SENSORY PROCESSING AND AUTISM
Do any of these situations sound familiar?

- Brian covers his ears or talks loudly when children are singing
- Jane rolls on the floor when others are sitting during reading
- Jacob refuses to touch play dough, sand or paint and holds his brush at the very end
- Bill climbs on top of tables and chairs and jumps off
- Cassandra constantly falls down and skins her knees
- Hassan refuses to play on outdoor playground equipment
- Toby chews his fingers and hands
- All these children may be showing signs of atypical sensory processing that interferes with everyday life

- What can be done to enable them to learn and function effectively?
WHAT IS SENSORY PROCESSING

HOW DOES IT WORK: WHAT DOES IT DO

WHAT SENSORY PROCESSING ISSUES MIGHT EXIST FOR CHILDREN WITH AUTISM

WHAT CAN BE DONE TO ADDRESS DIFFICULTIES: EVIDENCE OF SUCCESS
Sensory processing is the ability to

- gather
- understand,
- organize and
- use the information that comes to us from our senses. (Hearing, Seeing, Touching, Taste, Smell, Movement,)
Children learn about their environment through integrated sensory systems

- Auditory – hearing
- Visual – vision
- Oral / Gustatory – touch and taste in and around mouth
- Olfactory - smell

Children learn about their bodies through integrated sensory systems

- Tactile - touch
- Internal monitoring systems
  - Vestibular – movement and balance
  - Proprioception and Kinesthesia – body position
HOW DOES SENSORY PROCESSING CONTRIBUTE TO EVERYDAY EXPERIENCE?

- We live in a sensory world. We are all part of a social ‘tribe’ which has its own sensory elements.
- Being human is embedded in sensory events.
- Sensation is the common language through which we share the experience of being human.
- A common ground for understanding how we perceive the world around us.
HOW DOES SENSORY PROCESSING CONTRIBUTE TO EVERYDAY EXPERIENCE?

- AT THE SAME TIME:

- EVERYONE CHARACTERISES SENSORY EXPERIENCE FROM A DIFFERENT PERSPECTIVE

- PEOPLE RESPOND DIFFERENTLY TO THE SAME SENSORY EVENT

- WE ALL HAVE DIFFERENT SENSORY NEEDS AND PREFERENCES
SENSATION IS INTIMATE AND PERSONAL

OUR RESPONSES TO SENSATION DEFINE OUR INDIVIDUALITY

CONTRIBUTE TO OUR PARTICULAR TEMPERAMENT AND SELF-EXPRESSION
SENSORY PROCESSING REFLECTS CENTRAL NERVOUS SYSTEM ACTIVITY

MAKES SENSORY JUDGEMENTS ABOUT IMPORTANCE OF INPUT

CNS CREATES A RESPONSE BASED ON JUDGEMENT
How does this happen?

Executive Control (Metacognition):
- Regulation and allocation of attention to processing
  - Planning responses
  - Evaluating responses and plans
- Regulating information processing strategies
  - Cognitive effort

WHAT DOES IT MEAN?
WHAT WILL I DO?
DO I NEED MORE INFORMATION?
WILL IT WORK?
HOW HARD DO I HAVE TO WORK?

WHAT MAGNITUDE?
IS IT IMPORTANT?

WHAT DO I KNOW ABOUT IT?
DO I NEED TO REMEMBER IT?

DID IT WORK?
How does this happen?

Executive Control (Metacognition)
- USING SENSORY INFORMATION FOR COGNITION
- Cognitive effort

SENSORY REGISTRATION AND DISCRIMINATION

SENSORY REGULATION

SENSORY MEMORY
- Long Term Memory

SENSORY BASED BEHAVIOUR

SENSORY LEARNING

SENSORY FEEDBACK

Internal

External
RANGE OF RESPONSES TO SENSORY INPUT

- NOTHING
- INPUT IS DAMPENED DOWN
- ‘INHIBITED’

‘FINE TUNED’ to suit the task
Justin can see the smallest pieces of fluff on the carpet. This distracts his attention from what he is supposed to do – complete maths worksheet.

He hates lights and the fluorescent lights in the classroom can give him a headache. He often fidgets and squirms.

He can hear the teacher talking in the next classroom. He hears Robert dropping his ruler. He hears Peter moving his chair.

