Sensory Integration Theory

- Dr. Jean Ayers (2005) in the 1960's
- The organization of sensory information in the brain to make an adaptive response
- Miller, Anzalone, Lane, Cermak, & Osten (2007) clarified definition to include “all the constructs that discuss how the brain processes sensation and the resulting motor, behavior, emotion, and attention processes (p. 135).
- Miller et al., differentiate sensory integration theory and sensory based processing challenges or disorder for diagnostic clarification

Sensory Based Interventions

- Watling & Clark (2011) definition:
  - Sensory based interventions use discrete sensory experiences or environmental modifications to support regulation of behavior, address specific difficulties in sensory modulation or sensory discrimination, prepare the client for engagement, support the ability to focus on learning activities, and regulate behavior as task demands change. CE-4

The purpose of sensory based interventions is to modify regulatory state or behavior quickly without a lasting effect (Watling & Clark, 2011).
- Easily implemented into classroom settings and require minimal equipment

Benefits of Circle Time

- Teaching social routines and expectations
- Increasing appropriate interactions with peers
- Providing opportunities for observational learning
  - Barton, Reichow, Wolery, & Chen (2011)

Types of Interventions

- Sensory Motor Strategies:
  - Child’s active engagement in tactile, proprioceptive, and vestibular experiences prior to circle time
- Dynamic Seating:
  - Provision of a dynamic seating surface during circle time—Disc ‘o’ Sit Jr.
Prior Research

› Limited and mixed research
› Small research samples (most are 1–3 children using single subject research model)
› One randomized control study with 63 children

Research Question

› Does providing dynamic seating during circle time improve “on task” and “in seat” behaviors in preschool children with attention difficulties compared to traditional floor seating?
› Does providing tactile, proprioceptive, and vestibular input prior to circle time improve “on task” and “in seat” behaviors in preschool children with attention difficulties compared to traditional floor seating?

Methods

Subjects

› Preschool children ages 3–6 enrolled in specialized preschool classrooms in North Central Pennsylvania
› 15 children were invited to participate
› 9 participants from 3 classrooms obtained parental consent and met inclusion criteria
› To enter classroom children must demonstrate a delay greater than or equal to 25% or 1.5 standard deviations from the mean in at least two developmental domains (cognitive, speech and language, physical (motor and sensory), social–emotional, and adaptive)

Methods

Subjects

› Classroom staff and researcher reviewed each child’s IEP plan developed upon entrance into the program to determine attention to task concerns
› Classroom staff completed Sensory Processing Measure–Preschool edition (SPM–P) (Miller Kuhaneck, Henry, & Glennon, 2010) to determine which children demonstrated attention difficulties and may benefit from sensory intervention
› Cut off T-score of 65 or greater in 2 or more categories (visual, auditory, touch, body awareness, balance and motion) or 70 or greater on the Total Sensory Processing category

Methods

Subjects

› Exclusion criteria
› Physically unable to participate in sensory based interventions
› Do not have the ability to sit unassisted
› Present with inner ear difficulties as determined by parent report during the informed consent process

Procedures

› Counter balance technique
› Rotate the subject groups among the three interventions so all the subjects received the interventions at intervals during the study
› Useful when comparing different interventions that do not have a carry over effect (Ary, Jacobs, Razavieh, & Sorenson, 2009)
› Each intervention is independent of each other and exposure to one should not affect the other interventions (Watling & Clark, 2011)
Independent Variables

- Each subject group (classroom) rotated among the three conditions
- Condition 1 – baseline
  - Typical floor seating
- Condition 2
  - Dynamic seating during circle time (Disc ‘O’ Sit Jr.)
- Condition 3 – Sensory Motor Activities
  - Participation in a variety of tactile, proprioceptive, and vestibular activities prior to circle time

Procedures

- Classrooms run 2–3 days a week
- Each condition phase took place for a time period of 2 weeks (2–3 days per week)
- The total length of the study was 6 weeks
- Circle time was video taped during the study period
- Circle time lasted 7–10 minutes
- OTR trained classroom staff in procedures
- OTR or COTA in classroom at least 1 day a week

