Effects of Early AAC Intervention for Children with Down Syndrome

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Children with Down syndrome

- Down syndrome is the most commonly occurring chromosomal condition
  - Approximately 1 in 750 births
- Children with Down syndrome experience
  - Low muscle tone
  - Cognitive delays
  - Language delays
  - Delays in speech production
    - Reduced speech intelligibility

Delay in speech development

- Children with Down syndrome typically demonstrate significant delays in speech development
  - As a result, they have very limited means to express themselves during the critical early years of development
- Delays in speech may negatively impact many aspects of development
  - Functional communication
  - Social development
  - Language development
  - Learning / cognitive development
  - Literacy development
  - Quality of life

Early intervention

- Early intervention is critical
  - During the early years of development, children with Down syndrome typically have limited means of expression
    - They fall further and further behind their peers
    - They may become frustrated or develop learned passivity
  - It is often difficult to gauge their abilities given their limited communication
    - Parents and professionals may have lower expectations
      - The children may receive reduced language input
      - They may have limited access to learning experiences

AAC

- AAC involves the use of strategies & techniques to enhance communication
  - when speech is inadequate to meet communication needs
    - temporarily or
    - permanently or
  - when individuals are at risk for significantly delayed speech development
- Augmentative and alternative communication (AAC) offers a potential means to enhance
  - Functional communication
  - Social development
  - Language development
  - Learning / cognitive development
  - Literacy development
  - Quality of life

AAC systems

- AAC systems include
  - Unaided systems that do not require external equipment
    - E.g., signs, gestures
  - Aided systems that require external aids or equipment
    - Low tech communication boards or books
    - High tech speech generating systems (SGDs)
- It is NOT a question of choosing between AAC or natural speech
  - Rather AAC is used in conjunction with intervention to maximize speech development

Goals of presentation

- Share the results of a research study that evaluated the impact of early AAC intervention on the language & communication development of young children with Down syndrome
  - Describe AAC intervention and share research results
  - Share case examples to illustrate intervention and outcomes
- Project is part of a research grant funded by the National Institute on Disability and Rehabilitation as part of the AAC-RERC II (virtual research center)

Research questions

- What are the effects of early AAC intervention on the speech, language, & communication development of young children with Down syndrome?
  - Rates of turn taking /participation
  - Modes of communication
  - Vocabulary acquisition /use
  - Mean length of utterance /message

Research design

- Initially conceptualized as short term study
  - Single subject research design
    - Multiple baseline across participants
- Opportunity to extend intervention longitudinally
  - Describe effects over time
    - Data collection extended over a period of 14-28 months

Participants

- Part of a larger research study involving children with a range of developmental disabilities who had complex communication needs
- This part of the project focused on children with Down syndrome
  - 6 children with Down syndrome
  - Ages 6 - 16 months at start of study
    - Ages 21-37 months at end of data collection
  - 2 boys and 4 girls
  - None had functional speech at baseline
    - 5 were presymbolic
    - 1 (16 months old) was minimally symbolic
      - Introduced to Baby Signs by mother at 12 months
      - <10 signs expressively

Intervention

- Scheduled for 1 hour per week
- In natural environment
  - Typically at home
- Within naturally occurring interactions
  - play & other activities of daily living
- Involved
  - parents
  - siblings

Components of the intervention

see http://aackids.psu.edu

- Intervention involved 5 components:
  - Identified meaningful contexts for communication
  - Provided effective means to communicate
  - Selected appropriate vocabulary
  - Set up environment to support communication
  - Used appropriate interaction strategies to support communication

Identified meaningful contexts for communication / interaction

- Selected contexts to promote communication based on the following criteria
  - Interactive / reciprocal
  - Sustainable over multiple turns
  - Meaningful / familiar to child
  - Motivating for the child
  - Valued by the family
  - Fun!

Examples of contexts to promote communication /interaction

- Social games
  - E.g., peek a boo, "So big"
- Singing songs (line by line)
  - E.g., Itsy bitsy spider, Wheels on the Bus, Old McDonald
- Book reading
  - Brown Bear, Who's hiding?, Baby faces
- Play activities
  - Playing telephone, cars, farm, dolls, musical instruments

Provided effective means of communication

- Children were always encouraged to use vocalizations /speech
- In addition, children were provided with AAC to augment their communication
  - Signs and gestures
  - Speech generating devices /assistive technologies
- SGDs were designed to be
  - Fun
  - Easy to learn and use

SGDs were designed to be fun

(from Light, Drager, & Nemser, 2004; Light, Page, Curran & Pitkin, 2008)

- Customized to meet child's interests & preferences
- Incorporated motivating content
  - Opportunities for social interaction, book reading, singing songs, fun interactive play activities, companionship, art, etc.
- Incorporated multiple bright colors
- Characterized systems
  - Incorporated engaging characters into symbols
- Incorporated engaging output
  - Library of sound effects
- Incorporated humor and "fun" in the designs

SGDs were designed to be easy to learn & use

- Reduced learning demands by designing more developmentally appropriate systems
- Visual scene displays used to support children's understanding & use
  - A visual scene is a picture, photograph, or virtual environment that depicts and represents an interactive situation or experience
    - Digital photos that present visual scenes of child's experiences / daily activities
  - Vocabulary /language concepts are embedded under "hot spots" in visual scenes

