Effectiveness of a parent-implemented language intervention for late-to-talk children: A real-world retrospective clinical chart review

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Abstract

Background: Previous research has examined the impact of early language interventions on the linguistic skills of late-to-talk children. However, we have little understanding of how such interventions impact communicative participation (i.e., the ability to communicate in real-world contexts) or what factors influence individual response to these interventions. **Aims:** (1) To evaluate the effectiveness of *Target Word*TM – *The Hanen Program*® for Parents of Children Who are Late Talkers, for improving the communicative participation skills of children who are late-to-talk. (2) To explore predictors of *Target Word* participation-based outcomes. **Methods & Procedures:** We conducted a retrospective clinical chart review for 76 families who participated in the *Target Word* program at a publicly-funded clinic. Families completed the *Focus on the Outcomes of Communication Under Six (FOCUS)* and *MacArthur-Bates Communicative Development Inventories* at three time points: pre-intervention, post-intervention, and after a 3-month consolidation period. Regression analysis explored the relation between children's communicative participation outcomes and potential predictors of change identified by 26 *Target Word* certified speech and language therapists/pathologists. **Outcomes & Results:** At the end of intervention, 75% of children had made a clinically significant change on the FOCUS. Clinicians proposed verbal imitation, language development stagnation, and parent interaction style as the top predictors of communicative participation outcomes. Of these, only verbal imitation pre-intervention predicted communicative participation change following the *Target Word* program. **Conclusions & Implications:** The *Target Word* program can facilitate the development communicative participation skills in late-to-talk children. Modifications to the intervention may be needed in order to maximize outcomes for children with limited verbal imitation.

What this paper adds*What is already known on the subject*

Previous studies explored language-related outcomes of late-talkers after intervention, but their real-world communication and participation outcomes are unknown. We also lack knowledge about the specific child/family-related characteristics that may predict children's responsiveness to intervention.

What this paper adds to existing knowledge

Our retrospective review of clinic charts found that three-quarters of late-talkers who participated in the Hanen *Target Word* program, a parent-implemented language intervention, made significant improvement in real-world communication and participation. Late-talkers with verbal imitation concerns did not benefit as much from the intervention.

What are the potential or actual clinical implications of this work?

The *Target Word* program is an effective intervention for late-talkers in real-world clinical settings. Speech and language therapists should closely monitor the progress of late-talkers with limited verbal imitation during the intervention.

Introduction

Two essential guiding principles for early language interventions include the provision of family-centered services, and supporting children's development in their natural environments (American Speech-Language-Hearing Association 2008). Family-centered services are provided when speech and language therapists/pathologists (SLTs) recognize that the family is the expert on their child and work to include the family in all aspects of assessment and intervention services (Paul and Roth 2011). One way SLTs support children's development in naturalistic environments is by providing consultation and coaching to parents and caregivers. This approach supports families in creating language rich home environments that can facilitate children's development (Odom and Wolery, 2003, Wesley and Buysse, 2004, Woods et al. 2011).

Parent-implemented language intervention embedded in the natural environment has theoretical support. A major benefit of supporting children in their natural, everyday interactions with parents is proposed to be that it maximizes opportunities for learning and generalization of skills (Roper and Dunst 2003). Family involvement is also thought to ensure that the benefits from intervention continue beyond the period of intervention (White et al. 1992).

Despite its theoretical grounding, to date, randomized controlled trials have been inconsistent in their support for the effectiveness of parent-implemented interventions for late-to-talk children. Some trials found parent-implemented interventions significantly improved children's expressive vocabulary and grammar skills compared to a waitlist control group (e.g. Buschmann et al. 2009, Girolametto et al. 1996a), while others found no differences in expressive language/vocabulary for children on a waitlist versus those receiving parent-implemented intervention (e.g. Girolametto et al. 1996b, Wake et al. 2011). While these studies investigated linguistic outcomes following parent-implemented intervention, it remains unclear

whether parent-implemented interventions impact the everyday lives of children who are late-to-talk.

In order to understand the true impact of parent-implemented interventions, we need to evaluate children's participation-based outcomes. These have only recently begun to be explored and reported in the literature (Thomas-Stonell et al. 2010). *Participation*, as defined by the World Health Organization's (WHO) International Classification of Functioning, Disability and Health – Child and Youth (ICF-CY) framework, relates to a child's involvement in a life situation (World Health Organisation 2001). In the context of preschool language interventions, *Participation* refers to a child's ability to use newly developed language skills to communicate in everyday life-situations such as their home, preschool, or community (Eadie et al. 2006).