Justin’s teacher is constantly giving him additional individual verbal prompts to stay focussed.
How is Justin processing sensory information

Executive Control (Metacognition)
- Regulation and allocation of attention to processing
  - Planning responses
  - Evaluating responses and plans
- Regulating information processing strategies
  - Cognitive effort

WHAT DOES IT MEAN?
WHAT WILL I DO?
DO I NEED MORE INFORMATION?
WILL IT WORK?
HOW HARD DO I HAVE TO WORK?

WHAT MAGNITUDE?
IS IT IMPORTANT?

WHAT DO I KNOW ABOUT IT?
DO I NEED TO REMEMBER IT?

DID IT WORK?
Every bit of sensory input is processed in the brain relative to two uses

- **PROTECTION**
  - Survival
  - Stimulates arousal/ anxiety
  - Highly motivating
  - Preferred in CNS
  - Environment oriented
  - Defensive, automatic, stereotypic behaviours

- **DISCRIMINATION AND MAPPING**
  - Planning
  - Organisation
  - Sequenced, flexible behaviour
  - Effort
  - ‘fit’

**BALANCE**
The point at which a person detects and responds to sensory information

Below this threshold, the person is unaware of sensory input

Not a stationary point - dynamic and variable

Threshold

Affected by:

- Accumulation of sensation over time
- The sensory system being used
  - Intensity
  - Location of input
- ANXIETY
HYPERRESPONSIVITY occurs when:

- Sensory input **EXCEEDS** a person's ability to cope
- RESULTS IN BEHAVIOURAL DISORGANISATION
- Child with low sensory threshold will become disorganised more readily than that child with high sensory threshold
SENSORY HYPORESPONSIVITY

- HYPORESPONSIVITY occurs when:
  - greater than normal levels of input required for registration
• **Responsivity** is a **RANGE** within which sensory input is tolerated and used

• The **wider the range**, the more likely it is that the child maintains **regulated and adaptive behaviour**
If the range is NARROW

- The more likely it is that the child will have a limited range of behaviours or will only be able to perform in a limited number of sensory environments

- SENSORY INPUT
If the **threshold** is HIGH – lots of sensory input needed to meet sensory needs

- **ACTIVE** attempt to meet need for high level of sensory input
- **PASSIVE** attempt to meet need for input
If the **threshold** is LOW

- Actively avoids sensory input to meet sensory needs
- Overwhelmed by sensory input – unable to counteract response

**SENSORY INPUT**
Reactions to some sensory information are **TOO STRONG** and linked to negative behaviour, anxiety or extreme emotions.
Thresholds can be LOW and HIGH in specific sensory systems AND within one system.
Reactions may be NOT STRONG ENOUGH - inconsistent and fragmented behaviour
WHAT IS SENSORY PROCESSING AND HOW DOES IT WORK?

SUMMARY SO FAR:

- Sensory processing is:
  - Embedded in everything we do
  - Complex with multiple systems wired to function independently and together
  - Closely linked to behaviour and temperament
  - Expressed differently in everyone
  - ?? Typical??
WHAT IS A DISORDER OF SENSORY PROCESSING?

- When sensory events are processed in such a way that it affects participation in childhood learning experiences

- Long term and persistent: not temporary
WHAT SENSORY PROCESSING ISSUES MIGHT EXIST FOR CHILDREN WITH AUTISM

- Dimensions of sensory processing:
  - Registration
  - Regulation
  - Discrimination
  - Cognition

Using sensory information purposefully
Sensory registration and regulation in autism
What is it?

To regulate means to adjust or adapt to a certain proportion: to modulate, to temper

Sensory regulation occurs on neurophysiological and behavioural levels
Evidence of the impact of sensory dysregulation on behaviour of children with autism

- Meta-analysis of 14 studies: ASD
- Difficulties with sensory regulation common in persons with autism
- Different types
- Significant difference between ASD and typical peers in presence and frequency of sensory symptoms

- Underresponsivity
- Over-responsivity
- Sensation seeking

- Moderators that reduced the variability in findings were:
  - Age
  - Severity of autism

- Sensory differences highest for children 6-9 years

Evidence of the impact of sensory dysregulation on behaviour of children with autism

70 children and adolescents with ASD

- Significant association between amount of repetitive behaviours and sensory processing
- Perhaps there are sensory processing ‘subgroups’ based on severity of repetitive behaviours

In people with autism:

- **When high rate of repetitive behaviour present** – most likely to have atypical sensory processing score that is homogeneous
- **When low rate of repetitive behaviour present** – more heterogeneous score and minimal abnormal sensory responses

Evidence of the impact of sensory dysregulation on behaviour of children with autism

Sensory processing different in persons with autism in comparison to community controls (n=103: 3-43 yr)

- Older persons with autism were closer to the community controls but difference remained throughout life
- Less frequent sensory seeking and defensive reactions
- A link between sensory processing problems and difficulties in managing daily life

Evidence of the impact of sensory dysregulation on behaviour of children with autism

- Sensory seeking and touch processing correlated with performance of gross motor skills in children 3-4 yrs with ASD.

