Critical Review: Does Baby Sign Language have a Positive Affect on the Language Development of Typically Developing, Hearing Infants of Hearing Parents?

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This critical review examines the effects that introducing sign language to typically developing, hearing infants under the age of 36 months with hearing parents has on language development. Study designs include: systematic review, prospective cohort, and case study. Overall, research to date has failed to support claims that signing with typically developing hearing infants with hearing parents facilitates language development.

Introduction

All parents want what is best for their child. Products and ideas that claim to advance children's development leave parents wondering whether they or not they are doing enough for their child. One such idea, baby sign language, is quickly growing in popularity in the media, on the internet and in the clinical setting. Some hearing parents worry that introducing sign language will hinder their hearing child from developing spoken English. Conversely, another group of hearing parents are becoming increasingly interested in using different techniques, such as introducing signs in addition to modeling spoken English to advance their hearing child's language development. Many internet sites readily available to computer-savvy parents boast a long list of benefits including: reducing tears, tantrums, & frustration, allowing babies to share their worlds, strengthening the parent-infant bond, making learning to talk easier and stimulating intellectual development (Acredolo & Goodwyn, 2006). Online shopping has made it easier than ever to access baby sign language products, leaving parents with the product and many questions.

Questions such as: "Should parents be encouraged to teach their hearing infants to communicate using signs? Does signing in infancy advance child behaviour and development as claimed by many commercially available products for parents?" (Johnston, Durieux-Smith & Bloom, 2005, p.235). The growing popularity of introducing sign language to typically developing hearing children and the concerns of both eager and hesitant parents make it important for Speech-Language Pathologists to know if there is evidence to support introducing baby sign language to typically developing hearing infants with hearing parents and what affects it has on language development.

Objectives

The primary objective of this review is to critically evaluate the existing literature regarding the impact of baby sign language on language development of typically developing hearing infants with hearing parents. The secondary objective is to propose evidence-based practice recommendations integrating the results into clinical practice. Finally, recommendations will be given as to how to improve the quality of articles dealing with this topic.

Methods

Search Strategy

Information and references were gathered using a variety of databases, search engines and internet sites. Databases used include: PubMed, PsycInfo, JSTOR, ERIC, and Medline. Keywords used include: baby sign, symbolic gesturing, sign language, typically developing, hearing children and language development. Articles were also located using the references of reputable articles. The Google Scholar search engine was used to find articles that were not available on the University of Western Ontario's library databases by entering the article title or author name. Finally, the following internet sites were visited: www.signingbaby.com, www.babysigns.com, www.babybumblebee.com and www.sign2me.com. These websites were found using the Google search engine, from references in articles, and from word of mouth from clinical educators. These websites were reviewed for background information, proposed benefits being advertised to the general public and product information.

Selection Criteria

Articles selected for this critical review were required to include typically developing hearing children under the age of 36 months with hearing parents. Any articles that focused on hearing

children of deaf parents, atypically developing hearing children, or children with hearing impairments were not included.

Data Collection

Results of the literature search found the following types of articles which met the previously mentioned selection criteria: one case study (Holmes & Holmes, 1980), one prospective cohort study (Goodwyn, Acredolo & Brown, 2000) and one systematic review (Johnston et al, 2005).

Results

Holmes and Holmes' (1980) case study examined a typically developing, hearing male infant of two hearing parents who were deaf educators and fluent in Siglish (American Sign Language [ASL] that use English syntax patterns). This infant was exposed to simultaneous spoken and signed English from birth from his parents. He was also exposed to two deaf adults and numerous non-signing adults.

Holmes & Holmes (1980) chose to do a between group comparison, comparing their subject's results to those found in Nelson's (1973) group of typically developing hearing infants who received language input exclusively through the auditory modality. Holmes and Holmes' (1980) subject acquired his first ten words (signed and spoken) 3.1 months earlier than the mean of Nelson's group. Looking at spoken words only, Holmes and Holmes' (1980) subject acquired his first ten spoken words 2.1 months earlier than the mean of Nelson's (1973) group. He also acquired his first fifty words (signed and spoken) 8.1months earlier than the mean of the males in Nelson's (1973) study (Holmes & Holmes, 1980). It is important to note however that two children in Nelson's (1973) study also acquired fifty words by fourteen months (Holmes & Holmes, 1980). Looking again just at spoken words, Holmes and Holmes' (1980) subject acquired fifty spoken words 3.6 months earlier than the mean of the comparison group. Holmes and Holmes' (1980) subject started using two-word combinations between 14.2 and 16.1 months of age whereas none of Nelson's subjects had begun combining words by 19.6 months of age. However, because the infant's parents are proficient professionals in the field of deaf education and because the infant interacted frequently with two deaf adults, the results of this case study are not easily generalized.