Until recently, a barrier to studying children's communicative participation outcomes after language interventions was the lack of a valid and reliable measurement tool (Eadie et al. 2006, Yorkston et al. 2008, Washington et al. 2015). The *Focus on the Outcomes of Communication Under Six (FOCUS)* was created in response to this need (Thomas-Stonell et al. 2010). Developed based on the ICF-CY framework, and with input from SLTs and parents, the FOCUS measures changes in communicative participation skills for children receiving speech-language intervention services (Thomas-Stonell et al. 2009). It has good test-retest reliability, content validity, and construct validity, and provides an ecologically-sound cut-off score for interpreting the changes that occur from pre- to post-intervention (Thomas-Stonell et al. 2013). Specifically, a clinically meaningful change is said to have occurred if a child gains 16 or more points on the FOCUS between assessments. A change of 10-15 points suggest a possible clinically meaningful change, and a change of 9 points or less is not likely to be clinically meaningful (Thomas-Stonell et al. 2013). With the introduction of the FOCUS, it has become possible to explore whether and

how parent-implemented interventions for children who are late-to-talk improve children's communicative participation skills.

In addition to exploring the impact of this type of intervention on children's communicative participation skills, it is important to identify clinically-significant predictors of participation-based outcomes. Previous work on late-to-talk children explored predictors of change in children's linguistic (Bishop and Edmundson, 1987, Rescorla et al. 1997, Thal and Bates, 1997, Olswang et al. 1998, Fisher, 2017) and social communication skills (Chiat and Roy, 2008). For example, researchers identified expressive vocabulary and the ability to retell a story during the preschool years as predictors of later expressive language skills (Bishop and Edmundson, 1987, Dale et al. 2003, Rescorla 2011). It is not yet known which factors predict children's communicative participation outcomes following intervention. This knowledge would allow SLTs to better tailor interventions to meet the needs of each child and family (e.g., to determine which child may need closer monitoring or additional supports to ensure optimal participation-based intervention outcomes).

Only a handful of studies to date have identified predictors of communicative participation outcomes related to intervention. The first found that children who participated in intervention had greater gains in communicative participation skills than children who did not, and that those who spent more time in intervention had greater gains than those who spent less time, but more specific predictors of outcome were not available (Cunningham et al. 2018). The second study identified social skills, the presence of a comorbid mobility impairment, and active intervention status (as opposed to being on a waitlist for service) as significant predictors of communicative participation outcomes, but again, more specific predictors of outcome were not available (Washington et al. 2015).

Yoder and Compton (2004) provide a theoretical discussion on identifying predictors of treatment response. More specifically, they argue that predictors of intervention outcomes are frequently, if not always, specific to the intervention of interest, as the predictors should be related to the theoretical knowledge of the reasons thought to underlie treatment effects. We further argue that researchers should consult clinicians and consider clinical experience, empirical data, and theory when selecting predictors of intervention outcome, as these aspects of knowledge are the foundations of evidence-based practice (Sackett et al. 1996; Rycroft-Malone et al. 2009).

The inconsistent support for the effectiveness of parent-implemented language interventions, along with our lack of understanding of the real-world impact of these interventions, motivated the current study. The primary objective of this study was to evaluate to the effectiveness of a parent-implemented language intervention, the *Target Word™ – The Hanen Program® for Parents of Children Who are Late Talkers* for improving the communicative participation skills of preschoolers who were late-to-talk. The secondary objective was to identify predictors of children's communicative participation outcomes following intervention.

Methods

Participants

With approval from the university Research Ethics Board (108040), a retrospective clinical chart review was conducted for children whose parents participated in the *Target Word™ – The Hanen Program® for Parents of Children Who are Late Talkers* through a publicly-funded clinic in London, Ontario between January, 2015 to April, 2017. A total of 76 children (51 boys, 25 girls)

participated in the program. The average age of participants at the start of the intervention was 1.92 years ($SD = 0.29$). All children enrolled in the *Target Word* program were assessed by a SLT and met the following inclusion criteria:

- The child spoke fewer than 24 words at 18-20 months OR fewer than 40 words at 21-24 months OR fewer than 100 words at 24-30 months OR had no two-word combination at 24 months,
- The child had typically-developing receptive language skills OR a mild receptive language delay, and
- The child had two or more risk factors for developmental language disorder (e.g., family history of speech/language/learning disorders, limited speech sounds)

Measurement Tools

The *McArthur-Bates Communicative Development Inventories (CDI) - Words and Gestures* (Fenson et al. 2007) is a parent-report checklist that evaluates children's expressive and receptive vocabulary knowledge, as well as their use of communicative and symbolic gestures.