- Suggest atypical somatosensory responses impacting on motor development

- Sensory avoiding linked to fine motor skills in daily living skill performance

Atypical fear responses to sensory inputs

Two consequences:
1. Sympathetic nervous system responses (autonomic responses) = fear responses found in children with autism after sensory challenge
2. Parasympathetic nervous system responses = difficulty recovering from the challenge
Decreased, or disorganised sympathetic/parasympathetic CNS activity has been associated with a narrow range of behavioural adaptation to changing sensory conditions, and is a predictor of stress, vulnerability, and risk status.

ANXIETY + SENSORY OVER-RESPONSIVITY
SECONDARY BEHAVIOURS

Behaviours that are not direct defensive response to sensations
May be related to sensory defensiveness
Difficulties with STATE REGULATION
  - Anxiety
  - Stress
  - Distractibility
  - Sleep difficulties

PHYSICAL DISRUPTIONS (headaches, postural tension)
SOCIAL/EMOTIONAL DIFFICULTIES
  - Social avoidance
  - Aggression
  - Emotional fragility
  - ‘meltdowns’
Any informed care recognises that young people with ASD may have a history of sensory trauma and to ignore sensory hypersensitivities can exacerbate the trauma.

Hyper-sensitivity + inability to understand the nature and purpose of sensory inputs can trigger fear and negative reactions in young people with ASD (and Intellectual Disability).
What is the role of sensory processing when there is anxiety and hyper-sensitivity?

- Anxiety (high arousal)
- Sensory Hyper-responsivity
- Sensory Seeking
ANXIETY AND SENSORY HYPERRESPONSIVITY

- Anxiety stems from an inability to self-calm high levels of arousal
- It is among the most common psychopathologies in childhood
- Approximately 42-55% of youth with ASD meet criteria for an anxiety disorder
- As many as 62% of youth with mood or anxiety disorders show elevated autism spectrum traits

(Cartwright-Hatton, McNicol & Doubleday, 2006).
Children with autism may show a different pattern of anxiety than anxious youth without ASD. Children with ASD meet diagnostic criteria for specific phobias at a substantially higher rate than the 3.5-7.9% prevalence reported in community samples.

Children with ASD have been found to have more parent-reported physical injury fears compared to typically developing anxious youth, a pattern that may be explained by a heightened sensitivity to noise and touch among youth with ASD.
LINK BETWEEN SENSORY OVER-RESPONSIVITY AND ANXIETY CAN HAPPEN THREE WAYS

- Symptoms of anxiety lead to over-reaction to sensory stimuli
- This over-reaction is maintained and becomes learned behaviour through repetition
- Sensory over-responsivity produces anxiety
- Either specific avoidance or generalised anxiety through repeated exposure to sensory situation
Roger is at the bus line. The kids have a 20 minute wait, so most of the boys play handball. Reg was anxious about missing the bus.

He walked off and started kicking all the kid’s bags that were lined up. He was asked to stop and he refused.

He then pushed a Kindergarten girl in the back and shoved hard enough for her to fall over.

He then started to pick up rocks and throw them at parents and young siblings.

The teachers had to quickly escort parents and students out the gate. The teachers tried to restrain Roger but he kicked and punched them.

What sensory system is he using to deal with his anxiety?
Many children with autism show deficits in both sensory processing and affective (anxiety) patterns.

