## Supporting students with sensory processing challenges

# Evidence summary

This document summaries the Rapid Evidence Assessment completed for the Department of Education by:

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# Contents

# What we did and why

## Background

The Queensland Department of Education (department) supports students' wellbeing, engagement and achievement in their education. Students who experience sensory processing challenges including some students with autism, intellectual disability, or other disability, are supported by school teams to access, participate and achieve at school.

In 2011, the department published the *Best Practice Guidelines for Department of Education and Training Occupational Therapists: Supporting Students with Sensory Processing Challenges* (the guidelines). Since then, more research and interventions have become available.

Sensory-based interventions continue to gain popularity, but remain controversial. While there is substantial research literature on sensory-based interventions, conclusive evidence to inform decision-making often isn't available.

It is important to be aware that some interventions may be harmful or ineffective, or are not appropriate to use at school.

Our aim is to support schools to consider and use evidence-informed practices that assist students to achieve the best outcomes from their education.

This evidence summary is part of a suite of resources for staff of the department who support students with sensory processing challenges to succeed and overcome the barriers they experience.

## What we did

A Rapid Evidence Assessment (REA) was completed to review the literature related to sensory processing challenges in school settings. This evidence summary provides an overview of the REA, which aimed to update and build on our understanding of the evidence published since the guidelines were developed in 2011[1].

[1]State of Queensland, Department of Education. (2011). *Best Practice Guidelines for Department of Education and Training Occupational Therapists – Supporting Students with Sensory Processing Challenges* (department employees only)

## Who did the research

The REA was completed by researchers at La Trobe University and The University of Newcastle. Dr Katy Unwin, Dr Kylie Wales, Ms Tennille Johnson and Professor Alison Lane worked with a team of people from the department to determine the scope of the research.

## Research question

**What school-based interventions (including assessments) are effective in improving school access, participation and achievement for school students with sensory processing challenges, school staff and school communities?**

## How we did the research

REA uses a similar process to a systematic review. REA uses more structured and rigorous search and quality assessment of the evidence than a literature review. However, the process is faster and less thorough than a full systematic review. REA is useful for getting an overview of the evidence on a topic.

The search strategy in this REA was broad and considered many factors. After initial literature searches found only a small number of articles, additional searches were done to find more articles relevant to the research question.

All articles were assessed for quality. We did not use multiple, independent reviewers to screen and review full-text articles.

Articles included in the REA covered a range of functional concerns relating to sensory processing challenges, and practices that may be used in schools.

## Search strategy

Search terms were based on our research question:

*What school-based interventions (including assessments) are effective in improving school access, participation and achievement for school students with sensory processing challenges, school staff and school communities?*

The PICOC structure (Figure A) was used to ensure that all aspects of the research question were captured in the search strategy.

***Figure A: Search strategy mapped out using PICOC***

| | |
|---|---|
| **Population** | School-aged children (4-20 years), school staff, schools/school communities |
| **Intervention** | Interventions to address sensory processing challenges or in children with sensory challenges, appropriate for use in schools |
| **Comparison** | Usual/nil |
| **Outcome** | Improved school access, school participation and school achievement |
| **Context** | School settings including early childhood, primary and high schools |

For studies to be included in the REA:

- more than 80% of participants had to be aged 4-20 years
- the intervention had to be appropriate for implementation in a school
- the intervention needed to be used for participants with sensory processing challenges, or intended to address sensory processing challenges
- outcomes had to be:
    - from an intervention with students
    - related to improved school access, school participation or school achievement
    - for students, staff or school community
- needed to be published after 2010.

Studies were excluded when they:

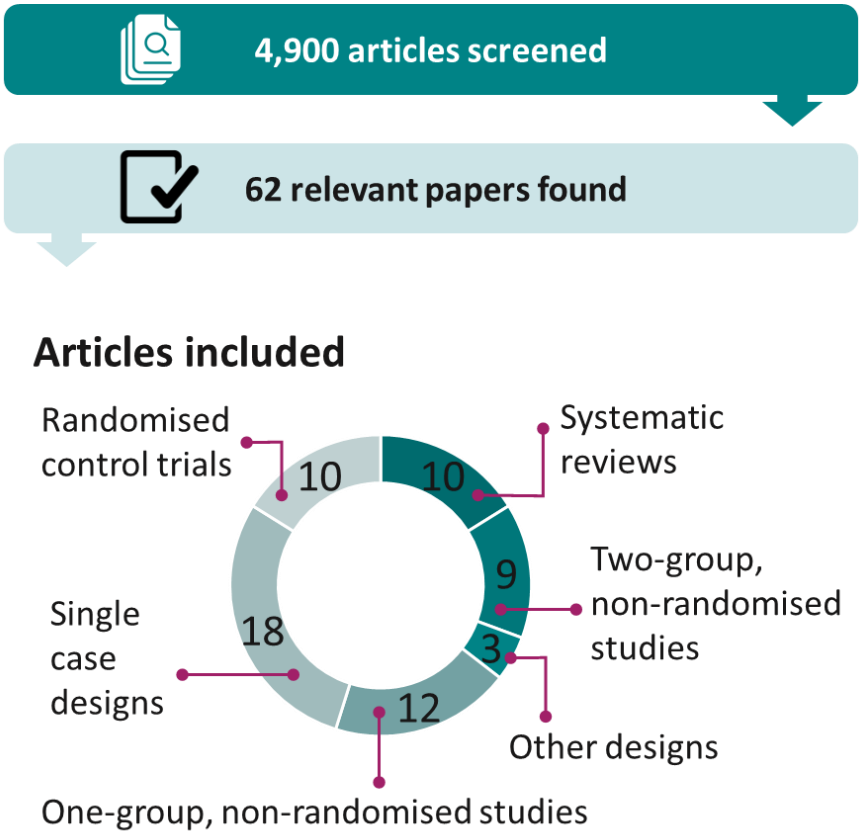
- used a single case design and presented only narrative data
- presented only qualitative data
- were a conference abstract, commentary, or presented in a book/book chapter, or
- were not available in English or as a full text article.

## Studies

Sixty-two articles were included in the final review. Over a quarter of the studies used a controlled design. That is, a design that considered and attempted to manage factors that may also impact on student outcomes

Included studies were conducted with a variety of student groups, including students with autism (34), ADHD/attentional issues (6), sensory processing difficulties (12), emotional/behavioural concerns (2), intellectual and developmental disability (9), learning disability (4), and no diagnosis/typically developing (10) (Appendix A).

***Figure B: Article screening***




## Challenges for interpreting the results

***Findings discussed in the REA should not be interpreted as the only evidence that specific interventions are effective or not effective for any child. Instead, the REA presents the results of studies examining questions for specific populations in defined contexts. The findings presented can be used to inform clinical decision-making based on the circumstances, in collaboration with the school team, student and parent/carer.***

***The REA does not consider evidence from practice, only peer-reviewed literature sources.***

While our inclusion and exclusion criteria give us confidence in our findings (due to the quality and relevance of the studies examined), not all practices used in schools to support students with sensory processing challenges are reflected in our results.