The FOCUS is a 50-item parent report tool that measures real-world communicative participation changes during speech-language interventions. Although an updated FOCUS form with 34 items is also available, it was not used during the time of our retrospective review. The FOCUS also includes profile scores that are categorized as *capacity/activity* (further subdivided into speech, expressive language, pragmatics, and receptive language) and *performance/participation* (further subdivided into intelligibility, expressive language, social/play, independence, and coping strategies/emotion). Profile scores for capacity/activity reflect the child's ability to execute a specific task or action in a standard environment like a

therapy room, or at home when provided with cueing and supports from parents (Thomas-Stonell et al. 2012). Profile scores for performance/participation reflect how children use their communication in everyday environments such as the home or preschool (Thomas-Stonell et al. 2012). These profile scores correspond to the *Activity* and *Participation* components of the ICF-CY, respectively (Thomas-Stonell et al. 2012).

The *Communication Function Classification System (CFCS)* was originally developed for use with children with cerebral palsy (Hidecker et al. 2011), but has recently been validated for use with preschoolers with a range of speech and language impairments other than cerebral palsy (Hidecker et al. 2017). SLTs classified children's communication skills into one of following five levels of function using the CFCS (Hidecker et al. 2011):

- Level I: effective sender and receiver with unfamiliar and familiar partners,
- Level II: effective but slower-paced sender and/or receiver with unfamiliar and familiar partners,
- Level III: effective sender and effective receiver with familiar partners,
- Level IV: inconsistent sender and/or receiver with familiar partners, and
- Level V: seldom effective sender and receiver with familiar partners.

Outcome Predictors Clinician Survey

An online survey was conducted to explore SLTs' perceptions of clinically meaningful predictors of change in the *Target Word* program. The survey contained two demographic questions: SLTs' years of experience running the *Target Word* program, and the frequency with which they ran the program. From a list of 37 possible predictors, SLTs were also asked to identify and rank the five predictors they felt most influenced children's communicative

participation outcomes following the *Target Word* program. The list of possible predictors was generated from reviewing the data collection forms and clinician's handbook (i.e., Leader's Guide) from the *Target Word* program (See Appendix for a list of factors included in the survey).

Procedure

Target Word Intervention

During the *Target Word* program, parents/caregivers attended four to five group training sessions with a Hanen *Target Word* certified SLT (Earle and Lowry, 2011; Earle, 2015). During the parent group sessions (2.5-3 hours each), SLTs discussed and demonstrated language stimulation strategies with parents. Language stimulation strategies taught included: let your child lead, expand your child's message, highlight words and add gestures, and create language learning opportunities (Earle and Lowry, 2011). Videotapes and role-playing activities were often used to illustrate those strategies. Parents were encouraged to practice the strategies with their child at home between training sessions. Each parent was provided with a *Target Word* parent handbook to facilitate learning.

In addition to group training sessions, parents/caregivers and children participated in three individual sessions with the SLT (one initial consultation session and two video feedback sessions). The initial consultation session took place at the start of the program. During this appointment, the SLT and family agreed on the child's intervention goal, which can include: increasing vocalizations during communication turns (noisy), increasing the child's ability to spontaneously copy single words (imitation), increasing the child's ability to produce single words spontaneously (single word), and increasing the child's use of word combinations either

spontaneously or in imitation (combination) (Earle and Lowry, 2011). Through interview with parents, the SLT also completed a detailed checklist of risk factors concerning the child in the *Target Word* program (see Appendix). Video feedback sessions took place between group training sessions. During the individual video feedback sessions (1 hour each), parents/caregivers demonstrated their use of the language facilitation strategies they had learned during the group sessions and practiced with their child at home. Individual sessions were videotaped and reviewed with parents/caregivers. First parents were asked to comment on their use of the strategies, then the SLT provided specific feedback about strategy use.

After the final group training session, parents were given a period of 12-18 weeks to consolidate the skills learned in the *Target Word* program. This means that parents were instructed to continue to practice the strategies they had learned with their child at home, but they did not have regular visits with the SLT. A follow-up session took place at the end of the consolidation period, where the child's skills were re-assessed to determine next steps.

Parents were asked to complete both the CDI and FOCUS at three assessment points: the initial consultation session (pre-intervention, up to 4 weeks prior to the first parent session), the final group training session (post-intervention, 9 weeks after the first parent session), and at the consolidation follow-up appointment (18-24 weeks after the first parent training session). The SLT classified the child's communicative function using the CFCS at each of the three time points.

During our retrospective chart review, the Fourth edition of the *Target Word* program was launched, so data from both the Third and Fourth editions of the program are included in our analyses. The respective timelines of both editions of the program are illustrated in Figure 1. The main difference between the editions is that parents who participated in the Fourth edition had

five group training sessions whereas those who participated in the Third edition only had four. In both programs, parents had the same number of one-on-one sessions with the SLT (Earle and Lowry, 2011; Earle, 2015). Of the 76 clinical charts reviewed, 57 families participated in the Third edition of the program and 19 families participated in the Fourth edition. Children who participated in the Third and Fourth editions did not differ in child-specific characteristics at pre-intervention (gender, age, goals for the program, FOCUS score, expressive and receptive vocabularies on the CDI) or post-intervention outcomes (i.e., changes in FOCUS score, changes in number of words understood/produced on the CDI). Additionally, after comparing the Third and Fourth editions of the program, we were confident that the majority of language facilitation strategies parents learned were the same. Therefore, we elected to combine the data for the children and families who participated in both editions of *Target Word*.

