Critical Review: What Presenting Speech and Language Characteristics of Late Talkers Distinguish Those Who Recover from Those Who Do Not?

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This critical review examines what presenting speech and language characteristics of late talkers distinguish those who recover from those who do not. One systematic review, one randomized controlled trial and eight cohort studies are reviewed. Overall, research suggests that children may be more at risk for persistent difficulties if they have lower scores in expressive language, receptive language, symbolic gesture use and functional communic-ation. However, models of prediction are far from perfect and the decision of whether or not to provide treatment is still largely based on speech-language pathologists' informal clinical judgments. Clinical implications for decisions regarding early intervention are discussed.

Introduction

Speech-language pathologists working in preschool settings frequently receive referrals for children under the age of three who are experiencing significant delays in the development of language skills relative to their same-age peers. These children are commonly referred to as late-talkers. Studies have estimated that of the 10% of toddlers who exhibit a delay in language acquisition, approximately 55-60% will "catch up" and exhibit age appropriate language skills by the time they enter Kindergarten (Dale, Price, Bishop, & Plomin, 2003; Thal & Tobias, 1992). Although this is encouraging, it also means that somewhere between 40-45% of these children will continue to have significant language difficulties. It is generally accepted that there are substantial benefits to providing early language intervention in the preschool period (Olswang, Rodriguez, and Timler, 1998). However, it is also generally accepted that speech-language pathologists must strive to attain the most efficient use of resources and that interventions should result in changes that would otherwise not occur on their own.

Objective

The purpose of this paper is to critically review the existing late talker literature on presenting speech and language characteristics that predict the outcome of language delay. In doing so, clinicians can make informed decisions regarding which children are most likely to catch up to their peers and in contrast, which children are most likely to have a persistent language delay or disorder and following from this distinction, make the appropriate recommendations for therapy.

Methods

Search Strategy:
Relevant articles were found by searching computerized databases, including ProQuest, Medline and PscyhINFO. A variety of different search strategies were employed using the key terms: (late talker), (language delay), (outcome), and (natural history). The search was limited to articles written in English between 1990 and 2008.

In addition, other applicable studies were obtained from the reference lists of previously searched articles.

Selection Criteria:
Studies selected for inclusion in this review were required to: 1) report on the natural history or outcome of language delay one or more years after intake; and 2) examine variations in presenting speech and language characteristics of late talkers who "recovered" compared to late talkers whose language difficulties persisted.

Articles that compared speech and language characteristics and outcomes of children with a history of language delay to children with normal language development and did not complete a within-group analysis of late talkers were deemed not relevant to this research question. In addition, articles that focused only on predictor variables other than speech and language characteristics, such as gender, socioeconomic status, family history, maternal characteristics, or history of middle ear infections were considered to be beyond the scope of this paper.

Data Collection:
Results of the literature search yielded 12 articles that met the selection criteria stated above. Study types included one systematic review, one randomized clinical trial and ten cohort studies. Upon further analysis, two of the cohort studies were excluded from the review because of small sample sizes (less than 5 late talkers).

Two of the cohort studies identified above were completed by Thal and colleagues using the same sample of children but different measures (Thal et al., 1992; and Thal, Tobias & Morrison, 1991). Similarly, four of the cohort studies identified above were completed by

Rescorla and colleagues using the same sample of children but taking outcome measurements at different ages (Rescorla, 2005; Rescorla, Mazik & Singh, 2000; Rescorla, Roberts & Dahlsgaard, 1997; and Rescorla & Schwartz, 1990).

Results

Dale, Price, Bishop and Plomin (2003) examined the possibility of predicting which two year olds with language delay would continue to have language impairments at three and four years of age. Using data from a sample of 8686 twin children who met the inclusion criteria, they identified 802 children who had expressive language delays at age two. Measurements included parent reports of: vocabulary, grammar, displaced reference skills, and nonverbal abilities. Logistic regression analyses were completed to predict outcomes at three and four years of age and found that although there were statistically significant differences in all measurements between transient and persistent cases, the effect sizes were not very large (n^2 values ranged from 0.000 to 0.062). The regression model only demonstrated a sensitivity of 51.5%. In other words, using this model of prediction which took into account age two vocabulary, grammar, displaced reference skills and nonverbal abilities, half of the children who would continue to have language difficulties were not identified.

