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Evidence from systematic review indicates that parents can learn to implement naturalistic interventions leading to improved language skills in their children with disabilities<sup>1</sup>

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- (1) What parent-implemented naturalistic language intervention approaches have been reported in the literature?
- (2) What are the attributes of study participants in these studies?
- (3) What are the characteristics of parent training programs?
- (4) What is the methodological quality of the studies?

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(5) What outcomes have been observed for parent and child participants with respect to skill acquisition, generalization, and maintenance?

## METHODS

**Design:** Systematic review.

**Data sources:** The following electronic databases were used to identify studies:

PsycINFO, Education full-text, Academic Search Premier, Cumulative Index to Nursing and Allied Health (CINAHL), Linguistics and Language Behavior Abstract, Education Resource Information Center (ERIC), Psychology and Behavioral Sciences, and Web of Science. The following search terms (including use of Boolean operators and truncation) were used in combinations not specified by the authors: parent, mother, father, implement\*, intervention, child\*, disabil\*, impairment, retardation, delay, communication, language, social, and naturalistic. The authors also conducted an ancestral hand search of the reference lists of articles that met the review inclusion criteria and a name search (using the same electronic databases) of an unspecified number of authors whose studies were identified in the review.

**Study selection and assessment:** To be included in the review, studies had to (a) be published in English in peer-reviewed journals, (b) involve an experimental study design focused on training parents to implement a naturalistic language intervention, (c) employ a single case experimental research (SCED) design, (d) present data on parent-implementation as well as child outcomes, and (e) include at least one child participant with identified disabilities aged 60 months or younger. No date limits were applied regarding study publication, nor was the date on which the searches were conducted by the authors provided. Due to the focus on naturalistic interventions, the authors noted that

studies conducted in clinical settings were only included if the intervention was delivered during developmentally-appropriate, play-based settings. The authors outlined reasons for excluding studies consistent with stated eligibility criteria, but no log of excluded studies was provided. Inter-rater agreement (IOA) for the screening phase was 100%, based on agreement between two independent coders for one third of all abstracts.

The following data were extracted from included articles: (a) child and parent participant attributes including gender, age, disability, and race/ethnicity; (b) methodological characteristics including study design, nature of the intervention, and geographical location in which the study occurred; (c) attributes of the parent training program including strategies used, dosage, and fidelity data; and (d) child and family outcomes including measures of assessor reliability. In addition, coders evaluated the methodological quality of each included study using the 11-point Single-Case Experimental Design (SCED) Scale (Tate et al., 2008). IOA for quality appraisal was 95% (range 82-100%). The number of points (out of 11) awarded to each study was converted to a percentage, prior to receiving a methodological quality classification of *poor* (0-24%), *fair* (25-49%), *good* (50-74%), or *strong* (75-100%).

**Outcomes:** Parent implementation outcomes were acquisition skills for implementing the naturalistic language intervention, generalization of these skills to other settings, and maintenance of skills over time. Child learning outcomes focused on the extent to which the parent's implementation of naturalistic language intervention led to the children's acquisition, generalization, and maintenance of language skills. Coders' judgements regarding outcomes were based on their own visual analysis of the data presented in each study as well as information reported by the original study authors. IOA between the two

independent coders was calculated for all studies that met the inclusion criteria, yielding 96% (range 94-100%) for data extraction.

## MAIN RESULTS

Fifteen studies met the inclusion criteria, spanning publication years 1992 to 2010, and featured 6 different naturalistic interventions: milieu teaching, pivotal response training, enhanced milieu teaching, blended communication and behavior support intervention, functional communication training, and naturalistic language paradigm. A total of 70 children (55 male, 15 female) received intervention across the 15 studies, and were variously described as having expressive language delays ( $n = 41$  children), receptive language delays ( $n = 35$ ), general language delay ( $n = 12$ ), language comprehension delay ( $n = 5$ ), and communication delay ( $n = 3$ ). The sample included children described as having autism spectrum disorder (ASD), language impairments, Down syndrome, spastic quadriplegia, pervasive developmental disorder, developmental disability, cerebral palsy, and Asperger syndrome, and included also one child without an identified disability who reportedly had a 7-month expressive-receptive language delay.

A total of 74 'parents' (64 mothers, 9 fathers, and 1 grandmother) were taught to administer the naturalistic interventions. Parents ranged in age from 20 to 48 years in the five studies in which this was reported, and varied also in socioeconomic status and level of education. In the two studies in which parent ethnicity was reported, 4 participants were Caucasian and 4 were African-American. A total of 17 trainers (predominantly higher degree research students with a minimum bachelor's degree) taught parents to administer the interventions.