< insert Figure 1 here >

Chart review

A Hanen-certified SLT provided a list that contained the names and birth years for every child who participated in the *Target Word* program at a publicly-funded clinic in London, Ontario between January, 2015 to April, 2017. The clinical charts of these children were located. From the clinical charts, the following information was extracted into a secured, de-identified spreadsheet: child age, child sex, risk factors (from the checklist in the *Target Word* program), parent attendance and punctuality during the program, CFCS classification, FOCUS score, and CDI vocabulary counts.

Clinician survey to identify predictors

To recruit clinicians who were delivering the *Target Word* programs, a link to an online survey was distributed to the coordinators at 31 publicly-funded Ontario Speech and Language Program centers where the *Target Word* Program is run. The coordinators further distributed the survey link to clinicians at each center. Twenty-six SLTs anonymously completed the online survey.

Statistical Analyses

Change scores for pre- to post-intervention, and pre-intervention to consolidation follow-up were calculated for the number of word understood/produced on the CDI, and FOCUS Total scores. Repeated measures ANOVA was then used to determine whether changes across the three assessment points were statistically significant. Post-hoc pairwise t-tests were conducted to determine where significant differences existed. For changes in FOCUS Total score, we also further characterised the change score into (a) minimally clinically important difference, (b) possibly a meaningful clinical change, and (c) not likely a meaningful clinical change according to the FOCUS interpretation guidelines (Thomas-Stonell et al. 2013). The subscale scores of the FOCUS were analysed using repeated measure ANOVA to determine whether changes in children occurred in specific ICF domains (i.e., *Participation* versus *Activity*). Changes in children's CFCS classifications were also examined for the above-mentioned periods. As CFCS levels are ordinal, the non-parametric Friedman test and Wilcoxon signed-rank tests were used. Changes in the FOCUS scores and CFCS levels between post-intervention and follow-up were calculated to evaluate maintenance of the treatment effect during the consolidation period.

We also conducted paired t-test to investigate the difference in CDI scores from pre-to-post intervention (no CDI scores were available at the follow-up session). This analysis allowed us to

investigate whether children as a group made statistically significant changes in vocabulary skills. The CDI - Words and Gestures has norms for children up to 18 months of age, but most of the children enrolled in this study were older than this. Therefore, since no age-appropriate normative information was available for us to determine the confidence intervals around individual children's CDI scores, we were unable to further determine if significant changes occurred at an individual level (e.g., using non-overlapping 90% confidence intervals of the pre- and post-intervention CDI scores) or to comment on whether the magnitude of change on the CDI scores were within the limits of the standard error of measurement of the tool (i.e. resulted from measurement errors rather than meaningful change).

Hierarchical regression analyses were conducted to identify significant predictors of children's communicative participation outcomes. Predictors identified by clinicians from the online survey were entered into the regression by ranking to predict FOCUS change scores immediate after the program (i.e., pre-to-post intervention) and at the consolidation follow-up session (i.e., pre-intervention to follow-up).

Results

Participants' age, sex, FOCUS Total Score, FOCUS Profile scores, CDI scores, and CFCS levels at pre-intervention, post-intervention, and follow-up are presented in Table 1.

< insert Table 1 here >

Participant Characteristics Pre-intervention

Seventy-six parents/caregivers participated in the *Target Word* program during this retrospective study. On average, parents began the program when their child was 1.92 years old. The most common intervention goals were imitation ($n=23$), single words ($n=21$), and word combinations

($n=18$). Two children had noisy as their therapy goal. We were unable to identify the goals from the charts of 12 children.

At pre-intervention, children scored an average of 144 points on the *FOCUS* ($n=58$), and could on average understand 217 words and speak 49 words according to parent report on the CDI ($n=66$). As previously mentioned, because the CDI – Words and Gestures was normed for children younger than those in our sample, no norms were available to determine whether individual children's scores were age-appropriate. However, we did count the number of children in our sample who scored below the 15th percentile for an 18-month-old child. For all of the children with pre-intervention CDI data, 56% ($n=37$) had an expressive vocabulary score below the 15th percentile for an 18-month-old on the CDI.

Missing Data

Of the 76 clinical charts reviewed, 38 clinical charts had complete pre- and post-intervention FOCUS data and 49 charts had complete pre- and post-intervention CDI forms. Due to the amount of missing data, we compared child characteristics at pre-intervention to ensure there were no differences between the children for whom we had complete versus incomplete data. At pre-intervention, there were no differences between these two groups on sex, age, goal in the *Target Word* program, Total FOCUS score, or expressive and receptive vocabularies on the CDI (see Table 2).