There were no studies able to be included in the REA that addressed the instructional environment as a practice focus. The REA also did not include any empirical studies on some contemporary approaches such as The Zones of Regulation programme.

While overall study quality in this area has improved in the last 10 years, most of the research still has flaws for example, small sample sizes, inconsistent dosing regimens and practice protocols, and poorly defined populations of interest.

Another limitation in the current published literature is the lack of standardised terminology and the inconsistency of outcomes measurement. This limits our ability to compare the results of studies and generalise findings to the school context.

## Evidence ratings

Practices examined by the studies included in the REA have been rated on their effectiveness. The ratings consider the reported outcomes and any limitations in study design. The following ratings were applied:

- **Effective**: The study results reported positive outcomes that support the practice in the parameters of the study. The results were statistically significant.
- **Inconclusive**: The study results were inconclusive. The study reported mixed results or had positive outcomes that were limited due to study design or bias.
- **Ineffective**: The study did not report a positive outcome.

Important notes:

- The evidence ratings do not mean the practice should be used in a school setting. A guide is being developed for this purpose, and will accompany this resource.
- Specialist support staff and teachers should apply careful reasoning when deciding what strategies will be used to support students. They must review their strategies regularly and carefully evaluate outcomes.
- The inclusion criteria requiring quality study designs limited the findings in the REA.

# What we found

Based on the outcomes examined in the REA, it is clear that any strategy used to support students must be individualised and evaluated carefully against the intended outcomes.

A number of studies advocated that a school's environments should be adjusted to support students' learning[9,15,31,35,55].

Strategies/interventions that ***may be effective*** include:

- sound amplification systems for autistic students with identified auditory processing difficulties to address listening-related stress;
- alternative seating in some school settings for some attentional concerns associated with sensory processing challenges (though **not** hyperactivity or oppositional defiance);
- stability balls to enhance physical activity, learning and engagement, and reduce anxiety; and
- multisensory environments to reduce distress and challenging behaviours and improve student wellbeing.

Strategies/interventions that ***are not recommended*** at this time:

- weighted vests used in school settings as a practice to improve classroom behaviour or attention; and
- multisensory environments to reduce the use of restraint and seclusion (though these may be effective in reducing distress, anxiety and challenging behaviours).

People planning to, or using any practice to support students with sensory challenges need to:

- clearly understand sensory processing and related challenges;
- scrutinise interventions and their appropriateness based on the best available evidence, student factors, context (e.g. school, classroom, etc.), and financial resources;
- generate a specific hypothesis for implementing the intervention/s; and
- use reliable and valid measures to track functional outcomes.

Individual evaluation is essential to determine the benefit of any practice for a student.

## Navigation

| Section | Included interventions/practices |
|---|---|
| **Alternative seating** | • Dynamic seating (not specified)<br>• Air/Seat/Therapy cushions<br>• Stability/Sensory balls<br>• Stability/Sensory/Therapy ball chair<br>• Floor seating<br>• Special seating (not specified, may include<br>• T-stool or cube chair) |
| **Auditory adjustments** | **Auditory modifications**<br>• Auditory integration-based approaches (e.g. filtered sound)<br>• Signal-to-noise ratio<br>• Sound-absorbing material<br>• Background noise<br>• Sound attenuation<br>• Earmuffs<br>• In-ear and over-ear headphones<br>• Noise cancelling headphones<br>• FM system/ Remote microphone systems/devices<br>• Soundfield amplification<br>**Auditory training programs**<br>• Auditory integration training<br>• Berard Auditory Training<br>• Covert audio coaching<br>• The Listening Program<br>• Integrated Listening Systems (iLs) |
| **Cognitive interventions** | • Modified Alert Program<br>• Cognitive behavioural therapy (CBT) |
| **Multi-sensory environments (MSEs)** | • Multi-sensory environment<br>• Magic room<br>• Sensory room |
| **Physical activity breaks and yoga** | • Physical activity breaks<br>• Slow, linear swinging<br>• Yoga |
| **Sensory-based interventions** | **Deep Pressure Proprioceptive Technique (DPPT)**<br>**Sensory Diets**<br>• Comprehensive sensory integration-based sensory diet<br>• Sensorimotor interventions<br>• Sensory motor activities chosen based on behaviours<br>• Sensory Activity Schedule (SAS)<br>• Brainworks program |
| **Visual strategies** | • Adjusting lighting<br>• Using halogen lighting<br>• No visual displays |
| **Weighted products** | • Weighted vests |

# Alternative seating

Alternative seating refers to using different types of seating equipment (e.g., seat cushions, therapy balls, stability balls, bean bag chairs) that support students' need for movement or body sensation.

Alternative seating can be used for different purposes for example, as an antecedent manipulation to affect behaviour such as sitting in a seat[10]. Alternative seating may be used as a stand-alone intervention, or within the context of a sensory diet.

The REA considered the results of 15 studies that investigated the use of alternative seating.

Overall, evidence regarding alternative seating was ***inconclusive***.

Based on the available evidence, it is unclear whether using alternative seating enhances task engagement, attention or in-seat behaviour in individuals with autism[6, 15, 36].

Results from studies that examined different seating apparatuses (e.g., therapy ball, cushion) cannot be compared.

When studies measured similar outcomes, the results were not necessarily consistent. For example, Schilling and Schwartz (2004) reported substantial improvements in in-seat behaviours and engagement across all participants when seated on therapy balls. However, Umeda and Deitz (2011) reported that the use of therapy cushions did not result in substantial change in either in-seat or on-task behaviours.

## Practice considerations discussed in the literature

Alternative seating should only be considered after a thorough understanding of need and review of other evidence-informed strategies. Ongoing monitoring of the effect of the alternative seating on educational goals is essential.

Alternative seating ***may*** be an effective strategy in some school settings for some attentional concerns associated with sensory processing challenges or to temporarily alleviate mood symptoms.

Alternative seating is ***not recommended*** to manage behavioural concerns such as hyperactivity and oppositional defiance.

### Inclusive education considerations

- Simple and time efficient intervention for teachers to implement[18, 37]
- Stability balls do not appear to detract from the instructional atmosphere in a classroom setting[17]
- Beneficial effects may not be as large if only one or two students in a classroom use a ball, because ball use is not part of the classroom culture or rule structure[18]
- Alternative seating is generally socially valid[10,42]
- One study indicated that using alternative seating does not appear to have negative effect for writing[45]

### Safety issues and contraindications

- Stability balls are a safety concern for students who do not have spatial skills and adequate core strength[32]

## Trial considerations

- School teams should consider the cost-benefit of stability balls as a classroom intervention in comparison to traditional classroom seating prior to implementation[42]
- Students accumulate light physical activity when using stability balls[17]
- Therapy cushions may be less effective than balls as a form of alternative seating. They may not provide sufficient postural demands or sensory input to produce behavioural changes[52]
- One study reported that replacing chairs with stability balls improved Year 6 students' math scores compared to 5-minute activity breaks and no physical activity during math class[37].