Although Holmes and Holmes (1980) concluded that the subject had accelerated language acquisition compared with the norms, there were no statistical analyses done to prove whether or not their results were significant. Demographic variables, such as socio-economic status, education levels or occupations of the parents that were reported in Nelson's (1973) study were not provided in Holmes and Holmes' (1980) article. No attempt to identify or isolate possible confounding variables was made when interpreting Holmes and Holmes' results or when comparing the two groups. Nelson's (1973) attempt to isolate variables that may have had an effect on early language acquisition was described including variables found to effect the rate of language development (number of adults who interacted with the child and sibling constellation), along with variables found not to have an effect (educational background of the parents and number of children in the family) (Holmes & Holmes, 1980). Holmes & Holmes (1980) made no attempt to examine or control these variables in their study. The number of adults the infant interacted with was not stated so there is no way to conclude that the addition of Siglish is the reason for any or all of the reported early language development. Additionally, although Nelson (1973) stated that parental education did not have an effect, perhaps knowledge of language acquisition and language stimulation techniques (which may accompany being a professional in deaf education) could also have accounted for perceived benefits in Holmes & Holmes (1980). The fact that the parents are educators of the deaf mean that the results of this study cannot be generalized to the general public, making it difficult to draw conclusions and find any relevant clinical applications.

Goodwyn, Acredolo and Brown (2000) set out to evaluate whether encouraging typically developing hearing infants to use sign language would have any effect on verbal language development. They conducted a prospective longitudinal study that began when infants were 11 months old and evaluated them using a variety of language measures at 15, 19, 24, 30 and 36 months. One-hundred and three infants were included in the study and infants were allocated to one of three groups: sign training (ST), verbal training (VT) or non-intervention control (NC) (Goodwyn et al, 2000). A between group design was used to determine if there were group differences in language development.

Baseline measures, including the MacArthur Communicative Development Inventory (CDI) and a fifteen-minute language sample were taken before the study began to determine if there were any differences between groups (Goodwyn et al, 2000). Although Goodwyn et al (2000) reported that there were no significant differences found between the

groups on any measure, no statistical data was provided to back up this statement.

Goodwyn et al (2000) included the VT group to control for potential training effects. They wanted to eliminate the possibility that any advanced language development seen in the ST group was not attributed to having parents being "trained" in any sort of language stimulation. When Goodwyn et al (2000) found that the VT group did not outperform the NC group (who received no language training) on any measure they concluded that the improvements made by the ST group were not simply due to parents having language stimulation "training".

To determine whether gains in receptive language had been made the ST group and NC group were compared on a composite receptive language score combining all receptive measure scores across the span of the study (Goodwyn et al, 2000). Statistically significant differences were found only at 19 months on the Sequenced Inventory of Communicative Development (SICD) ($p=.01$) and at 24 months on the Receptive One-Word Picture Vocabulary Test (ROWPVT) ($p=.04$) (Goodwyn et al, 2000). However, despite this relatively small window of advanced language for the ST group, Goodwyn et al (2000) inappropriately concluded that sign language "fosters rather than hinders the development of language comprehension skills, especially during the second year."

Z-scores for each expressive language measure were averaged to determine composite expressive language scores (Goodwyn et al, 2000). Results favouring the ST group were found using MANOVA analyses at 15 and 24 months with $p < .01$ and $p < .009$ respectively (Goodwyn et al, 2000). Statistically significant group differences were not found for any of the remaining ages.

Using the language samples gathered at 24 months and using one-way ANOVA's Goodwyn et al (2000) concluded that the Mean Length of Utterances (MLU) for the ST group were significantly ahead of the NC group ($p<.04$). Goodwyn et al (2000) again concluded that sign language facilitates longer MLU's, despite having only performed analyses at 24 months.