< insert Table 2 here >

Communicative Participation Outcomes

A repeated measures ANOVA revealed that children's FOCUS Total scores increased significantly across the three assessment points ($F(2,44) = 31.22, p < 0.000, \eta^2_{\text{partial}} = 0.587$). Post-hoc pairwise comparison (with Bonferroni correction, $\alpha = 0.05/3$) revealed that there was a significant increase in FOCUS scores between pre-intervention and post-intervention ($t(22) = -6.792, p = 0.000$), and between pre-intervention and follow-up ($t(22) = -6.43, p = 0.000$), but no significant difference between post-intervention and follow-up, ($t(22) = -2.39, p = 0.026$).

Using the recommended interpretation of change score on the *FOCUS*, we also identified the number of children who met the minimally clinically significant change criterion in their communicative participation skills (i.e., 16 points). Three-quarters of children made clinically significant improvements on the FOCUS from pre- to post-intervention and from pre-intervention to the follow-up session. For the 26 children for whom we have follow-up data, 43% made further minimally clinically significant change (i.e., gained at least 16 points more during consolidation), while 48% did not make additional gains during the consolidation period (see Table 3 and Figure 2). To better understand how children changed in their communicative participation skills, we grouped FOCUS change scores into four profiles (see Figure 3):

- Profile 1: Child gained at least 16 points in FOCUS Total score from pre- to post-intervention, but lost at least 16 points between post-intervention and follow-up ($n=5$)
- Profile 2: Child gained at least 16 points in FOCUS Total score from pre- to post-intervention and maintained this gain between post-intervention and follow-up ($n=6$)
- Profile 3: Child made no gains between pre- and post-intervention but gained at least 16 FOCUS Total score points between post-intervention and follow-up ($n=2$)

- Profile 4: Child gained at least 16 points in FOCUS Total score from pre- to post-intervention and again between post-intervention to follow-up ($n=10$)

< insert Table 3, Figure 2 here >

A within-subjects repeated measures ANOVA (2 assessment times x 9 FOCUS subscale scores) was conducted to explore how the FOCUS profile scores contributed to FOCUS change scores. There was a significant interaction between assessment points (pre and post) and FOCUS profile scores ($F(1, 5.69) = 4.40$, $p \leq 0.001$; Greenhouse-Geisser adjusted). Post-hoc pairwise comparisons (with Bonferroni adjustment, $\alpha = 0.05/9$) revealed significant improvements in all but one of the FOCUS profile scores from pre- to post-intervention, $p \leq 0.001$, and $p = 0.02$ for the receptive language subscale.

Expressive and Receptive Vocabulary Outcomes

On average, children could produce an average of 55 more words and gained an understanding of 53 more words on the CDI between the pre- and post-intervention assessments. These changes were statistically significant, $t(48) = -7.10$, $p < 0.001$ and $t(48) = -9.95$, $p < 0.001$, respectively. Data were not available for the CDI at the follow-up assessment. Since the majority of children were over 18 months of age when they began the *Target Word* program, we are unable to report whether skills were at, below, or above age expectations in terms of their expressive and receptive vocabulary, or whether the changes in scores were clinically meaningful.

Changes in Levels of Communicative Function

Significant changes in CFCS levels were found during the *Target Word* Program, $\chi^2(2) = 12.05$, $p = 0.002$. Post-hoc Wilcoxon signed-rank tests revealed a significant reduction in CFCS level

(i.e., improvement in communication effectiveness) from pre-intervention to post-intervention ($Z = -3.317, p = 0.001$) and from pre-intervention to follow-up ($Z = -3.659, p < 0.001$), but not from post-intervention to follow-up ($Z = -2.311, p = 0.021$, Bonferroni adjusted $\alpha = 0.05/3$).

Predictors of Outcome from Clinician Survey

Twenty-six *Target Word* certified SLTs responded to the online survey. On average, respondents had 5.8 years of experience delivering the *Target Word* program ($SD = 4.3$ years, range: 1-18 years). The frequency with which clinicians offered the *Target Word* program varied from once every two years to 5 times a year. The three most commonly selected risk factors were “not imitating verbal models” (selected by $n=17$ SLTs), “parent interaction style” ($n=12$), and “language stagnation to date” ($n=11$). These predictors were entered into a hierarchical regression analysis starting with the most frequently identified predictor. None of these risk factors were significant predictors of FOCUS change scores between pre- and post-intervention, $F(3,33) = 0.362, p = 0.781$. For FOCUS change scores between pre-intervention and follow-up, verbal imitation risk alone was not a significant predictor. However, when the variance contributed by parent interaction style was controlled for (i.e., in step 2 of the regression), verbal imitation risk was a significant predictor of FOCUS change scores, $F(2, 30) = 3.715, p = 0.036$. Children who had limited verbal limitation at the beginning of the *Target Word* intervention made fewer gains on the FOCUS from pre-intervention to follow-up. Data from the regression analyses are summarized in Table 4. Our regression did not violate the assumption of circularity ($VIFs \geq 1.007$).