The characteristics of the parent training programs varied considerably across studies, with the strategies used to train parents including verbal or graphical performance feedback, handouts or manuals, verbal presentations, video examples, modeling, role play, discussion and problem solving, demonstration with another child, and coaching parents as they delivered the intervention. Where reported, the frequency and duration of parent training was highly variable and included, for example, a total of 6 hours in one study (Coolican, Smith, & Bryson, 2010), 5 hours of training over 5 days (25 hours) for parents in another study (Koegel, Symon, & Koegel, 2002), and weekly feedback for parents on their delivery of intervention (Tait, Sigafos, Woodyatt, O'Reilly, & Lancioni, 2004). Some studies involved training parents to a specific criterion for mastery, requiring between 17-86 sessions of between 30-60 min duration (i.e., up to 86 hours) (Alpert & Kaiser, 1992; Delaney & Kaiser, 2001; Hancock, Kaiser, & Delaney, 2002; Hemmeter & Kaiser, 1994; Kaiser, Hancock, & Hester, 1998; Kaiser, Hancock, & Nietfeld, 2000). Interventions were delivered in family homes, clinics, child care centers, and early intervention centers. In the majority of studies ( $n = 11$ ), intervention was implemented during play activities, with a smaller number of studies featuring implementation during other activities and family routines. Only one study (Delaney & Kaiser, 2001) reported parent training fidelity data.

The mean methodological quality score across studies, assessed using the SCED Scale (Tate et al., 2008), was 76% (range 59-91%). Fifty-three percent of studies did not receive points for generalization, 80% did not meet requirements for independent assessors, and 93% did not include statistical analyses. Reliability data relating to the coding of parent behaviours was provided in 12 of 15 studies, with IOA scores ranging

from 0-100%. IOA for coding of child behaviours was reported in 14 of 15 studies and ranged from 33-100%.

In terms of parents' outcomes, all 74 parent participants applied the interventions during interactions with their children, following training. Generalization data were reported in 8 of the 15 studies, with parents demonstrating the use of intervention strategies across two or more settings (e.g., clinic and home). Maintenance data were reported for 40 parents across six studies, indicating that all parents maintained their use of learned strategies in follow-up sessions, conducted between 1 month and 12 months post-intervention. Regarding child outcomes, 66 of the 70 children reportedly increased their production of targeted language behaviours following the naturalistic interventions, while 3 children who received milieu teaching and 1 child who received pivotal response training did not improve. Evidence for a generalization effect was provided for 27 of 34 children across 8 studies, while evidence for maintenance was presented for all 25 children across 5 studies in which such data were reported.

#### **AUTHORS' CONCLUSIONS**

The authors concluded that parents of children with disabilities can be taught to implement naturalistic language interventions with their young children and that their implementation of such led to improvements in their children's language skills. The authors also concluded that parents were able to generalize and maintain their use of naturalistic intervention strategies, while their children generalized and maintained changes in their language skills. Nevertheless, the authors noted that the studies included small sample sizes and called for improvement in the quality and reporting of future studies to address limitations in the studies reviewed. These limitations included (a)

heterogeneity in the skills and needs of child participants, (b) the need to increase the proportion of male trainers and parents as intervention agents, (c) a lack of detailed reporting of parent participant demographic characteristics including factors that may influence uptake and outcomes (e.g., SES status, educational level), (d) inadequate description of training methods to allow for replication, (e) lack of data concerning treatment fidelity (for both therapists training parents and parents implementing techniques with their children), (f) the need to examine the application of parent-mediated naturalistic strategies within daily routines rather than as distinct play activities, and (g) the need for consistent evaluation and reporting of generalization and maintenance data.

**Commentary**

The rationale for using parent-mediated interventions is now well established, acknowledging that parents are usually children's first language teachers (Roberts & Kaiser, 2011) and are attuned to their children's individual motivations, learning strengths, and areas of need (Tamis-LeMonda, Bornstein, & Baumwell, 2001). The findings of this review suggest that parents can also be effective agents of naturalistic intervention delivery to their children with disabilities. The findings are consistent with those of Roberts and Kaiser (2011) who examined the effects of parent-mediated naturalistic interventions for children with language impairments more broadly (including children with autism) using a systematic review of group-based intervention studies with meta-analysis.