Summary of results

| Intervention | Evidence | Outcomes |
|---|---|---|
| **Dynamic seating (not specified)** | **Inconclusive for:** | • **improved classroom behaviour[36]** |
| **Air/seat/therapy cushions** | **Inconclusive for:** | • **in-seat behaviour[35]**<br>• **on-task behaviour[15, 35]**<br>**However, one study determined therapy cushions (inflatable discs) are ineffective for improving in-seat and on-task behaviours[52]** |
| **Stability/sensory balls** | **Effective for:** | • **improving student learning when used for continuous low-intensity posturing and positioning[37]** |
| | **Inconclusive for:** | • **on-task behaviour[25, 45]**<br>• **academic productivity[34]**<br>• **overall performance[42]**<br>• **in-seat behaviour[32, 45] (or ineffective[25])** |
| | **Ineffective for:** | • **classroom behaviour[17, 34, 42]** |
| **Stability/sensory/therapy ball chair** | **Effective for:** | • **improved attention span[22]**<br>• **temporarily alleviated anxiety/ depressive symptoms[22]** |
| | **Inconclusive for:** | • **in-seat behaviour[10, 18, 35]**<br>• **on-task behaviour[10, 15, 18, 35]** |
| | **Ineffective for:** | • **classroom behaviour[17]**<br>• **hyperactivity[22]**<br>• **oppositional defiant behaviours[22]** |
| **Floor seating** | **Ineffective for:** | • **enhancing attention and in-seat behaviour[6]** |
| **Special seating (not specified, may include T-stool or cube chair)** | **Ineffective for:** | • **attention[6]**<br>• **in-seat behaviour[6]** |

## Interpreting the results

- Understanding students' priorities and having a range of chair choices available might help in achieving more positive results, especially for on-task behaviour[36].
- Some studies showed similar patterns for on task and out-of-seat behaviour while students were seated on traditional chairs and stability balls[42].
- In two studies, results indicated increases for both in-seat and on-task behaviour with the stability ball chair compared to a standard table chair, however, results varied across participants[10, 32].
- One study showed sitting on stability balls improved attention span and temporarily eased anxiety or depressions symptoms among Year 2 students. However, these participants had low baseline scores for hyperactivity, oppositional defiant behaviour, anxiety or depression and may not be

typical of students whose teachers are seeking support. Assessors in this study were not blinded[22]. This may mean these findings don't apply to other classrooms.

# Auditory practices

Auditory practices focus on helping a child respond to salient auditory stimuli. Studies with auditory-based interventions included auditory integration training, covert coaching, noise-cancelling headphones, sound-absorbing material, sound amplification systems, and modifications to signal-to-noise ratio.

The REA considered the results of 17 studies that examined auditory practices.

Auditory practices were divided into two sub-categories

- *auditory modifications*, where modifications were made to the sound environment to improve access to sound stimuli; and
- *auditory training*, where listening and sound processing skills were directly addressed. Interventions reviewed included auditory integration training, listening therapy, noise cancellation headphones and sound amplification systems.

More methodologically rigorous studies are needed to further explore the potential benefits of auditory practices.

Overall, the evidence on auditory practices for children with sensory processing challenges and autism is ***inconclusive***, with limited evidence of positive effects on discrete skill domains.

## Practice considerations discussed in the literature

### Safety issues and contraindications

- Adverse effects of long-term earmuff and headphone use have not been studied[29].

### Trial considerations

- There is controversy in the literature regarding the effectiveness of Auditory integration training in reducing auditory hypersensitivity[1].
- Providing earmuffs and noise cancelling headphones are possible ways to reduce auditory sensory stimuli[29].
- Students may refuse to wear devices such as headphones and earmuffs[29].

## *Auditory modifications*

Summary of results

| Intervention | Evidence | Outcomes |
|---|---|---|
| **Auditory integration-based approaches (e.g. filtered sound)** | **Ineffective** on: | • language outcomes[58] |
| **Signal-to-noise ratio** | **Inconclusive** for: | • improved classroom performance in autistic children[54] |
| **Sound-absorbing material** | **Inconclusive** for: | • improving classroom behaviours[31] |
| **Background noise** | **Inconclusive**: | • effects for on-task behaviour[15] |
| **Sound attenuation** | **Inconclusive** for: | • effects for on-task behaviour[15] |
| **Earmuffs** | **Effective** for: | • reducing responses to auditory stimuli[29] |
| **In-ear and over-ear headphones** | **Inconclusive** for: | • reducing sympathetic activation[44] |
| **Noise cancelling headphones** | **Ineffective** for: | • reducing responses to auditory stimuli[29] |
| **FM system/ Remote microphone systems/devices** | **Effective** for: | • improving speech perception in everyday listening conditions[47]<br>• reducing listening-related stress in one-on-one and group listening contexts[47]<br>• enhancing speech recognition in noise[48]<br>• on-task behaviours[48]<br>• improved listening behaviours[48] |
| | **Inconclusive** for: | • improving listening, communication and social interaction[46]<br>• reducing physiological stress[46] |
| **Soundfield amplification** | **Inconclusive** for: | • improved teacher-rated listening behaviour and phonological processing [61] |

## *Auditory training*

Summary of results

| Intervention | Evidence | Outcomes |
|---|---|---|
| **Auditory training programs (overall)** | **Inconclusive** for: | • improving educational participation [56]<br>• sensory processing [56] |
| **Auditory integration training** | **Effective** for improving: | • social awareness[1]<br>• social cognition[1]<br>• social communication[1]<br>• speech[1]<br>• sociability[1] |
| **Berard Auditory Training** | **Effective*** for: | • improving behaviours including social skills[12] |
| **Covert audio coaching** | **Inconclusive** for: | • increasing attending behaviour in autistic children in the classroom [14] |
| **The Listening Program** | **Inconclusive** for improving: | • auditory sensitivity [23, 24]<br>• self-stimulatory behaviours [24] |
| **Integrated Listening Systems (iLs)** | **Inconclusive** for: | • enhancing auditory defensiveness [62] |

## Interpreting the results

- *Causality cannot be determined using the study design employed to examine Berard Auditory Training[12].
- Small sample sizes and other design weaknesses across all studies limit the generalisability of results.
- It is possible that some relevant studies were missed by the REA.
- No studies in the systematic review completed by Villasenor et al. (2018) [56] measured participation-level outcomes.
- Case study and qualitative methodology, although appropriate for exploration, are weak designs for empirical research[31].

# Cognitive interventions

*The REA did not include all cognitive strategies/interventions that may be used in schools.*

Cognitive interventions address the way the student thinks about and plans for sensory processing challenges. Any practice that supported the student to use cognitive strategies such as reframing, planning or goal-setting to manage sensory processing challenges was classified as a cognitive intervention. In this review, studies focused on cognitive behavioural therapy and the Alert Program® were included.