Law, Boyle, Harris, Harknes and Nye (2000) completed a large systematic review on speech and language delay which included analysis of the existing literature on the natural history of this population. They found that children with both expressive and receptive language delays (6 studies) were more likely to have persistent difficulties compared to children with only expressive language delays (5 studies) - 75.6% compared to 40% respectively.

The Portland Language Development Project by Paul (2000) tracked 36 children who had expressive language delays between the ages of 20 and 36 months, aiming to identify variables that could predict outcome. At the time of intake, the following skills were assessed: nonverbal cognition, adaptive behaviour, phonological production, expressive vocabulary, and maladaptive behaviour. Children were categorized based on outcome measures in second grade as either having a history of expressive language delay or having chronic expressive language delay. Stepwise linear discriminant analyses using the 0.1 level of significance identified socioeconomic status, Vineland Adaptive Behaviour Scale (VABS) expressive score, and VABS gross motor score as being significant predictors of outcome in second grade. Using these measures for prediction yielded excellent sensitivity (96.2%) and specificity (90%). Receptive language, phonological skills, nonverbal cognitive skills, and amount of maladaptive behaviour did not assist in predicting long-term outcomes.

Rescorla and colleagues completed a longitudinal cohort study on late talkers and comparison children who were followed from age two to age 13 (Rescorla, 2005; Rescorla, Mazik & Singh, 2000; Rescorla, Roberts & Dahlsgaard, 1997; and Rescorla & Schwartz, 1990). The late talkers in this sample consisted of children who were identified between the ages of 24 and 31 months as having normal IQ, normal receptive language, and a delay in expressive language of at least 6 months. Results from studies on these children that are relevant to this review are described below.

Recorla, Roberts, and Dahlsgaard (1997) and Rescorla and Schwartz (1990) examined whether outcome at age three could be predicted from assessment data that was collected for 34 late talkers at intake (24-31 months). Multiple regression analyses found that the degree of delay in expressive language skill at intake, as measured by the Reynell Expressive Language Scale, explained 21-34% of the variance in outcome measures. In addition, age of intake was negatively correlated with outcome, however it was no longer a significant predictor once the variance due to expressive language delay was accounted for. In other words, if two late talkers presented with the same expressive language skills at intake, the older child would be more likely to have persistent difficulties; this is not necessarily due to his/her age, but rather due to the fact that he/she is more delayed relative to age expectations. The regression analyses found that receptive language skills and nonverbal cognitive abilities at intake were not significant predictors of language outcome at age three. This finding was not unexpected given that selection criteria for the participants included average receptive language and nonverbal IQ abilities.

Rescorla, Mazik and Singh (2000) further analyzed age three outcomes of 28 late talkers and 25 comparison children from this population by looking at vocabulary acquisition patterns from age 2;0 to 2;6. The Language Development Survey (LDS), a checklist completed by parents, was used to measure vocabulary. By analyzing the vocabulary growth curves, it was apparent that children could be divided into two groups: those who had a reported vocabulary of 100 words or more at age 2;6, and those who did not. These two groups significantly differed on all expressive language outcome measures with children who were still very delayed in vocabulary (had less than 100 words) at 2;6 being most likely to have persistent language difficulties at age 3;0. LDS vocabulary score at age 2;6 was significantly correlated with all outcome measures that were administered at age 3 (Reynell Expressive Language Scale, Expressive One Word Picture Vocabulary Test (EOWPVT), Mean Length of Utterance (MLU), and Index of Productive Syntax (IPSyn)).

Finally, Rescorla (2005) published an article outlining the age 13 outcomes of these children, including the variance that could be accounted for by age two predictors. Hierarchical regression analyses found that LDS vocabulary score at age two was a significant predictor of age 13 scores, explaining some of the variance in vocabulary (14%), grammar (13%), verbal memory (21%) and reading comprehension (14%). In agreement with Recorla, Roberts, and Dahlsgaard (1997) and Rescorla and Schwartz (1990), receptive language and nonverbal ability did not explain any of the variance in age 13 outcomes. However, as mentioned previously, all children in this study had average receptive language and nonverbal IQ scores at intake.