< insert Table 4 here >

Discussion

The primary objective of this study was to provide an ecologically-valid evaluation of a parent-implemented language intervention for children who are late-to-talk. We conducted a retrospective clinical chart review of 76 children whose parents/caregivers participated in the *Target Word* program in a publicly funded, community clinic. Three-quarters of children showed clinically significant gains in their communicative participation skills (reflected by FOCUS score) and statistically significant gains in expressive and receptive vocabularies (reflected by CDI scores) immediately following the 10-week program. The majority of these children maintained their communicative participation gains during a three-month consolidation period in which they were not in regular contact with the SLT. Clinicians' CFCS classifications corroborated the findings from parent-report FOCUS and CDI scores. Clinicians classified children as improving in their levels of communicative function following the intervention. Our data suggest that the *Target Word* program is an effective intervention for improving preschoolers' communicative participation skills.

As a group, children made significant gains in their communicative participation skills and function (reflected by both FOCUS score and CFCS levels) during the time in which parents/caregivers were actively participating in the *Target Word* program. Children did not make statistically significant changes during the consolidation period. It may be tempting to conclude that the consolidation period is not particularly effective. However, a more detailed exploration of the individual profiles of children's FOCUS change scores revealed four patterns of response to intervention. Our exploratory analysis revealed that 43% (10 of 23) of children made clinically significant gains on the FOCUS during both the active intervention period and again during the consolidation period. In contrast, a smaller group of children made clinically

significant gains during the active intervention period only, and regressed during the consolidation period (5 of 23). This individual profile analysis shows that the consolidation period may be effective for some children, but not others. Our ability to further understand what child and family characteristics may predict these outcome profiles was limited by our sample size, but the predictors of communicative participation outcomes identified in this study provide a fruitful start for future research.

The secondary objective of this study was to identify predictors of communicative participation outcomes. *Target Word*-certified SLTs identified “not imitating verbal models,” “parent interaction style,” and “language stagnation to date” as the most likely pre-intervention predictors of children’s outcomes in the intervention. Those factors did not predict change in communicative participation skills immediately following intervention, but verbal imitation risk was a significant predictor of communicative participation outcomes at follow-up when the variance contributed by parent interaction style was controlled. Children identified as at risk due to limited verbal imitation made fewer gains in communicative participation skills. One interpretation of this finding is that limited verbal imitation was an indicator of other developmental issues such as oral motor impairment or autism spectrum disorder. Another possible interpretation is that a child’s ability to imitate is a foundational skill that is necessary before language stimulation strategies taught to parents during the *Target Word* program can be effective. In both cases, a restricted ability to imitate may limit the benefits children derive from the *Target Word* program, suggesting that clinicians should closely monitor children presenting with verbal imitation risk to ensure the effectiveness of the intervention provided. It is important to note that verbal imitation risk alone was not a significant predictor of communicative participation outcome, but became a significant predictor when parent interaction style was

controlled in the regression analysis. This suggests that parent interaction style likely is an important consideration when predicting children's outcomes in intervention, but our small sample size may have limited our ability to detect it as a predictor. We encourage future studies to continue to consider the role of parent interaction style as a predictor of intervention outcomes.

A major contribution of the current study is our effort to ensure that our findings reflect day-to-day clinical practice so as to maximize the external validity of our findings. Through retrospective clinical chart review, we have addressed two specific gaps in the literature regarding effectiveness of parent-implemented intervention. First, as pointed out by Roberts and Kaiser (2011) in their recent meta-analysis, the majority of the current intervention studies lack external validity given that families who volunteered to participate in research studies rarely reflected the diversity of families seen as part of routine care. Participants in our study were drawn from all the families who participated in the *Target Word* program in a publicly funded, community clinic, and thus, by default provided us a representative sample to make conclusions about the real-world *effectiveness* of the program (i.e. as opposed to *efficacy*, where interventions were provided in a controlled environment). Second, as a field, we have only just begun to explore the real-world communicative participation outcomes of children following language intervention. The findings from this study inform the effectiveness of a parent-implemented intervention on the real-world outcomes of late-to-talk children. Additionally, two predictors identified by practicing *Target Word* certified SLTs, namely verbal imitation risk and parent interaction style, were found to play an important role in children's communicative participation outcomes after the program, underscoring the value of bringing the expertise of front-line clinicians into the research process (Crooke and Olswang, 2015).