Addressing both aspects simultaneously (sensory and anxiety/emotion) without consideration of causation can benefit everyday adaptation and reduce stress.
ASSESSMENT OF SUITABILITY FOR SENSORY BASED INTERVENTIONS

CRITERIA:

- Occupational need (REASONS?)
- Evidence of significant and persistent SOR
- Suitable family/school context resource
- Therapist knowledge and skill
- Sufficient service delivery resources for follow up and support
SENSORY THINGS TO OBSERVE
Type and style of intervention is dependent upon goal, resources and context

Use M.A.T.C.H. system to determine
- What needs to be learned
- Who needs to do the learning
<table>
<thead>
<tr>
<th>Modify Task</th>
<th>Does the task need to be changed to suit the child’s sensory processing capacity?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alter Expectations</td>
<td>Do the teacher/parent/therapist’s expectations need to change?</td>
</tr>
<tr>
<td>Teach Strategies</td>
<td>What sensory processing strategies/experiences might be provided to the child to help his/her performance?</td>
</tr>
<tr>
<td>Change Environment</td>
<td>Does the sensory environment need to be changed to suit the child’s processing needs?</td>
</tr>
<tr>
<td>Help by Understanding</td>
<td>What information should be provided to teachers/parents/children to help them understand the need for a change in the way things are done?</td>
</tr>
</tbody>
</table>
HOW? STRATEGY ONE

- Direct ‘sensory’ intervention (OT)
  - Work on widening and resetting the threshold range for sensitivity and discrimination
  - Work on establishing recovering strategies
**Modify Task**

**Alter Expectations**

**Teach Strategies**

What **sensory processing strategies/experiences** might you provide the child to help his behavioural accommodation?

**Change Environment**

**Help by Understanding**
Ayres Sensory Integration®:
- Most researched area of clinical practice for sensory processing disorders
- Controversy and disunity
- Studies in 1970’s and 80’s suggested positive impact vs later studies
- Recent RCT study indicates effects (Schaaf et al 2013)
- Evidence evolving to support its use with high functioning children with autism
Use of Sensory Activity Schedule in home and school contexts

- Carefully selected sensory input is integrated into daily routines to regulate behaviour
- The timing, intensity and duration of sensory based activity is critical
- Individually constructed for each child’s situation
<table>
<thead>
<tr>
<th>Modify Task</th>
<th>How would you <strong>change the task</strong> to suit the child’s sensory processing capacity?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alter Expectations</td>
<td>How might the <strong>teacher/therapist’s expectations</strong> change?</td>
</tr>
<tr>
<td>Teach Strategies</td>
<td></td>
</tr>
<tr>
<td>Change Environment</td>
<td></td>
</tr>
<tr>
<td>Help by Understanding</td>
<td>What education should you provide to teachers and parents to help them <strong>understand BOTH</strong> the behaviour and need for a change in their approach?</td>
</tr>
</tbody>
</table>
What is a sensory activity schedule?

- An activity program that is developed to meet the sensory needs of an individual child with sensory processing difficulties
- **The purpose is to help the child function better in a sensory world**
- The sensory diet includes touch, vestibular, proprioceptive, and visual input that the child seeks in a structured way so that behaviour remains purposeful
- **A sensory activity schedule also incorporates activities to calm the child when they are unable to calm themselves**
What is the behaviour

- Define the behaviour(s)
- Do they stem from the same cause
- Do the behaviours occur in a predictable pattern

Is change needed?

- Harmful
  - Destructive
  - Disruptive
- Interferes with learning
  - Socially undesirable
Analysing behaviours: Identifying antecedent situations

**ENVIRONMENT**
- Size of room
- Structured/Unstructured
- Adult/child ratio
- Environment
- Time of day

**TASK**
- No task/in task
- Characteristics of task
- What task preceded behaviour
Analysing behaviours: Identifying antecedent situations

- **SPECIAL EVENTS?**
  - Recent illness
  - Lack of sleep
  - Emotional episode
  - Other

- **WARNING SIGNS?**
  - Restlessness
  - Eye aversion
  - Distractibility
  - Frustration
  - Stop activity
  - Raised voice
  - Stereotypic behaviour
Is the person trying to OBTAIN something?

Is the person trying to AVOID something?
Is the person trying to **OBTAIN** something?

**EXTERNAL**
- Attention
- Object
- Activity

**INTERNAL**
- Sensory
  - Vision
  - Touch
  - Auditory
  - Proprioception
  - Vestibular

Is communication acceptable/unacceptable?

Productive/non-productive
Effective
Acceptable?
Is the person trying to **AVOID** something?

