Using Functional Communication Training to Reduce Aggressive Behavior in Autism

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Pervasive Developmental Disorder: Autism

- Individuals with autism present with the following characteristics:
  - Deficits in social skills
  - Deficits in language & communication skills
  - Exhibit stereotypical behavior
  
(DSM IV, 2000)
Challenging Behavior

Deficits in speech & language contribute to challenging behaviors which become the primary communication mode

Typically aggressive in nature

• Aggressive Behavior
  • defined as being hurtful to others (e.g., hitting, kicking, head-butting, spitting, slapping, pulling hair) or hurtful to self (SIB)

• Self-Injurious Behavior (SIB)
  • self-aggression, forceful in nature, & may leave physical evidence (e.g., self-biting, pinching, hair pulling, scratching, slapping, hitting (with object/body part)

(NIH, 1991)
Functional Communication Training (FCT)

- Systematic intervention in which the challenging behavior is replaced by more socially appropriate behavior. (Sigafoos & Meikle, 1996)
  - Replacement behavior is intended to serve the same purpose as the challenging behavior. (Carr, 1988)
  - Underlying notion that challenging behaviors are communicative intents (Durand, 1993; Skinner, 1957)
Purpose of Review

- Evidence Based Practice (EBP)
  - Provide evidence about the effectiveness of FCT for practitioners
  - Provide a systematic review which uses quantitative measures to determine treatment effectiveness
- Last review published in 1997 (Mirenda)
- Research Question
  - Is FCT an effective treatment in decreasing aggressive behaviors in individuals with autism?
A comprehensive search strategy was used to locate intervention studies:

- numerous databases (e.g., Academic Search Elite, ERIC, Medline, PsycINFO)
- search engines (Google Scholar, MetaPress, & Science Direct)
- other strategies (ancestry & journal hand searches)
- Keyword and keyword combinations used:
  - autism, self-injury, challenging behavior, aggression, functional communication training (FCT), functional equivalence training, developmental disabilities, response training, manual signs, graphic symbols, augmentative & alternative communication (AAC), self-abuse, problem behaviors
Out of 24 studies, 10 met the inclusion criteria.

- FCT was operationally defined
- Subjects were diagnosed as having autism (other PDD’s excluded)
- Single-subject research design
  - True experimental design only, no pre-experimental
- Published in peer-reviewed journals from 1976 - 2005
- Aggressive behaviors were targeted in the intervention
Rejected Studies

• These articles met the initial keyword criteria. However, they were rejected upon careful review for one or more of the following reasons:
  • Was not FCT but rather functional communication
  • FCT was not the intervention
  • Aggression was not the target behavior
  • No intervention was implemented
Accepted Studies

FCT only:
- Braithwaite & Richdale (2000)
- Sigafoos & Meikle (1996)
- Schindler & Horner (2005)
- Wacker, et al. (1990)

FCT within a treatment package:
- Fisher et al. (2005)
- Hagopian et al. (2005)
- Lalli, Casey, & Kates (1995)
Non-parametric Measures

- **Percentage of Non-overlapping Data (PND)**
  
  (Scruggs, Mastropieri, & Casto, 1987)

  **Mean PND:**
  
  - greater than 90% = highly effective
  - between 70% - 90% = fairly effective
  - between 50% - 70% = questionable effectiveness
  - below 50% = unreliable treatments

- **Percentage Reduction Data (PRD)**

  \[ \left( \frac{\mu_B - \mu_I}{\mu_B} \right) \times 100 = \% \text{ reduction from baseline} \]
PND

Calculate the percentage of treatment data points that do not overlap with the lowest (or highest) baseline data points

Ex: $4/5 = 0.8 = 80\%$
Calculate the mean of last 3 data points for baseline (μB) & treatment (μI) then subtract from each other, divide by μB to obtain the percent reduction from the baseline.

\[
\left( \frac{\mu_B - \mu_I}{\mu_B} \right) \times 100 = \% \text{ reduction from baseline}
\]

Ex: \( \mu_B = (4 + 5 + 8) / 3 = 5.7 \)

\( \mu_B = (3 + 0 + 0) / 3 = 1 \)

\( \left( \frac{5.7 - 1}{5.7} \right) \times 100 = 82\% \)
The following replacement behaviors were identified:

- **Speech (n=3)**
  - Vocalizations were used as the replacement behavior
    - Braithwaite & Richdale (2000)
    - Sigafoos & Meikle (1996)