Limitations

The changes found in the FOCUS (i.e. communicative participation outcomes), CDI scores, and CFCS levels should be interpreted with some caution. Due to the retrospective nature of this study, we did not have a control group to whom we could compare changes in the FOCUS and CDI scores. This means it is possible that the changes observed on FOCUS and CDI were the result of maturation instead of intervention. However, based on the results of an earlier study, we do not believe this is the case. Thomas-Stonell et al. (2013) found that children on a waitlist for speech and language services (with an average wait time of two months) had a mean FOCUS Total score change of 5.87, which was significantly lower than the suggested cut-off of 16 points for change to be considered clinically significant. Given this work, it seems unlikely that children who made 16 points or more of change on the FOCUS in the current study did so as a consequence of maturation alone.

Another limitation of this study is that a fairly large portion of the data were missing from the clinical charts. Complete pre- to post-intervention data were not available for half of the 76 families who participated in the *Target Word* program. We compared child-specific characteristics at pre-intervention and can report that the children for whom we had complete data were not different from those with incomplete data, but there is no way for us to know whether children with and without complete data would be different post-intervention. Therefore, this study may not reflect the true effectiveness of the *Target Word* program. Our limited sample size also restricted our ability to explore more predictors of intervention outcomes from the 37 collected as part of the *Target Word* program. To avoid inflation of false positives, we only explored three predictors according to clinicians' ratings. It is possible that

other predictors identified by clinicians were significant predictors of communication participation outcomes that we were unable to investigate due to our limited sample size.

A final concern relates to our lack of information about the size of children's expressive and receptive vocabularies relative to same-age peers. Although all children who participated in the program met the pre-determined inclusion criteria (see Methods section) and were identified as late-talkers after an assessment by SLT, we do not have norm-referenced language assessment information for most children. The lack of such information prohibited us from (a) providing a baseline description of the children's language ability relative to their same-aged peers; and (b) fully understanding the clinical relevance of changes in children's vocabulary abilities.

Future Directions

There is a dearth of literature exploring parents' experiences providing early intervention for their late-to-talk children. One future direction is to explore parents' experiences in the *Target Word* program in order to understand why some children make clinically meaningful changes in their communicative participation skills while others do not. One possible barrier may be caregivers' expectations from the *Target Word* program. For example, Glogowska and Campbell (2000) found that many parents expected their SLT to provide the bulk of the therapy to their child. Other barriers may include parents' perceived self-efficacy, their perceptions of the usefulness of specific language facilitation strategies, and their ability to implement strategies at home with their child. Roulstone et al. (2015) investigated 57 parents' views on some commonly used language facilitation strategies (e.g., getting down to the child's level, waiting, etc). The research team provided parents with video demonstrations of a SLT first explaining each strategy and using it with a child. The majority of parents found the videos useful but a

small number reported that the videos were unhelpful. Some parents also reported that they were unsure if they would be able to implement the strategies and whether their child would enjoy the suggested activities.

Another future direction is to understand the effectiveness of the *Target Word* program in comparison to a control group. As discussed above, the lack of a waitlist control group in our study limited our ability to fully contextualize the changes in various outcome measures. In particular, we cannot differentiate the changes in outcomes due to intervention versus maturation. Future research using a prospective, randomized control design could address this limitation.

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Table 1

Characteristics of Children in the Target Word Program

Characteristic	Pre-intervention (<i>n</i> = 59)	Post-intervention (<i>n</i> = 38)	Follow-up (<i>n</i> = 23)
Age in years (<i>SD</i>)	1.42 (0.28)	2.11 (0.30)	2.54 (0.32)
Sex (M:F)	40:19	27:11	16:7
<i>Communication Function Classification System</i>			
Level I	0	0	1
Level II	0	0	8
Level III	6	12	2
Level IV	46	23	8
Level V	4	0	1
Missing	3	3	3
<i>FOCUS</i>			
Total score (<i>SD</i>)	144.5 (33)	182.9 (44)	207 (62)
<i>Capacity/Activities subscales</i>			
Speech	1.7 (0.8)	2.4 (1.1)	3.2 (1.6)
Expressive Language	1.5 (0.5)	2.7 (1.3)	3.6 (1.6)
Pragmatics	3.0 (1.1)	4.0 (1.1)	4.6 (1.1)
Receptive Language	4.5 (1.0)	5.0 (1.0)	5.3 (1.0)
<i>Performance/Participation subscales</i>			
Intelligibility	1.9 (0.9)	2.6 (1.2)	3.3 (1.7)
Expressive Language	1.2 (0.5)	1.8 (1.1)	2.7 (1.8)
Social	3.4 (1.0)	4.0 (1.1)	4.4 (1.3)
Independence	3.2 (1.1)	4.3 (1.2)	4.5 (1.5)
Emotion	4.1 (1.2)	4.8 (1.0)	4.8 (1.3)
<i>CDI</i>			
Number of words understood	217 (101)	279 (79)	Not available
Number of words produced	49 (51)	97 (80)	Not available

Note. *ns* are based on the availability of FOCUS data. *n*=59 completed the FOCUS at pre-intervention, *n*=38 completed FOCUS at both pre-and post-intervention, and *n*=23 completed FOCUS at pre-post and follow-up.