Of all the articles reviewed for this paper, Roulstone, Peters, Glogowska and Enderby (2003) were the only researchers to control for the effects of intervention in their effort to examine outcomes of language delay. In their randomized clinical trial, data was collected at intake and at a 12 month follow up session on 69 late talkers who were randomly assigned to a "therapy later" group. Logistic regression analyses were conducted for 11 predictor variables, including: auditory comprehension, expressive language, phonology errors, VABS socialization score, stage of play rating, Therapy Outcome Measures (TOM) impairment rating, TOM disability rating, assigned stratum (general language, expressive language only, or phonology), reported language stage, family history and mothers education. At the 5% level of significance, the only predictor that was statistically significant was the TOM disability rating; children with lower disability ratings at intake were more likely to recover from their language delay. This measure is a clinician rating of the child's functional communication and takes many aspects of a child's difficulties into account. In addition, they found that late talkers in the general language stratum (receptive and expressive delays) were less likely to catch up than children in the expressive language only or phonology strata (recovery rates of 19%, 29% and 58% respectively).

Thal and Tobias (1992) and Thal, Tobias and Morrison (1991) examined early predictors of persistent language difficulties in 10 late talkers between the ages of 18 and 28 months who were matched to both an age matched group and a language matched group of normally developing children. The participants were followed for one year.

Thal, Tobias and Morrison (1991) found that vocabulary and MLU did not predict language status at the one year follow up. However, randomization tests showed that children who remained delayed (the "truly delayed late talkers", n = 4) had significantly lower scores on intake measures of language comprehension and use of symbolic gestures than did children who caught up (the "late bloomers", n = 6).

Thal and Tobias (1992) found that late bloomers had produced significantly more communicative gestures at intake than truly delayed late talkers. Interestingly, the Mann Whitney U test showed that the late bloomers had also produced significantly more gestures than the age matched and language matched controls, where as the truly delayed late talkers did not significantly differ from the controls on this measure. These results led the researchers to suggest that late talkers who recover use communicative gestures to compensate for their lack of speech and late talkers who remain delayed do not.

Summary of Findings

Receptive Language:
Three studies in this critical review concluded that lower receptive language scores increased the risk that a preschooler with an expressive language delay would have persistent language difficulties (Law et al., 2000; Roulstone et al., 2003; and Thal et al., 1991). However, the Portland Language Development Study by Paul (2000) disputed this finding and stated that receptive language was not a significant predictor of outcome. Recorla et al. (1997) and Rescorla et al. (1990) also stated that receptive language abilities were not significant predictors of outcome, however the intake criteria for these studies required children to have average abilities in this domain.

Expressive Language:
Articles by Paul and Rescorla found that expressive language abilities could be used to predict long-term outcomes (Paul, 2000; Recorla et al., 1997; Rescorla et al., 1990; Rescorla et al., 2000; and Rescorla, 2005). However, Thal et al. (1991) concluded that vocabulary and MLU did not predict outcome and Dale et al. (2003) found that their regression model, which included parent reports of vocabulary and grammar, could not accurately predict which children would remain delayed.

Other:
Thal et al. (1991) identified children who had persistent delays as having lower scores on the use of symbolic gestures and in accordance with this finding Thal et al. (1992) concluded that children who caught up in language skills produced significantly more communicative gestures at intake than truly delayed late talkers. Supporting these studies, Roulstone et al. (2003) found that the only statistically significant predictor of language outcome was the TOM disability rating which is an overall rating of functional communication skills.

In addition, phonological skills, maladaptive behaviour and nonverbal cognitive abilities were not significant

predictors of outcome of language delay (Paul, 2000; Dale et al., 2003; and Roulstone et al., 2003)

Discussion

Considering the significant variety in the methodologies of the studies included in this critical review, it is not surprising that the results are quite variable. Factors such as the age of intake, age of follow up, intake criteria, assessment tools, and outcome measures make the task of direct comparison of these studies and generalization of findings difficult.

Many studies used follow up data that was taken one year after intake or at age three. One migh question if this is even a valuable measure - is this a long enough time period to allow late talkers to catch up? In addition, if they have caught up to their peers, do they continue to perform at age level expectations after school entry? Rescorla (2005) views language delay as being on a continuum of impairment. She proposes that late talkers who catch up and children with persistent specific language impairment (SLI) are not from two distinct categories but rather are from two different ends of the spectrum. This theory is supported by her finding that at age 13 late talkers show a weakness in language skills when compared to their peers who developed language normally, despite being within normal limits on many outcome measures.