The REA included two studies looking at cognitive strategies to support self-regulation. Both used a pre-post design. The first explored a modified Alert program with 19 participants aged 3-5 years[8]. The other considered the use of a group intervention based on cognitive behavioural therapy (CBT), in which participants were aged 11-16 years[16].

Between the two studies, the evidence was ***inconclusive*** that teaching regulation skills improves self-regulation skills[8] or reactivity to sensory stimuli[16].

## Practice considerations discussed in the literature

The results of the study examining the modified Alert program indicate that children's vocabulary about self-regulation and ability to recognise feelings can be influenced when the activities and experiences become embedded into the daily routine of the classroom[8].

### Trial considerations

- Teachers are likely to adjust programs and routines[8].
- Meetings with teachers facilitate collaboration and growth[8].
- Teacher training and 'buy in' is crucial to success of program[8].
- Consider communicating with caregivers in ways other than handouts[8].
- Participants in the 8-week CBT considered the program acceptable[16].

### Summary of results

| Intervention | Evidence | Outcomes |
|---|---|---|
| **Modified Alert Program** | **Inconclusive** for: | • improving self-regulation skills [8] |
| **Cognitive behavioural therapy (CBT)** | **Inconclusive** for: | • improving sensory reactivity [16] |

## Interpreting the results

- The cognitive behavioural therapy-based intervention for sensory processing difficulties was delivered over 8 weeks to a group of students with differing sensory needs[16].
- Qualitative evidence reported supports the feasibility of CBT-based sensory intervention as a potential psycho-educational therapeutic intervention in schools for young people on the autism spectrum[16].
- Questionnaires completed by parents may have limited power to detect the changes in the scenarios that were chosen by the adolescents themselves[16].
- The modified Alert program was delivered over 2 sessions that were not fully attended. The study was not fully achieved[8].

# Multi-sensory environments

Multisensory environments (MSEs) are spaces designed to amplify or attenuate environmental sensory stimuli with the intention of helping users learn and manage sensory stimulation.

Use of MSEs must be considered carefully due to the risk of unintended consequences.

**There are number of factors that are essential to consider before using multi-sensory environments, as use could cause harm and/or lost learning opportunities.**

**This document** does not **provide information about using a multi-sensory environment appropriately or safely.**

The REA included seven studies looking at multi-sensory environments.

The evidence for MSEs is not strong enough to support wide-spread adoption[11].

MSEs ***may*** help to reduce distress or anxiety (however this needs to be determined at an individual level, considering the student's history and preferences) and improve student wellbeing. However, results between studies were mixed.

The evidence was ***inconclusive*** for MSE effect for:

- reducing challenging behaviour
- reducing stereotypical behaviour
- behaviour generally
- aggressive behaviours.

MSEs were found to be ***ineffective*** for enhancing attention and performance in class.

When MSEs were examined for a relationship with reducing restrictive practices, the evidence was:

- ***inconclusive*** to support MSEs reducing distress; restraint and seclusion; and aggressive behaviours.
- ***ineffective*** in reducing seclusion rates.

MSEs are ***not recommended*** as a strategy to reduce the use of restraint and seclusion.

## Practice considerations discussed in the literature

Occupational therapists and other appropriate specialist support staff should work with stakeholders to identify and address sensory elements that contribute to anxiety or maladaptive behaviours.

Schools should consider carefully before proceeding with using MSEs.

Preliminary support was found for the use of MSEs in *clinical settings* to reduce anxiety and challenging behaviours[11].

### Safety issues and contraindications

- Potential for incorrect use or misuse leading to occupational deprivation, lost learning opportunities or restrictive practices.
- Students must not be left unsupervised.

### Trial considerations

- Effects of MSEs are not necessarily universal[11].
- Multiple study participants expressed a clear dislike of multisensory environments[11].

### Summary of results

| Intervention | Evidence | Outcomes |
|---|---|---|
| **Multi-sensory environment/ magic room/ sensory room** | **Effective** for: | • reducing anxiety and challenging behaviour in people with intellectual and developmental disabilities in clinical settings[11]<br>• improving student wellbeing[21]<br>• increasing attention[53]<br>• fewer and shorter vocalisations and less and shorter stereotyped/idiosyncratic speech [53]<br>• reducing distress in adolescents with a history of aggression[59*] |
| | **Inconclusive** for: | • effect on child behaviours[30]<br>• for reducing:<br>  ○ stereotyped behaviour[27]<br>  ○ distress[49]<br>  ○ restraint and seclusion[49]<br>• aggressive behaviours[49] |
| | **Ineffective** for: | • change in speech[53]<br>• reducing seclusion rates[59] |

## Interpreting the results

- Most studies relied on behavioural observations to measure outcomes[11].
- Studies were carried out in non-school settings, e.g. residential care, clinic, dental facilities[11].
- All studies had small sample sizes and few used adequate control conditions[11].

# Physical activity breaks and yoga

In the REA, physical activity breaks and yoga were considered a proprioceptive practice. Proprioceptive practices focus on one's sense of movement and knowledge of body position.

The application and outcomes of studies included in the REA are very limited when considering the nature of possible use in schools.

## Practice considerations discussed in the literature

Studies in the REA reported:

- continuous low intensity posturing and positioning activities in the classroom using a stability ball ***may*** be more effective than either short physical activity breaks or no physical activity during class time[37].
- evidence for slow linear swinging is insufficient with respect to immediate effects on attention (when used before tabletop activities it should not be expected to immediately improve attention of preschoolers with autism) [9].
- One study supports the use of yoga to enhance educational participation[25].

### Summary of results

| Intervention | Evidence | Outcomes |
|---|---|---|
| **Physical activity breaks** | **Ineffective** for: | • improving maths scores[37] |
| **Slow, linear swinging** | **Inconclusive** for: | • task behaviour[9] |
| **Yoga** | **Effective** for improving: | • classroom communication<br>• engagement in school[25] |

# Sensory-based interventions

The REA considered a range of sensory-based interventions. This chapter focuses on the deep pressure and proprioceptive technique and sensory diets. Sensory interventions can also be found in other chapters.

There is substantial empirical literature on sensory-based interventions for children with disabilities[2]. Based on the available evidence, ***insufficient evidence exists*** to support their use[2,] with some authors suggesting that sensory-based treatments are more likely to be ineffective than effective[6].

Therapists must make critical and conscientious decisions regarding the of the sensory-based intervention approaches carefully monitor their use with students[43].

## *Deep pressure proprioceptive technique*

Wilbarger's deep pressure and proprioceptive technique (DPPT) uses a sensory-based technique along with sensory-diet activities throughout the day.

### Practice considerations discussed in the literature

- DPPT is not designed for the school context.
- DPPT needs to be carried out with careful monitoring and requires detailed home programs to support the family. Occupational therapists need to be aware of the difficulties involved in intensive intervention programs such as DPPT for parents/carers before prescribing them[7].
- Cost-effectiveness of such programs also needs to be considered as it involves weekly monitoring by the therapist[7].