Table 2

Pre-intervention Characteristics of Children with and without Post-intervention Data

Characteristic	With post-intervention data (<i>n</i> = 38)	Without post-intervention data (<i>n</i> = 38)
Age in years (<i>SD</i>)	1.92 (0.29)	1.92 (0.32)
Sex (M:F)	27:11	24:14
<i>Communication Function Classification System</i>		
Level III	4	2
Level IV	29	18
Level V	3	1
Missing	2	17
<i>Goal in Target Word</i>		
Noisy	0	2
Imitation	11	12
Single Words	15	6
Word Combinations	8	10
Missing	4	8
FOCUS		
Total score (<i>SD</i>)	142 (29)	150 (37) ^a
CDI		
Number of words understood	230 (88)	202 (115) ^b
Number of words produced	49 (56)	47 (47) ^b

^a N=21^b N=30

Table 3

FOCUS Change Scores

FOCUS total score change	Pre to post intervention (<i>N</i> = 38)	Post-intervention to follow-up (<i>N</i> = 26)	Pre-intervention to follow-up (<i>N</i> = 36)
Not likely a meaningful clinical change (<9)	7 (18%)	13 (50%)	7 (19%)
Possibly a meaningful clinical change (10-15)	2 (5%)	1 (4%)	2 (6%)
Minimal clinically important difference (16+)	29 (76%)	12 (46%)	27 (75%)

Table 4

Predictor Analysis

Variables	<i>t</i>	<i>p</i>	Standardized β	<i>F</i>	<i>df</i>	R^2	ΔR^2
Pre- to post-Intervention FOCUS change							
Step 1				0.052	1,35	0.001	0.001
Verbal imitation risk	0.229	0.820	0.039				
Step 2							
Verbal imitation risk	0.053	0.958	0.009	0.550	2,34	0.031	0.030
Parental interaction risk	1.024	0.313	0.175				
Step 3				0.362	3,33	0.032	0.000
Verbal imitation risk	0.040	0.968	0.007				
Parental interaction risk	1.000	0.325	0.182				
Limited change	-0.128	0.899	-0.023				
Pre-intervention to follow-up FOCUS							
Step 1				3.466	1,31	0.101	0.101
Verbal imitation risk	-1.862	0.072	-0.317				
Step 2				3.715*	2,30	0.199	0.098
Verbal imitation risk	-2.094	0.045*	-0.344				
Parental interaction risk	1.915	0.065	0.314				
Step 3				2.664	3,29	0.216	0.018
Verbal imitation risk	-1.837	0.076	-0.312				
Parental interaction risk	1.808	0.081	0.300				
Limited change	-0.805	0.428	-0.137

Figure 1. Timeline of the *Target Word* intervention across (a) the third and (b) the fourth editions.

Figure 2. Changes in FOCUS Total score.

Figure 3. Different profiles of changes in FOCUS Total score.

Appendix

The following risk factors are collected by speech-language pathologists in the *Target Word* program (Earle and Lowry, 2011; Earle, 2015):

1. Quiet as a baby
2. Reduced quality of babbling as an infant
3. Recurrent otitis media
4. Child has active medical condition
5. Child has difficult temperament
6. Prematurity
7. Child was exposed to toxins in utero
8. Limited vocabularies, with few verbs
9. Concerns about social skills
10. Language stagnation to date
11. Reduced variety of representational gestures
12. Not imitating verbal models
13. Limited variety of consonant sounds
14. Poorly differentiated vowels
15. Continues to be quiet now
16. Mild receptive language delay
17. Delayed or restricted sequenced pretend play
18. Difficulty coordinating gesture plus verbal with communicative intent
19. Difficulties in other areas of motor development
20. Frequent preferred speech motor movements during word attempts
21. Verbal productions are variable
22. Difficulties in other areas of motor development
23. Frequent preferred speech motor movements during word attempts
24. Verbal productions are variable
25. Difficulties in other areas of motor development
26. Parental education
27. Number of children in home
28. Parental cognitive limitations
29. Parental mental health
30. Significant parental stress
31. Significant sibling concerns
32. Marital discord
33. Single parent
34. Family history of speech/language/learning difficulties
35. Parent interaction style
36. Social economic status
37. Target Word program attendance
38. Others, please specify: _____