Behavior Lens

- Two behavior raters who were blind to the purpose of the study viewed the recordings to collect data on
  - In seat behavior
  - On task behavior
- Raters used the IPAD app BehaviorLens to collect data (SuperPsych ed, 2012)
- A 92% reliability was established between the two raters prior to the data collection

Dependent Variables

- In seat behavior (Schilling & Schwartz, 2004)
  - Floor: child being in upright position with any portion of the buttocks in contact with the floor
  - Dynamic seating: any portion of the child’s buttocks in contact with the piece and the piece staying on the floor
- On task behavior (Umeda & Deitz, 2011)
  - Engagement in appropriate classroom activities as demonstrated by visual orientation toward appropriate classroom activity, appropriate manipulation of materials, and appropriate interaction with teacher or peers
Results

- Data was analyzed using SPSS Version 17 (SPSS Inc., 2008). All nine children who participated in the study were included in the “on task” and “in seat” descriptive results.
- If the child was present for less than three data collection sessions per condition, their results were not included in the ANOVA calculations.
- A one-way repeated measure ANOVA was calculated to compare the percentage of change for both “on task” and “in seat” behaviors.

Descriptive Analysis

<table>
<thead>
<tr>
<th>Condition</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
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<tbody>
<tr>
<td>Condition 1 (No Intervention)</td>
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<td>7.50</td>
<td>60.55</td>
<td>26.54</td>
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<td>Condition 2 (Disc ‘O’ Sit Jr.)</td>
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<td>75.00</td>
<td>43.55</td>
<td>23.00</td>
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Average Percentages of “On Task” Behaviors by Condition

<table>
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<tr>
<th>Condition</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
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</thead>
<tbody>
<tr>
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<td>49.50</td>
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Average Percentages of “In Seat” Behavior by Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition 1 (No Intervention)</td>
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<td>71.80</td>
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<td>21.80</td>
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<tr>
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<td>32.97</td>
<td>17.06</td>
<td>25.14</td>
<td>17.06</td>
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Mean Percentages of “In Seat” Behaviors in the Participants who Completed the Entire Study

<table>
<thead>
<tr>
<th>Condition</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
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<tbody>
<tr>
<td>Condition 1 (No Intervention)</td>
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<td>72.68</td>
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### Inferential Analysis

**Paired Comparisons of the Effect of the Three Conditions on “On Task” Behaviors**

- The mean difference is significant at the .05 level.

<table>
<thead>
<tr>
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<th>Condition</th>
<th>Mean Difference (I - J)</th>
<th>Std. Error</th>
<th>Sig.</th>
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<td>.795</td>
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<tr>
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<td>3</td>
<td>19.720</td>
<td>6.512</td>
<td>.117</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>19.720</td>
<td>6.512</td>
<td>.117</td>
</tr>
</tbody>
</table>

**Discussion**

- The results of this study indicate that the use of Disc ‘O’ Sit Jr. cushions in place of typical floor seating improves “on task” behaviors.

- In contrast, a significant difference in “on task” behaviors was not found when comparing Condition 3 to Condition 1.

- This indicates that providing sensory based motor and tactile activities prior to circle time may not have the desired carryover effect to produce improvements in attention to task.
Discussion

- These findings could indicate that preschool children in a specialized classroom with attention difficulties benefit more from engagement in sensory based activities during circle time rather than prior to circle time. They may need the constant proprioceptive and vestibular engagement provided by dynamic seating to modulate their regulatory state.

- Despite the conflicting evidence regarding the significance found in the study, descriptive statistics demonstrate a trend towards increased “on task” behaviors across the two intervention conditions compared to no intervention (Table 5). Given the limited time frame and small participant group, a larger study, more controlled study, over a longer period of time may produce statistically significant results.

- The results of this study did not indicate the use of Disc ‘O’ Sit Jr. cushions or participation in sensory based motor and tactile activities prior to circle time significantly improved “in seat” behaviors. Although a statistically significant difference was not found, descriptive results indicate a trend towards higher “in seat” behaviors when participating in sensory based motor and tactile activities prior to circle time and using dynamic seating during circle time (Table 6).

Limitations

- Time constraints
- Small sample
- Geography
- Differences in classroom management

References

References


References