### Summary of results

| Intervention | Evidence | Outcomes |
|---|---|---|
| **Deep pressure proprioceptive technique (DPPT)** | **Inconclusive** for: | • improving development, participation and occupational performance[3]<br>• reducing sensory defensiveness[7] |

### Interpreting the results

- Both studies reviewing DPPT had very small sample sizes (2 and 5 respectively) and other design flaws that impact the validity and reliability of results.

## *Sensory diets*

Sensory diets include any multisensory or sensorimotor activity or set of activities designed to support the needs of a child or group of children. It could include providing specific, planned and purposeful sensory activities, augmenting learning activities with sensory elements or sensory-based play.

In this review, any practice that provided a prescribed set of sensory or sensorimotor activities to support learning was classified as a sensory diet.

The REA included 9 studies evaluating sensory diets. Studies involved preschool and primary school aged children.

Overall, evidence for sensory diets was ***inconclusive***.

## Practice considerations discussed in the literature

- Guiding educational teams to understand the causes of a child's problematic behaviours are important for framing individualised interventions to address challenges in daily routines[5,60].
- Targeted sensory opportunities ***may*** support engagement in learning for some students with autism and intellectual disability[38,40,41].
- Embedding sensorimotor strategies in activity allows the students to stay in the natural classroom environment and participate with their peers in a way that does not exclude them[5].

### Trial considerations

- Sensory activities ***may*** result in observable but inconsistent changes, or work for some students but not others[4,5,33].
- Sensorimotor strategies are a simple and cost-effective option for modifying activities for all students[5,33,58].
- Teachers need to be involved in the selecting interventions and closely collaborate with specialist support staff who work with the teacher to develop a safe protocol and use with each student[43].
- Sensory tools need to be carefully matched to the needs of the child to ensure it optimises their attention and performance in class[55,58].

Summary of results

| Intervention | Evidence | Outcomes |
|---|---|---|
| **Comprehensive sensory integration-based sensory diet** | **Inconclusive** | efficacy of sensory-based treatments for children with disabilities [2] |
| **Sensorimotor interventions** | **Inconclusive** for: | • enhance in-seat behaviour[5]<br>• attention[5]<br>• improving student engagement[5] |
| **Sensory motor activities chosen based on behaviours** | **Inconclusive**: | that sensory motor activities reduce activity levels[33] |
| **Sensory Activity Schedule (SAS)** | **Effective** for: | • improving cognitive strategy use<br>• with strategies:<br>  ○ involvement<br>  ○ attention<br>  ○ sensory perception<br>  ○ planning and organisation[40,41]<br>• improving in classroom task performance[38, 39] |
| | **Inconclusive** for: | • on-task behaviour[4] |
| **Brainworks program** | **Effective** for: | • improving sensory processing and behaviour[60] |

## Interpreting the results

- Many of the studies investigating sensory interventions used a small sample size, or had other methodological flaws that limit generalisation to other settings[4,5,38,39,40,41,60].
- SAS is teacher directed, implementation may have varied between teachers[40,41].

# Visual strategies

Visual practices focus on either enhancing visual stimuli (e.g., enhancing lighting) or reducing visual distractions (e.g., removing visual displays). They aim to support students to process visual cues effectively.

Three studies examined practices that aimed to address difficulties processing visual stimuli. All practices focussed on modifications to the physical environment and included adjustments to lighting types and intensities, and reduction of visual displays.

Overall, evidence for adjusting lighting was ***inconclusive***.

Reducing visual displays is effective in increasing students' attention levels[26].

## Practice considerations discussed in the literature

- No visual background displays increase attention levels[26].
- A clear effect was found for the presence of visual displays on attention for all children. Students spent more time looking at the background in high levels of classroom visual displays compared with no visual display[26].
- The presence of visual displays had a much greater effect for children with autism[15].
- Beneficial effects on task engagement were reported for using modified lighting, including black light and halogen lights[15,31]
- Students reported that sensory comfort in a classroom improves attention, engagement, mood, and performance [31]

### Summary of results

| Intervention | Evidence | Outcomes |
|---|---|---|
| **Adjusting lighting** | **Inconclusive** for: | on-task behaviour[15] |
| **Using halogen lighting** | **Inconclusive** for: | improving classroom behaviours[31] |
| **No visual displays** | **Effective** for: | increasing attention levels for autistic children[26] |

## Interpreting the results

- The impact physical environment modifications have on engagement and learning outcomes in individuals with autism requires further investigation[15]
- Although the results were inconclusive, they trended toward a positive effect[15]
- The systematic review may have missed some relevant studies[15]
- Study designs tended to be weak, using small sample sizes[26,31].

# Weighted products

In the REA, weighted products were considered a proprioceptive practice. Proprioceptive practices focus on one's sense of movement and knowledge of body position.

**There are number of factors that are essential to consider before using weighted products, as use could cause harm.**

**This document** does not **provide information about using weighted equipment appropriately or safely.**

Studies in the REA considered the effects of weighted vests in the classroom or school environment.

In the last 10 years ***no studies report positive effects*** of weighted vests for improving in-seat and on-task behaviour in the classroom for any student group.

There is ***insufficient evidence*** in the literature to draw a conclusion regarding other weighted items including blankets, cushions and toys.

## Practice considerations discussed in the literature

- Caution must be used in generalising the use of weighted vests to enhance educational participation in classrooms[25].
- Taylor et al. (2017) reported that using weighted vests with individuals with autism is not an evidence based practice[51].
- The evidence for the effectiveness of weighted vests with children with ADHD is limited, and it is insufficient for children with autism[9].
- An intervention being popular does not equate to effectiveness[51].

### Safety issues and contraindications

- The lack of an established intervention protocol strengthens the need to use the intervention with close clinical observation and systematic data collection[13].

### Trial considerations

- Weighted vests ***may*** be a component of intervention for some children, but current evidence does not support use in isolation to improve attention to task or sitting in children with autism in the classroom setting[28].
- Weighted vests should be used in conjunction with a carefully designed and implemented process of data gathering and analysis[13].

Summary of results

| Intervention | Evidence | Outcomes |
|---|---|---|
| **Weighted vests** | **Ineffective** for: | • Improving attention[13] (or **inconclusive**[9])<br>• in-seat behaviour[25, 51]<br>• on-task behaviour[25, 51]<br>• task behaviour and sitting time[28]<br>• classroom behaviour[34]<br>• reducing participants stereotypy[57]<br>• academic productivity[34] |

## Interpreting the results

In one study, objective data demonstrated that effects of weighted vests were not strong or consistent across participants. However, subjectively school staff in this study reported that weighted vests were effective in improving classroom behaviours in all participants some of the time, and a desire to continue using weighted vests[28].