<table>
<thead>
<tr>
<th>EXTERNAL?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention</td>
</tr>
<tr>
<td>People</td>
</tr>
<tr>
<td>Situations</td>
</tr>
<tr>
<td>Transitions</td>
</tr>
<tr>
<td>Tasks</td>
</tr>
<tr>
<td>Objects</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TASK ANALYSIS?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task too difficult</td>
</tr>
<tr>
<td>Not challenging</td>
</tr>
<tr>
<td>Involves transitions</td>
</tr>
<tr>
<td>Dislikes</td>
</tr>
<tr>
<td>Self-confidence</td>
</tr>
<tr>
<td>Fear</td>
</tr>
<tr>
<td>Sensory</td>
</tr>
<tr>
<td>No meaning</td>
</tr>
</tbody>
</table>
Is the person trying to **AVOID** something?

**INTERNAL/SENSORY**
- Overstimulated
- Arousal
- Specific type of sensory input

**INTERNAL/SYSTEMIC**
- Pain
- Hunger
- Itching/irritation
- Illness
- Hot/tired
Determine if you need to:

- **Stop** the behaviour
- **Limit** the behaviour
- **Alter** the behaviour
- **Let it fade** (extinguish) with sensory based program
Determine what is the sensory stimulation provided from the behaviour:

- Intensity
- Duration
- Frequency
If sensory links to behaviours are found:

**What need is met:**
- Obtain something
- Avoid or terminate something
- Communicate something

**Sensory behaviour to:**
- Calm self
- Arouse self
- Organise self
From this information an activity schedule is planned

- Specific
- Timetabled
- Behaviour based
- Individual
- Age appropriate
- Contextually relevant
ACTIVITY SCHEDULE IS PLANNED AND SPECIFIC

BEHAVIOUR

WHAT IT LOOKS LIKE

ALTERNATIVE ACTIVITY
BEHAVIOUR

PROPRIOCEPTIVE / VESTIBULAR SEEKING

WHAT IT LOOKS LIKE

• PRESSING BODY AGAINST THINGS
• HITTING
• RUNNING
• TENSING MUSCLES AND JOINTS
• UNUSUAL POSTURES
• THROWING
• BREATHING
• BLOWING

ALTERNATIVE

• BLANKET WRAPS
• SQUEEZE TOYS
• TRAMPOLINE
• EXERCISE PROGRAM
HOW?

- Work on one situation at a time
- Use sensory input that is calming

Expected outcome (what is measured)
- React to sensation in a way that leads to function
- Focus on relevant sensory input (INDIVIDUAL)
- Move/touch without fear, aversive reactions to sensations that are part of life (REDUCE ANXIETY)
- Within the context of RELEVANT activity
What can you do for movement seekers?

- Tire swing
- Balancing feats
- Riding toys
- Hula hoops
- Running and jumping
- Trampoline (mini)
- Rolling downhill
- Movement games (ring around the rosie – Hokey Pokey)
What can you do for proprioceptive seekers/underresponders?

- Examples?
Weighted ‘things’ PRECAUTIONS
ORAL PROPRIOCEPTIVE
EVIDENCE

- Sensory Activity Schedule and Environmental Adjustments:
  - Activities and environmental adjustments designed to complement the child’s sensory needs.
  - Highly individualised
  - Emerging support
HOME:

Randomised controlled study (Chapparo & Mora, 2011)
To determine whether a Sensory Protocol, when used by parents/carers under the guidance of trained occupational therapists improves the functional performance and behavioural responses for children with severe sensory defensiveness.
Randomised controlled study

30 Children with ID + ASD and severe sensory defensiveness and nominated carers or parents were randomly allocated to:

- **Experimental intervention (Group 1 Sensory Intervention)**
- **Control intervention (Group 2 Behavioural Intervention)**

Used GOAL ATTAINMENT SCALES generated by parents and DEVELOPMENTAL BEHAVIOURAL CHECKLIST as outcome measures
## Example Sensory Diet