It seems apparent that theoretical issues surrounding the etiology and prognosis of language delay need to be resolved before we can clearly understand predictor variables of long-term impairment (Olswang, Rodriguez and Timler, 1998). As mentioned above Rescorla (2005) proposes a general weakness in language skills that varies in severity. Paul (2000) on the other hand proposes a general lag in neurological development that affects a variety of areas. This is supported by her finding that a significant predictor of long-term outcome was the VABS gross motor score (Paul, 2000).

A strong confounding variable present in these articles is the influence of language intervention on outcome. The majority of studies did not identify the presence or absence of treatment for language delay. It can be assumed that some children in these cohorts received intervention, likely those with the most severe expressive language delays. This unaccounted for variable may have changed language outcomes for some children, possibly making some predictors of persistent delay less poignant. Roulstone et al. (2003) were the only researchers to control for the effects of intervention by looking at subjects who were randomly assigned to a “therapy later” group.

Finally, the outcome of these studies can be significantly influenced by the measurements that are used to: 1) classify children as being language delayed; and 2) determine whether or not the children have caught up. To determine who was delayed, some studies used standardized assessments, others used more informal clinical judgments and others used only parent report. The outcome measures used also differed significantly across studies. Rescorla et al. (1997) demonstrated the significance of choice of outcome measure by reporting that in their sample, the percentage of late talkers who later performed within the average range ranged from 58-79% on lexical measures and from 24-35% on syntactic measures.

Conclusion and Clinical Implications

In conclusion, this critical review highlights the fact that currently speech-language pathologists do not have enough information to predict with high sensitivity and specificity if a late talker will catch up or will continue to have language difficulties (Kelly, 1998; and Roulstone et al., 2003). Despite this negative outlook, sufficient research is available that enables clinicians to use evidence based practice to make decisions about when to recommend early intervention.

Olswang et al. (1998), Thal and Katich (1996), and Whitehurst and Fischel (1994) propose using models of prediction that look at the presence or absence of positive predictors of change and/or risk factors for chronic impairment. Based on the studies included in this review, a late talker may be more at risk for persistent difficulties if he or she: demonstrates delayed receptive language; has a more severe delay in expressive language; does not use age appropriate symbolic gestures; and has low scores on measures of functional communication. Even with this information, a perfect model of prediction does not yet exist. For example, a delay in receptive language does not always mean that a child will display persistent language difficulties and likewise, normal receptive language does not always mean that a child with an expressive language delay will recover. In the article by Roulstone et al. (2003), 19% of children with a receptive delay recovered and only 29% of children with only expressive delays recovered (i.e., 70% of children with normal receptive language remained delayed). Similarly, despite being a significant predictor of outcome, the degree of expressive language impairment of children in the study by Rescorla et al. (1997) only explained 21-34% of the variance in outcome. Thal et al. (1992) identified that there are currently no established norms or standardized assessments for determining if gesture production is within normal limits. Overall, speech-language pathologists are still required to rely largely on their subjective clinical judgments to make decisions about which children are likely to catch up and which children will benefit from early intervention.

Rescorla et al. (1997) suggest that clinicians should have increasing concern for late talkers as they reach the 30

month point and continue to have limited expressive speech. This is consistent with Rescorla et al. (2000) who found that children who were still very delayed in vocabulary at 30 months were most likely to have persistent difficulties. Similarly, Paul (1996) recommends a "watch and see" approach to intervention. Therefore, future research in this area that would assist clinicians in making decisions regarding treatment should include examining the effects of waiting to provide intervention.

This review did not examine the predictive value of variables other than presenting speech and language characteristics, such as socioeconomic status (SES). Most of the studies included used participants from middle to upper class families. It seemed to be generally agreed on by the authors of studies in this review that children from families with lower SES were more at risk for persistent difficulties. Further research in this area is warranted.

Finally, studies that aim to replicate the findings mentioned in this paper, while also reporting the type and amount of treatment that participants received would give clinicians more confidence in their ability to use these variables to make informed clinical decisions regarding when to recommend early language intervention.

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