Potential advantages of VSDs

- VSDs represent familiar events and activities
  - replicate the contexts in which children learn language
  - maximize meaningfulness of representations
- Language concepts are presented in context
  - provide support for understanding & learning
  - support access to language via episodic memory
- VSDs preserve conceptual & visual relationships between symbols that occur in life
  - preserve the location, proportionality of concepts
- VSDs provide motivating & interesting contexts
  - stimulate interaction
- VSDs also seem to offer visual processing advantages
  - regularly process scenes visually within daily life
  - rapidly process scenes (<200 milliseconds)

Selected appropriate vocabulary

- Introduced new vocabulary regularly during meaningful play activities
  - Modeled functional use of vocabulary in context
    - speech & sign
    - speech & aided AAC
- Ensured that vocabulary was
  - Motivating and fun
  - Functional
  - Developmentally appropriate
- Encouraged language learning via AAC
  - Did not require language learning prior to AAC

Set up environment to support communication

- Ensured appropriate positioning to
  - Accommodate vision and hearing
  - Maximize motor function
  - Minimize joint attention demands
    - Hold AAC system in front of child

Used strategies to promote communication

- Provided opportunities for child to communicate during all activities
  - Opportunities to make choices, request objects/ activities, comment on play, express emotions
- Waited & allowed child time to communicate
- Modeled AAC + speech
  - Speech + signs
  - Speech + aided AAC
- Responded to the child's attempts to communicate

Results
Rates of turn taking

- All children participated minimally in interactions at baseline prior to intervention
- All demonstrated significant increases in their rates of turn taking after introduction of AAC
  - Rates of turn taking varied across children
- All children sustained interactions with others for significantly longer after AAC intervention
  - Many more opportunities to learn language and other skills

Results
Modes of communication

- The children had limited means to communicate at baseline
- During intervention, the children used multiple means of communication
  - Used aided AAC immediately upon introduction
    - At the start of intervention, relied heavily on aided AAC / assistive technology to participate
    - Aided AAC systems imposed minimal motor /linguistic demands; offered visual supports for communication; were engaging and fun
  - As the children developed motor /language skills, they used signs /gestures as well as aided AAC
    - Emergence around 9-15 months
  - All children began to use speech as they were able
    - Emergence around 13-19 months

Results
Modes of communication

- The children relied on multiple modes to communicate
  - Access to aided & unaided AAC provided the children with the means to actively participate in social interactions and learn language before they were able to use speech
    - They were ready to communicate before they were able to talk
  - Use of AAC did NOT inhibit speech development
    - The children acquired their first spoken words earlier
    - The children relied increasingly on speech over time

Results
Vocabulary acquisition and use

- The children expressed few concepts at baseline
  - They had minimal means to express themselves
- New vocabulary was regularly introduced and modeled for the children
  - Speech + aided AAC
  - Speech + sign
- During intervention, the children rapidly acquired "first words" via AAC
  - Acquired first words via AAC well before they had first spoken words
- All demonstrated significant growth in their expression of concepts after introduction of AAC

Results
Complexity of messages

- Over time, all of the children learned to combine concepts to express more complex meanings
  - Children began using 2 word messages between 18-27 months
    - Continued to rely heavily on single word messages
  - Gains in length of message were not as strong as pragmatic & semantic gains

Results
Range of interactions

- All children learned to participate in a range of interactions
  - Social routines
  - Play activities
  - Educational activities
  - Not just expression of needs and wants
- The children used AAC
  - With parents and teachers
    - To make requests, share information, learn new concepts, ask questions, play, etc.
  - With other children as contexts/shared activities to support social interaction
    - Shared books, singing, play activities
  - By themselves for play and learning

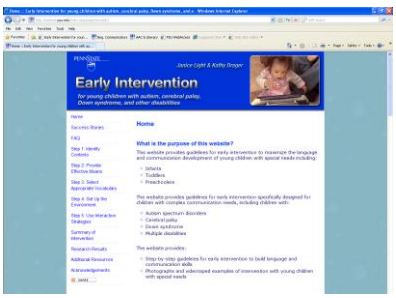
Conclusions

- Early AAC intervention did NOT inhibit speech development in young children with Down syndrome
- Early AAC intervention offered the means to jumpstart language and communication development with young children with Down syndrome
  - Increased rates of participation /turn taking
  - Enhanced semantic development
    - Acquisition of first words / range of vocabulary concepts
  - Provided access to new learning
    - Early preschool concepts – colors, numbers, literacy
  - Facilitated social interaction with adults and peers
  - Provided lots of fun!

The art and the science of AAC intervention

- Effective early intervention for children with Down syndrome requires:
  - Science
    - Implementation of evidence-based intervention procedures
    - Monitoring of effectiveness
    - Evaluation of outcomes
  - Art
    - the belief and the commitment to the right of all individuals to express themselves fully and seek their full potential

Early intervention for young children with autism, cerebral palsy, Down syndrome & other disabilities
Website at http://aackids.psu.edu



Resources

- Website
  - http://aackids.psu.edu
- Webcast
  - www.aac-rerc.com
  - Select webcasts from menu
    - Select "AAC interventions to maximize language development for young children" (Janice Light)
- References
  - Visit http://aackids.psu.edu
    - Select "Additional resources" from menu for a downloadable list of references

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The Penn State Team

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