There are several reasons to have confidence in the findings of the current review – in addition to the fact that the conclusion converges with that of Roberts and Kaiser

(2011) – based on the methodological strengths of the review process. These strengths include the establishment of focused research questions; a comprehensive search strategy without date limits; confirmation of good inter-rater agreement for study screening, data extraction, and quality ratings; and the inclusion of the SCED scale measure of study quality (Schlosser, Wendt, & Sigafoos, 2007). Confidence in the relevance of the findings to clinical practice is enhanced by the focus on naturalistic interventions which are already recommended for use by speech-language pathologists and educators to support the language development of children with, or at risk for, language disorders (Paul & Norbury, 2012).

However, the review also features several limitations that should be considered when interpreting the findings. The inclusion of studies based on children having an ‘identified disability’ means that the participant pool is highly heterogeneous. Whilst the positive findings imply the generalized applicability of parent-mediated naturalistic interventions to a broad clinical caseload, the total sum of evidence for these interventions for children in any one specific disability population is reduced. In some cases, the phenotypic overlap between diagnostic labels means that the differences between participant groups (e.g., children described as having ‘pervasive developmental disorder’ and those described as having ‘ASD’) are likely to be minimal, implying that the results are likely to be relevant to both populations. However, in other cases, the contrast in learning strengths and needs of children across studies is likely to be more substantive, and may limit the relevance of findings based on one population (e.g., children with primarily physical disabilities, including spastic quadriplegia and cerebral



palsy in the current review) to others (e.g., children with ASD or pervasive developmental disabilities).

The authors suggested that the review "...may help practitioners working with young children with disabilities and their parents to identify characteristics of effective naturalistic language interventions and to determine attributes of successful training programs for parents" (p. 37). While the review provides a descriptive summary of the characteristics of each program (e.g., strategies employed, dosage, context), this information alone is insufficient to enable readers to determine which attributes, of the many presented across interventions, are associated with successful outcomes. For example, parent training dosage varied from 6 to 86 hours. It is not clear what minimum number of hours of training is required in order to achieve an effect, both within and across interventions, and thus the extent to which interventions are likely to be cost-effective and/or feasible in clinical settings. Similarly, it is not clear what factors may have been associated with variability in IOA for coding of outcome measures, which ranged from 33-100% for child behaviors and 0-100% for parent behaviors across studies.

A central consideration of any intervention must be the generalization and maintenance of skills acquired through the intervention. The review authors summarize data from the 15 studies on generalization and maintenance, noting that only 52% of studies reported on generalization and 40% on maintenance of parents' skills acquired in the training programs. Similarly, only 52% of studies reported on generalization and 33% on maintenance of the children's targeted language skills. These measures of generalization and maintenance were collected between one and twelve months after

completion of intervention. While most parents were able to maintain and generalize the skills learned, it appears 20% of children were not able to generalize newly learned skills to contexts beyond the initial setting. Consequently, when designing and implementing parent-mediated interventions, clinicians should consider including explicit strategies (e.g., practice across multiple contexts and communication partners) to promote generalization and maintenance (see Schlosser & Lee, 2000).

Finally, when interpreting the findings of the review, consideration should also be given to the fact that the evaluation of intervention outcomes was limited to the authors' visual analysis of the data presented in each study and the original study authors' reporting of the findings. Although there is no consensus on any single best approach, a variety of statistical methods are now available that are suitable for use in the meta-analyses of single-subject experimental designs (e.g., Parker, Hagan-Burke, & Vannest, 2007; Parker, Vanmest, & Brown, 2009; Schlosser, Lee, & Wendt, 2008; Wilson, 2011) and have been applied in the disability field (Ganz et al., 2012; Schlosser & Lee, 2000). In the absence of such a meta-analysis, readers should consider returning to the original studies reported in this review in order to form their own view regarding the strength, consistency (within and across studies), and clinical significance of intervention effects.

In sum, the findings of the review support the notion that parents of children with some types of disabilities can learn to apply naturalistic teaching methods and that doing so can lead to improvements in their children's language skills. The reporting of positive findings across studies involving heterogeneous groups of children, albeit with small samples, suggests that this approach may be suitable for children presenting with a variety of communication needs. However, the current lack of information regarding the

optimum design, components, and implementation of parent-training programs due to variability across studies, combined with the individual variability evident in the results for individual parents and children, points to the need for careful monitoring and data-driven decision making when attempting to implement such interventions in clinical contexts.

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