- **Manual Signs & Gestures (n=3)**
  - A combination of manual signs and gestures were used as the replacement behavior
    - Sigafoos & Meikle (1996)
    - Wacker, et al. (1990)

- **Graphic Symbols (n=3)**
  - Graphic symbols were used as the replacement behavior
    - Schindler & Horner (2005)
    - Sigafoos & Meikle (1996)
## Analysis: Speech

Vocalizations were used as the replacement behavior

<table>
<thead>
<tr>
<th>STUDY</th>
<th>N</th>
<th>Condition</th>
<th>PND (%)</th>
<th>PRD (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Braithwaite &amp; Richdale, 2000</td>
<td>1</td>
<td><strong>Escape/Access</strong></td>
<td>97</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(“I want ___ please”)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(“I need help please”)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day, Horner, &amp; O’Neill, 1994</td>
<td>1</td>
<td><strong>Escape</strong></td>
<td>100</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(“go”)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sigafoos &amp; Meikle, 1996</td>
<td>1</td>
<td><strong>Attention/Access</strong></td>
<td>96</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(“Beth”)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(“drink”, “toy”, “want”)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participants Total n = 3</td>
<td></td>
<td><strong>Median</strong></td>
<td>97%</td>
<td>98%</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Mean</strong></td>
<td>98%</td>
<td>96%</td>
</tr>
</tbody>
</table>

(scores across all interventions)
Analysis: Manual Signs & Gestures

A combination of manual signs and gestures were used as the replacement behavior

<table>
<thead>
<tr>
<th>STUDY</th>
<th>N</th>
<th>Condition</th>
<th>PND (%)</th>
<th>PRD (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day, Horner, &amp; O’Neill, 1994</td>
<td>1</td>
<td>Access (want)</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Sigafoos &amp; Meikle, 1996</td>
<td>1</td>
<td>Attention (tapping teacher’s hand)</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Wacker, et al., 1990</td>
<td>1</td>
<td>Access (touching chin)</td>
<td>50</td>
<td>49</td>
</tr>
<tr>
<td>Participants Total n = 3</td>
<td></td>
<td>Median = 100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean = 83.3%</td>
<td>83%</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>(scores across all interventions)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Analysis: Graphic Symbols

Graphic symbols were used as the replacement behavior

<table>
<thead>
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<th>N</th>
<th>Condition</th>
<th>PND (%)</th>
<th>PRD (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horner &amp; Day, 1991</td>
<td>1</td>
<td><strong>Escape</strong> (Break)</td>
<td>46</td>
<td>&lt;21</td>
</tr>
<tr>
<td>Schindler &amp; Horner, 2005</td>
<td>1</td>
<td><strong>Escape</strong> (Activity)</td>
<td>58</td>
<td>83</td>
</tr>
<tr>
<td>Schindler &amp; Horner, 2005</td>
<td>1</td>
<td><strong>Access</strong> (preferred activity)</td>
<td>72</td>
<td>92</td>
</tr>
<tr>
<td>Sigafoos &amp; Meikle, 1996</td>
<td>1</td>
<td><strong>Access</strong> (food, drink, toy)</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Participants Total</td>
<td>n=4</td>
<td>Median</td>
<td>= 65%</td>
<td>88%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>= 69%</td>
<td>74%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(scores across all interventions)</td>
<td></td>
<td></td>
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</tbody>
</table>
Findings

- FCT ranged from fairly effective to highly effective in the studies reviewed.
- FCT yielded greater reduction of challenging behaviors when speech & manual signs/gestures were used as the replacement behaviors.
  - Graphic symbols yielded the least amount of reduction.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PND</td>
</tr>
<tr>
<td>speech</td>
<td>97%</td>
</tr>
<tr>
<td>manual signs &amp; gestures</td>
<td>100%</td>
</tr>
<tr>
<td>graphic symbols</td>
<td>65%</td>
</tr>
</tbody>
</table>
Limitations

• A small number of studies were analyzed
  • very specific inclusion criteria

• PND calculations had to be adjusted for some studies
  • outliers & unusual circumstances in the data reported in the studies
Future Directions

• Master theses & dissertations are currently under review and will be included in the future
• Inclusion of studies in which FCT is part of a treatment package is warranted & will be analyzed
• Reliability analysis
  • Inclusion of study coding
• Use of 3rd statistic
  • Percentage of Zero Data (PZD) for measuring behavior reduction
• PRD needs to be developed further
  • no conventions available for score interpretation regarding degree of effectiveness
References


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