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# Appendix A: Summary of study findings

Listed alphabetically by intervention

| Intervention | Population | Age | Evidence | Study |
|---|---|---|---|---|
| Auditory integration training<br>*Auditory training | Autism | Preschool, Primary and Secondary<br>Up to 17 years | Effective in improving social awareness, social cognition, and social communication as well as speech, communication and sociability. | Al-Ayadhi, L. Y., Majeed Al-Drees, A., & Al-Arfaj, A. M. (2013). |
| Auditory integration-based approaches (e.g. filtered sound)<br>Music therapy<br>*Auditory training | Autism | Preschool and Primary<br>2–12 years | Ineffective for auditory integration-based approaches on language outcomes. | Weitlauf, A. S., Sathe, N., McPheeters, M. L., & Warren, Z. E. (2017).<br>*Systematic Review* |
| Background noise<br>Sound attenuation<br>*Auditory mod | Autism | Not stated | Inconclusive effects for on-task behaviour. | Dargue, N., Adams, D., & Simpson, K. (2021).<br>*Systematic Review* |
| Beard Auditory Training<br>*Auditory training | Autism (n=34), PDD-NOS, speech language delay or ADD | Preschool and Primary<br>3–10 years | Effective in improving behaviours including social and motor skills. | Brockett, S. S., Lawton-Shirley, N. K., & Kimball, J. G. (2014). |
| Brainworks program Sensory breaks, sensory equipment and modifications to classroom.<br>*Sensory diet | Sensory modulation disorder | Preschool and Primary<br>Not specified. Pre-K-grade 6 discussed | Brainworks program was Effective in improving sensory processing and behaviour. | Wild, G., & Steeley, S. L. (2018). |

| Intervention | Population | Age | Evidence | Study |
|---|---|---|---|---|
| Cognitive behavioural therapy (CBT) | Autism | Primary and Secondary<br>11–16 years | Inconclusive evidence that CBT improves sensory reactivity. | Edgington, L., Hill, V., & Pellicano, E. (2016). |
| Common classroom chairs, air-sit cushion and ball chairs<br>*Seating | Autism | Primary 7–10 years | Inconclusive evidence that air sit cushions and ball chairs improved in-seat and on-task behaviour | Sadr, N. M, Haghgoo, H. A., Samadi, S. A., Rassafiani, M., & Bakhshi, E. (2015). |
| Comprehensive sensory integration-based<br>*Sensory diet | Sensory integration disorder<br>Autism<br>Developmental delay<br>Down Syndrome<br>Cerebral Palsy<br>Other motor impairments<br>ADHD | Preschool and Primary<br>Mean age of group design studies – 82.9 months<br>Mean age of single case design studies – 67.8 months | Inconclusive for comprehensive sensory integration-based | Barton, E. E., Reichow, B., Schnitz, A., Smith, I. C., & Sherlock, D. (2015).<br>*Systematic Review* |
| Covert audio coaching<br>*Auditory training | Autism | Primary<br>6–11 years | Inconclusive for increasing attending behaviour in autistic children in the classroom. | Crocco, C., & Bennett, K. D. (2019) |
| Deep pressure and proprioceptive technique *Deep pressure | Autism, PDD-NOS | Preschool 5 years | Inconclusive evidence to support DPPT in improving development, participation and occupational performance. | Benson, J. D., Beeman, E., Smitsky, D., & Provident, I. (2011). |

| Intervention | Population | Age | Evidence | Study |
|---|---|---|---|---|
| Deep pressure and proprioceptive technique<br>*Deep pressure | Developmental delay in two or more areas or disability from birth to 6 years of age. Sensory defensiveness. | Preschool 3–4 years | Inconclusive evidence to support deep pressure and proprioceptive technique in reducing sensory defensiveness. | Bhopti, A., & Brown, T. (2013). |
| Dynamic seating (therapy balls) *Seating | Autism | Primary 7–10 years | Inconclusive evidence for dynamic seating improved classroom behaviour | Sadr, N. M., Haghgoo, H. A., Samadi, S. A., Rassafiani, M., Bakhshi, E., & Hassanabadi, H. (2017). |
| Ear-level remote microphone devices and Classroom amplification systems.<br>*Auditory mod | Autism | Primary and Secondary<br>Study A (n=16, mean age = 9.5y). Study B (n=9, mean age = 14.9y) | Effective in improving speech perception in everyday listening conditions.<br>Effective in reducing listening-related stress in one-on-one and group listening contexts (microphone). | Rance, G., Saunders, K., Carew, P., Johansson, M., & Tan, J. (2014). |
| Floor seating or alternate seating (T-stool or cube chair) *Seating | Autism | Preschool 4y2m – 4y6m | Ineffective evidence to support floor or alternate seating in enhancing attention and in-seat behaviour. | Benson, J. D., Morgus, K., Donoso Brown, E., & Smitsky, D. (2019). |
| Halogen lighting<br>*Visual mod | Participants needed to demonstrate classroom-ready behaviours as defined by the school and be free of special health concerns, cognitive impairment, or a psychiatric condition. | Secondary<br>13–20 years | Inconclusive evidence that sound- absorbing material and halogen lighting improves classroom behaviours. | Kinnealey, M., Pfeiffer, B., Miller, J., Roan, C., Shoener, R., & Ellner, M. L. (2012). |

| Intervention | Population | Age | Evidence | Study |
|---|---|---|---|---|
| In-ear (IE) and over-ear (OE) headphones<br>*Auditory mod | Autism | Primary and Secondary<br>8–16 years | Inconclusive evidence to support headphones reducing sympathetic activation. | Pfeiffer, B., Stein Duker, L., Murphy, A., & Shui, C. (2019). |
| Integrated Listening Systems (iLs)<br>*Auditory training | Auditory processing disorder and Auditory sensory over-responsivity | Primary<br>7 years | Inconclusive evidence for integrated listening systems enhancing auditory defensiveness. | Zachry, A. H., Lancaster, S., & Robertson, E. M. (2019). |
| Lighting<br>*Visual mod | Autism | Not stated | Inconclusive effects for on-task behaviour. | Dargue, N., Adams, D., & Simpson, K. (2021). |
| Modified Alert Program<br>*Alert | Nil mentioned | Preschool<br>3–5 years | Inconclusive evidence that the modified alert program improves self-regulation skills. | Blackwell, A. L., Yeager, D. C., Mische-Lawson, L., Bird, R. J., & Cook, D. M. (2014). |
| Multisensory environments<br>*MSE | People with intellectual and developmental disorders | Preschool, Primary and Secondary<br>Children and older adults | MSE was Effective in reducing anxiety and challenging behaviour in people with IDD.<br>Inconclusive evidence to support widespread adoption due to insufficient study. | Breslin, L., Guerra, N., Ganz, L., & Ervin, D. (2020).<br>*Scoping Review* |
| Multisensory environments<br>*MSE | Autism and neurodevelopmental disorder | Primary<br>7–8 years | MSE was Effective in improving student wellbeing. | Garzotto, F., Beccaluva, E., Gianotti, M., & Riccardi, F. (2020, April) |
| Multisensory environments<br>*MSE | Autism and severe intellectual disabilities | Secondary<br>14-year-old F, 18-year-old M | Inconclusive evidence for MSE reducing stereotyped behaviour. | Hill, L., Trusler, K., Furniss, F., & Lancioni, G. (2012). |