<table>
<thead>
<tr>
<th>Time</th>
<th>Key events in the day</th>
<th>DPPT</th>
<th>Other sensory diet activities</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.00</td>
<td>Wake up</td>
<td>✓</td>
<td>Jump and crash on bed</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Massage on hands</td>
<td>Tim woke in angry mood</td>
</tr>
<tr>
<td>8.00</td>
<td>Breakfast</td>
<td></td>
<td>Drink with crazy straw</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rock on big ball</td>
<td></td>
</tr>
<tr>
<td>9:00</td>
<td></td>
<td></td>
<td>Go for walk</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Massage on hands</td>
<td></td>
</tr>
<tr>
<td>10.30</td>
<td>Morning tea</td>
<td>✓</td>
<td>Eat roll-up</td>
<td></td>
</tr>
<tr>
<td>12.30pm</td>
<td>Lunch</td>
<td>✓</td>
<td>Have drink using crazy straw</td>
<td></td>
</tr>
<tr>
<td>2.00</td>
<td></td>
<td></td>
<td>Jump on trampoline 15 minutes</td>
<td>Calm</td>
</tr>
<tr>
<td>3.30</td>
<td>Outdoor play</td>
<td>✓</td>
<td>Runs with sister, goes in cubby house</td>
<td>Found Tim enjoys making cubby houses</td>
</tr>
<tr>
<td>4.30</td>
<td>Afternoon tea</td>
<td></td>
<td>Hand fidget toy</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Juice with straw</td>
<td></td>
</tr>
<tr>
<td>5.30</td>
<td></td>
<td>✓</td>
<td>Sit on rocking chair to watch television</td>
<td></td>
</tr>
<tr>
<td>6.30pm</td>
<td>Dinner</td>
<td></td>
<td>Chewy foods in dinner</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Weighted pillow on lap</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bath</td>
<td></td>
<td>Warm bath with firm sponge</td>
<td></td>
</tr>
<tr>
<td>8.00</td>
<td>Bedtime</td>
<td>✓</td>
<td>Rock on parent’s lap and read story.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Weighted blanket.</td>
<td></td>
</tr>
</tbody>
</table>
Sensory diet activities and DPPT

- Bouncing up & down on ball
- Bear Hugs
- Brief heavy chores n push, pull, lift
- Mini tramp or tramp
- Air cushion
- Pillow squashing
- Biking
- Gentle helper squishes
- Pressure brushing n joint compression
Both interventions effective in achieving functional goals

- The sensory intervention is more effective than behavioural intervention for improving the behavioural responses at home of children with Intellectual Disability, Sensory Defensiveness and Behaviour Support Needs.
Parents perceived that the sensory intervention has a greater impact on daily life of children, is easier to implement than behavioural intervention
QUALITIES OF SENSORY DIETS THAT WORKED
<table>
<thead>
<tr>
<th>Sense</th>
<th>Occasions of use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proprioception</td>
<td>30</td>
</tr>
<tr>
<td>Vestibular</td>
<td>12</td>
</tr>
<tr>
<td>Tactile</td>
<td>5</td>
</tr>
<tr>
<td>Oral</td>
<td>2</td>
</tr>
<tr>
<td>Visual</td>
<td>2</td>
</tr>
<tr>
<td>Auditory</td>
<td>1</td>
</tr>
</tbody>
</table>

The above list indicates that proprioceptive based activities were used the most, followed by vestibular based activities.
# Sensory based activities used by parents in the study

## Proprioception

<table>
<thead>
<tr>
<th>Being squashed by ball</th>
<th>Stomp feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Squashing with pillow</td>
<td>Firm hugs</td>
</tr>
<tr>
<td>Wrap up and squeeze in blanket</td>
<td>Hand and foot massage</td>
</tr>
<tr>
<td>Pulling and pushing</td>
<td>Electric massager on hands and face</td>
</tr>
<tr>
<td>Swimming</td>
<td>Wipes table down with warm water</td>
</tr>
<tr>
<td>Arm wrestle</td>
<td>Spray from squeeze bottle</td>
</tr>
<tr>
<td>Climbing frame at playground</td>
<td>Sit on vibrating cushion to eat or travel</td>
</tr>
<tr>
<td>To bed with weighted blanket</td>
<td>Rough and tumble play</td>
</tr>
<tr>
<td>Sit to eat with weighted vest on</td>
<td>Popping bubble wrap</td>
</tr>
<tr>
<td>Carry weighted backpack to school</td>
<td>Firm rub down with towel after wash</td>
</tr>
<tr>
<td>Sit with weighted lap bag</td>
<td>Sit amongst large, firm cushions</td>
</tr>
<tr>
<td>Animal walks to table</td>
<td>Running</td>
</tr>
<tr>
<td>Firm touch on head</td>
<td>Jumping</td>
</tr>
<tr>
<td>Carries heavy objects</td>
<td>Walk the dog</td>
</tr>
<tr>
<td>Lift heavy objects</td>
<td>Crash on cushions</td>
</tr>
</tbody>
</table>
Classroom based sensory intervention for children with autism spectrum disorders (ASD): A pilot study using single system design