Goodwyn et al (2000) stated that their evidence "strongly support[s] the hypothesis that symbolic gesturing facilitates the early stages of verbal language development." However, statistically significant results were only found at 19 and 24 months for receptive language and only at 15 and 24 months for expressive language. Numerous methodological flaws such as participation selection bias, group allocation bias, experimenter bias and extraneous variables make it difficult to agree with their bold conclusions.

Other confounding variables such as parental education level, or number of adults interacting with each child were not taken into account.

Johnston et al (2005) conducted a systematic review to answer the following questions: "1.Do baby signing programs work? 2. Are these programs effective in advancing expressive and receptive language, parent-child interaction and infant cognition as claimed? 3. Can and should parents be encouraged to teach their hearing infants to communicate using gestural signs?"

Results specific to the seventeen articles reviewed were presented in a clear, logical fashion which explained flaws in the articles' designs. However, only the weaknesses of the articles were discussed with no mention of any strengths.

Johnston et al's (2005) systematic review included potential confounding variables often not mentioned in the studies they reviewed such as joint-attention, and parental scaffolding which are also known to advance language development (DeLuzio & Girolametto, 2006). A particularly strong addition, Johnston et al (2005) went one step further and offered suggestions as to why using baby sign could cause harm including stressing and making parents feel guilty because they are not meeting the recommendations of infants specialists, and pointing out that training the infant to communicate prematurely could have a negative impact on important routes and patterns of development that are developing for other skills.

Although statistical analyses were not reported because the "features of studies varied so significantly or were so under-reported that the studies could not be reasonably or confidently compared or summarized", Johnston et al's (2005) systematic review shed important light on the immense weaknesses in methodology found in the research dealing with sign language and typically developing hearing infants (Johnston et al, 2005, p.243). Their conclusions have important implications to clinical practice as they questioned the use of signs in typically developing hearing children. "Why should language development require intervention in the absence of identified developmental perturbations such as hearing loss or language delay?" (Johnston et al, 2005, p.245).

Johnston et al's (2005) systematic review failed to support claims that early exposure to sign language advances children's development due to insufficiencies in scientific methods and to equivocal results.

Conclusions

It appears that the literature available on baby sign language with typically developing hearing children under the age of 36 months with hearing parents is still in its early stages. Based on this literature, and its inconsistent results, parents should neither be encouraged nor discouraged from introducing symbolic gestures to their infants.

Parents who were not already considering using sign language should not be encouraged to start based on the lack of evidence to show that there is any advancement in language development as a result. Articles that claim benefit are flagged with methodological weaknesses. Johnston et al's (2005) systematic review was unable to confidently compare or summarize studies included in the review because of poor scientific methods. Their review failed to support claims that signing facilitates language development in typically developing hearing infants.

However, it may also be stated that based on available literature parents who have independently decided they would like to introduce signs to their infant should not be discouraged from doing so. Although there is no well designed research to prove the direct benefits of baby sign language on language development, and although some have suggested that the stress of teaching sign language to an infant can be overwhelming and therefore harmful, there is also no evidence at this time to support that introducing sign language has any negative effects. The increased interaction time, bonding, eye contact and joint attention inherent in teaching an infant sign language has been proven to have some benefits on language development (Johnston et al, 2005; DeLuzio & Girolametto, 2006). Therefore, until research exists that proves introducing sign language to this population will cause harm, if a parent has already decided they would like to try baby sign language, research is not at a point to discourage them from doing so. Interested families that are seeking information from professionals should be provided with a brief overview on the research to date before they decide whether or not they wish to proceed.

Recommendations for Future Research

Well-designed studies need to be carried out to examine the effects of baby sign language on language development in typically developing hearing infants of hearing parents. Some positive findings have been found, however their methodological flaws make it impossible to draw any clinically relevant conclusions from them.

Goodwyn et al's (2000) large sample size, two control groups and prospective longitudinal design are an ideal place to start. However, procedures for selecting participants as well as group allocation procedures need to be done randomly and documented within the report. Other confounding variables such as parental education and knowledge of language acquisition, number of adults each child interacts with and joint-attention need to be controlled in the future.

References

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