| Intervention | Population | Age | Evidence | Study |
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| Multisensory environments<br>*MSE | Autism | Preschool and Primary<br>3–12 years | Inconclusive effect on child behaviours. | Kim, M. K., & Park, N. K. (2021). |
| Multisensory environments<br>*MSE | Acute and chronic emotional and behavioural disorders | Primary and Secondary<br>12–17 years | Inconclusive evidence to support MSE reducing distress; restraint and seclusion; and aggressive behaviours. | Seckman, A., Paun, O., Heipp, B., Van Stee, M., Keels-Lowe, V., Beel, F., & Delaney, K. R. (2017). |
| Multisensory environments<br>*MSE | Autism | Preschool and Primary<br>4–12 years (M=8 years) | MSE were Effective in increasing attention, fewer and shorter vocalisations along with less and shorter stereotyped/idiosyncratic speech.<br>Ineffective on change in speech. | Unwin, K. L., Powell, G., & Jones, C. R. (2021). |
| Multisensory environments<br>*MSE | Acute and chronic psychiatric problems | Primary and Secondary<br>12–18 years (mean age 15.35yrs) | MSE were Effective in reducing distress, especially in adolescents with a history of aggression.<br>Ineffective in reducing seclusion rates. | West, M., Melvin, G., McNamara, F., & Gordon, M. (2017). |
| No visual displays<br>*Visual mod | 37 Autism, 52 Typically developing | Preschool, Primary and Secondary<br>Autism (7y10m – 12y9m). Typically developing (5y – 13y3m) | Reducing visual displays is effective in increasing attention levels for autistic children. | Hanley, M., Khairat, M., Taylor, K., Wilson, R., Cole-Fletcher, R. & Riby, D. M. (2017). |

| Intervention | Population | Age | Evidence | Study |
|---|---|---|---|---|
| Noise cancelling headphones and earmuffs<br>*Auditory mod | Autism | Preschool, Primary and Secondary<br>4–16 years (M = 8 years 2 m) | Earmuffs were effective in reducing responses to auditory stimuli and noise cancelling headphones were not effective. | Ikuta, N., Iwanaga, R., Tokunaga, A., Nakane, H., Tanaka, K., & Tanaka, G. (2016). |
| Personal frequency modulation system<br>*Auditory mod | Autism and ADHD (n=11). Typically functioning (n=11) | Primary<br>9–12yrs | Personal frequency modulation system was Effective in enhancing speech recognition in noise, on-task behaviours and improved listening behaviours. | Schafer, E. C., Mathews, L., Mehta, S., Hill, M., Munoz, A., Bishop, R., & Moloney, M. (2013). |
| Physical activity breaks Stability balls<br>*Movement *Seating | Not reported | Primary 11–12 years | Physical activity breaks were Ineffective in improving maths scores. Continuous low-intensity posturing and positioning using a stability ball were Effective in improving student learning. | Mead, T., et al. (2016). |
| Sensorimotor interventions<br>*Sensory diet | Autism | Preschool<br>4–5 years | Inconclusive evidence that sensorimotor interventions enhance in-seat behaviour and attention.<br>Inconclusive evidence for improving student engagement. | Benson, J. D., Donoso Brown, E. V., Blough, A., & Smitsky, D. (2020). |
| Sensorimotor interventions<br>*Sensory diet | Autism | Primary<br>8–12 years | Inconclusive evidence that sensory strategies improve on-task behaviour of children with autism. | Benson, J. D., Blaskowitz, M. G., Collins, A., Smitsky, D., Chippich, E., & Connell, C. (2021). |
| Sensory Activity Schedule (SAS)<br>*Sensory diet | Atypical sensory processing | Primary<br>7.4 years | Effective in improving cognitive strategy use and with strategies involvement attention and sensory perception, and planning and organisation. | Mills, C. J., et al. (2021). |

| Intervention | Population | Age | Evidence | Study |
|---|---|---|---|---|
| Sensory Activity Schedule (SAS)<br>*Sensory diet | Autism | Preschool and Primary<br>4–12 years | Effective in improving cognitive strategy use and with strategies involvement attention and sensory perception, and planning and organisation. | Mills, C. J., Chapparo, C., & Hinitt, J. (2020). |
| Sensory Activity Schedule (SAS)<br>*Sensory diet | Autism and intellectual disability | Preschool and Primary<br>5–9 years | Inconclusive evidence supporting improvement in classroom task performance. | Mills, C., & Chapparo, C. (2017). |
| Sensory Activity Schedule (SAS)<br>*Sensory diet | Autism, intellectual disability, severe language delay | Primary<br>6–7 years | Inconclusive evidence supporting improvement in classroom task performance. | Mills, C., Chapparo, C., & Hinitt, J. (2016). |
| Sensory balls *Seating | Learning disabled | Primary 8–12 years | Inconclusive evidence supporting the use of sensory balls in improving on-task and out of seat behaviour. | Piragasam, G. A., Rabi, N. M., & Masnan, A. H. (2018). |
| Sensory integration based *Seating | Nil reported | Primary 7–8 years | Ineffective evidence to support sensory processing tools enhancing attention and arithmetic performance. | van der Wurff, I., Meijs, C., Hurks, P., Resch, C., & de Groot, R. (2021). |
| Sensory integration-based Sensory diet Weighted blankets *ASI *Sensory diet *Weighted | Autism | Preschool and Primary 2–12 years | Inconclusive evidence for sensory-based approaches, environmental enrichment approaches, music. | Weitlauf, A. S., Sathe, N., McPheeters, M. L., & Warren, Z. E. (2017).<br>*Systematic Review* |

| Intervention | Population | Age | Evidence | Study |
|---|---|---|---|---|
| Sensory motor activities selected from a list based on the behaviours displayed by the child<br>*Sensory diet | No diagnosis | Preschool and Primary<br>3–6 years | Inconclusive evidence that sensory motor activities reduce activity levels. | Lin CL, Min YF, Chou LW, Lin CK. (2012) |
| Signal-to-noise ratio<br>*Auditory mod | Autism | Preschool, Primary and Secondary<br>5–20 years | Inconclusive evidence that signal-to-noise ratio improved classroom performance in autistic children. | van der Kruk, Y., Wilson, W., Perrkad, K., Downing, C., Harper-Hill, K., & Ashburner, J. (2017).<br>*Systematic Review* |
| Snug vest *Deep pressure | Autism | Preschool and Primary 5–6 years | Snug vests were Ineffective at reducing participants stereotypy. | Watkins, N., & Sparling, E. (2014). |
| Sound absorbing material<br>*Auditory mod | Participants needed to demonstrate classroom-ready behaviours as defined by the school and be free of special health concerns, cognitive impairment, or a psychiatric condition. | Secondary<br>13–20 years | Inconclusive evidence that sound-absorbing material and halogen lighting improves classroom behaviours. | Kinnealey, M., Pfeiffer, B., Miller, J., Roan, C., Shoener, R., & Ellner, M. L. (2012). |
| Sound based intervention<br>*Auditory training | Mild-moderate Autism, presence of SOR to auditory stimuli | Preschool and Primary<br>5–10 years | Inconclusive evidence to support the listening program in improving auditory sensitivity. | Gee, B. M., Thompson, K., & St John, H. (2015). |