Caroline Mills Dr Chris Chapparo
(continuing)
Background

• Special school based research
• Children with ASD, ID, autism specific special school in Sydney

**Research Question:**

*What is the impact of a Sensory Activity Schedule (SAS) on task performance in children with ASD in a classroom setting?*
Referral and Assessment

- Referred to School OT for reduced participation
- Teacher reported: ‘Off task’ behaviour- sensory seeking or sensory avoiding function, frustrated, fixed in routine
- Short Sensory Profile findings:
- All total scores showed definite difference
  (underresponsive/seeks sensation, auditory filtering, visual/auditory sensitivity, tactile sensitivity)
Method

• Single System AB design: non-concurrent, multiple baseline

• Phase A (Baseline): Best practice teaching in ASD

• Phase B (Intervention): Sensory Activity Schedule (SAS) + Best practice teaching

• Desk work tasks were rated including cutting, sticking, put in tasks, puzzles and matching.

• Teacher designed tasks
Method

• Sampling of class task performance was videotaped by school staff
• Between 11 and 18 videos were rated using procedural task analysis for each student.
• Videos were randomly ordered and scored by researchers
• For each student, Phase A (Baseline) and Phase B (Intervention) performances were compared.
Intervention- Sensory Activity Schedule (SAS)

• Administered by teacher’s aide and teacher.
• Morning session- after morning circle, before desk work.
• Used classroom based equipment
• 10-15 mins

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Description</th>
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<tbody>
<tr>
<td>Bouncing on a therapy ball, tight lycra, deep touch pressure</td>
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<tr>
<td>Jumping on a mini-tramp, deep touch pressure</td>
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<tr>
<td>Squashing with a bean bag</td>
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<tr>
<td>Rolled over a therapy ball, jumping on a mini tramp and crashing into cushions, shoulder squeezing, tight lycra</td>
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</tr>
<tr>
<td>Child</td>
<td>Stage One Task Mastery Result</td>
</tr>
<tr>
<td>-------</td>
<td>------------------------------</td>
</tr>
<tr>
<td></td>
<td>Phase A (Baseline)</td>
</tr>
<tr>
<td>M</td>
<td>69.5%</td>
</tr>
<tr>
<td>B</td>
<td>86.67%</td>
</tr>
<tr>
<td>L</td>
<td>81.32%</td>
</tr>
<tr>
<td>C</td>
<td>85.2%</td>
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</tbody>
</table>

*Two tailed, Independent Samples T test (confirmed by Mann Whitney U statistic)
** Significance at the 0.05 level, *** Significance at the 0.01 level
Phase A - Baseline
Phase B - SAS Intervention

p=0.038, p<0.05
<table>
<thead>
<tr>
<th>Modify Task</th>
<th>Alter Expectations</th>
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<tr>
<th>Teach Strategies</th>
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<tr>
<th>Change Environment</th>
<th>Help by Understanding</th>
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</thead>
<tbody>
<tr>
<td><strong>How might you change the environment to suit the child’s processing needs?</strong></td>
<td></td>
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</tbody>
</table>
Use of Fidgets and Fiddletoys:

No evidence to support their use to reduce sensory seeking behaviour
‘Recovery’ corner
MODIFYING THE PROPRIOCEPTIVE ENVIRONMENT?
Dynamic Seating:

- Improved sustained sitting and writing legibility for students with ADHD when seated on balls and movable cushion seating

- Some research supports improved on-task behaviours and self-regulation
INTERVENTION FOCUS AND TYPE: EVIDENCE

- Weighted products:
  - Widespread application
  - Little evidence to support use
  - Small studies show some improvement in attention and in-seat behaviour
  - Precautions include biomechanical stress from weight
Everyone has **unique responses** to sensory experiences that are a part of everyday occupations.

**Atypical responses** do not necessarily constitute a ‘problem’ which requires ‘remediation’.

Intervention is when people **create effective responses to everyday sensations** that not only suit their sensory needs and preferences, but also support social and occupational participation.

**Intervention** is only required when markedly atypical responses become a barrier to participation in a manner that is acceptable to a child’s particular ecology (e.g. family, school).


