158–175. www.ncbi.nlm.nih.gov/pmc/articles/PMC7380015

Spruijt, A., Dekker, M., Ziermans, T., & Swaab, H. (2018). Attentional control and executive functioning in school-aged children: Linking self-regulation and parenting strategies. *Journal of Experimental Child Psychology*, *166*, 340–359. doi:10.1016/j.jecp.2017.09.004

Tranj, D., Casini, M., Capuzzo, F., Gentile, S., Bianco, G., Menghini, D. et al. (2011). Executive and intellectual functions in attention-deficit/hyperactivity disorder with and without comorbidity, *Brain Development*, *33*(6), 462–469.

Turnbull, K., Reid, G. J., & Morton, J. B. (2013). Behavioral sleep problems and their potential impact on developing executive function in children. *Sleep*, *36*(7), 1077–1084. doi:10.5665/sleep.2814

Wilson, S., Anderson, K., Baldwin, D., Dijk, D., Espie, A., Espie, C. et al. (2019). British Association for Psychopharmacology consensus statement on evidence-based treatment of insomnia, parasomnias and circadian rhythm disorders: An update. *Journal of Psychopharmacology*, *33*(8), 923–947. doi:10.1177/0269881119855343