| Intervention | Population | Age | Evidence | Study |
|---|---|---|---|---|
| Sound field amplification system<br>*Auditory mod | Autism | Primary<br>7.6 – 9.3 years | Inconclusive evidence to support sound-field amplification to improve teacher-rated listening behaviour and phonological processing. | Wilson, W. J., Harper-Hill, K., Armstrong, R., Downing, C., Perrykkad, K., Rafter, M., & Ashburner, J. (2021). |
| Sound-based interventions<br>*Auditory training | Children with sensory processing challenges | Preschool, Primary and Secondary<br>2–19 years | Inconclusive evidence for sound-based interventions improving educational participation and sensory processing. | Villasenor, R. F., Smith, S. L., & Jewell, V. D. (2018).<br>*Systematic Review* |
| Stability ball chair *Seating | Autism | Preschool and Primary 4–8 years | Inconclusive evidence to support stability balls enhancing in-seat and on-task behaviour. | Brennan & Crosland (2021) |
| Stability balls *Seating | Nil reported | Primary Elementary school age (4th graders) | Stability balls are ineffective for classroom behaviour. | Erwin, H. E., Fedewa, A., Ahn, S., & Thornton, M. (2016). |
| Stability balls *Seating | ADHD | Primary 7–8 years | Stability balls are ineffective in enhancing classroom behaviour or overall performance. | Olson, N. A., Panahon, C. J., & Hilt-Panahon, A. (2019). |
| Stability balls *seating | ADHD | Primary 9 years 11m (mean age) | Inconclusive evidence that stability balls improve in-seat and on-task behaviour. | Fedewa, A. L., & Erwin, H. E. (2011). |
| Stability balls *Seating | Nil reported | Primary 7 years | Stability balls were effective for improved attention span and temporarily alleviated anxiety/depressive symptoms. Ineffective on hyperactivity, oppositional defiant behaviours. | Gaston, A., Moore, S., & Butler, L. (2016). |
| Stability balls *Seating | Autism and intellectual disability | Preschool and Primary 4–12 years | Inconclusive evidence for stability balls improving in-seat behaviours. | Krombach, T., & Miltenberger, R. (2020). |

| Intervention | Population | Age | Evidence | Study |
|---|---|---|---|---|
| Study A: Ear-Level Remote Microphone Systems,<br>Study B: Soundfield Classroom Distribution<br>*Auditory mod | Autism | Primary and Secondary<br>8–15.4 years | Inconclusive evidence to improve listening, communication and social interaction and reduction in physiological stress. | Rance, G., Chisari, D., Saunders, K., & Rault, J. L. (2017). |
| The Listening Program<br>*Auditory training | Autism + sensory over responsiveness to auditory stimuli | Primary 7 years | Inconclusive evidence that the listening program improves auditory sensitivity and self-stimulatory behaviours. | Gee, B. M., Thompson, K., & St John, H. (2014). |
| Therapy ball chairs Seat cushions *Visual mod *Auditory mod *Seating | Autism | Not stated | Inconclusive effects on-task behaviour. | Dargue, N., Adams, D., & Simpson, K. (2021).<br>Systematic Review |
| Therapy cushions *Seating | Autism | Preschool and Primary 5–6 years | Therapy cushions were Ineffective for improving the in-seat and on-task behaviours | Umeda, C., & Deitz, J. (2011). |
| Vests (weighted or non-weighted) *Weighted | Autism, sensory modulation dysfunction, teacher reported difficulty with attention | Preschool and Primary 3–10 years | Vests were ineffective for task behaviour and sitting time. | Hodgetts, S., Magill-Evans, J., & Misiaszek, J. (2011). |
| Weighted vests *Weighted | Nil reported | Primary 7–10 years | Weighted vests are ineffective for attention in classroom. | Collins, A., & Dworkin, R. J. (2011). |
| Weighted Vests *Weighted | Autism | Not listed | Weighted vests were ineffective in improving in-seat behaviour on-task behaviour | Taylor, C. J., Spriggs, A. D., Ault, M. J., Flanagan, S., & Sartini, E. C. (2017). |

| Intervention | Population | Age | Evidence | Study |
|---|---|---|---|---|
| Weighted vests Stability balls *Weighted *Seating *Movement | Not stated | Preschool, Primary and Secondary 5–21 years | Ineffective: weighted vests/ stability balls on in-seat and on-task behaviour. | Grajo, L. C., Candler, C., & Sarafian, A. (2020). *Systematic Review* |
| Weighted vests Seating *Weighted *Seating | Sensory integration disorder Autism Developmental delay Down Syndrome Cerebral Palsy Other motor impairments ADHD | Preschool and Primary Mean age of group design studies – 82.9 months Mean age of single case design studies – 67.8 months | Ineffective for weighted vests. Inconclusive for seating. | Barton, E. E., Reichow, B., Schnitz, A., Smith, I. C., & Sherlock, D. (2015). *Systematic Review* |
| Weighted vests Stability balls *Seating *Weighted | ADHD | Preschool and Primary 5–12 years | Weighted vests and stability balls were Ineffective for classroom behaviour. | Macphee, F. L., Merrill, B. M., Altszuler, A. R., Ramos, M. C., Gnagy, E. M., Greiner, A. R., . . . Pelham, W. E. (2019). |
| Weighted vests Therapy balls Air cushions Platform swings Activity breaks Ayres Sensory Integration® *Seating *Weighted *Movement *ASI | Nil listed | Preschool, Primary and Secondary<br>Not specified, inclusion criteria, 4–17 years | Inconclusive on sensory intervention modalities related to sensory-based, sensorimotor and sensory integration. | Ouellet, B., Carreau, E., Dion, V., Rouat, A., Tremblay, E., & Voisin, J. I. (2021). *Systematic Review* |

| Intervention | Population | Age | Evidence | Study |
|---|---|---|---|---|
| Weighted vests, slow swinging, incorporation of multisensory activities into preschool routines *Weighted *Movement *Sensory diet | Autism | Not specified | Inconclusive evidence to support weighted vests on attention, slow linear swinging on task behaviour and embedding tactile, proprioceptive, and vestibular activities in preschool on play skills. | Bodison, S. C., & Parham, L. D. (2018).<br>*Systematic Review* |
| Yoga | Not stated | Preschool, Primary and Secondary 5–21 years | Effective: Yoga to improve classroom communication and engagement in school. | Grajo, L. C., Candler, C., & Sarafian, A. (2020).<br>*Systematic Review* |