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A three-armed randomized controlled trial of Lidcombe Program
and Westmead Program early stuttering interventions

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Abstract

Purpose: To compare two experimental Westmead Program treatments with a control Lidcombe Program treatment for early stuttering.

Method: The design was a three-arm randomized controlled trial with blinded outcome assessments 9 months post-randomization. Participants were 91 pre-school children.

Results: There was no evidence of difference in percentage syllables stuttered at 9 months among groups. Dropout rates were substantive and may have been connected with novel aspects of the trial design: the use of community clinicians, no exclusion criteria, and randomization of children younger than 3 years of age.

Conclusion: The substantive dropout rate for all three arms in this trial means that any conclusions about the 9-month stuttering outcomes must be regarded as tentative. However, continued development of the Westmead Program is warranted, and we are currently constructing an internet version.

Keywords: stuttering, pre-school, treatment

1. Introduction

1.1 *The Lidcombe Program for early stuttering*

The Lidcombe Program is an intervention for early stuttering, developed for children younger than 6 years of age. It is a behavioral treatment in which a parent presents verbal contingencies for the child's stutter-free speech, and occasionally for stuttering moments, and makes daily measures of stuttering severity. The parent carries out the treatment in the child's everyday environment with guidance at weekly visits from the speech-language pathologist (SLP). The program has also been conducted with group clinic visits and using webcam.

The Lidcombe Program evidence base includes non-randomized clinical trials (Harrison, Wilson, & Onslow, 1999; Onslow, Andrews, & Lincoln, 1994; Onslow, Costa, & Rue, 1990; Rousseau, Packman, Onslow, Harrison, & Jones, 2007; Wilson, Onslow, & Lincoln, 2004), randomized clinical trials (Arnott et al., 2014; Bridgman, Onslow, O'Brian, Jones, & Block, 2016; Jones et al., 2005; De Sonnevile-Koedoot, Stolk, Rietveld, & Franken, 2015; Lewis, Packman, Onslow, Simpson, & Jones, 2008), randomized clinical experiments (Harris, Onslow, Packman, Harrison, & Menzies, 2002; Harrison, Onslow, & Menzies, 2004; Franken, Kielstra-Van der Schalk, & Boelens, 2005), long-term clinical trial follow-ups (Jones et al., 2008; Lincoln & Onslow, 1997), and evidence of clinical translation (O'Brian et al., 2013). Meta-analysis, including randomized and non-randomized clinical evidence involving a no-treatment control group (N=134), shows a 7.5 odds ratio for attaining below 1.0 percent syllables stuttered (%SS) at 6.3 months post-randomization (Onslow, Jones, Menzies, O'Brian, & Packman, 2012). The optimal evidence base for SLPs who treat early stuttering would include randomized trials of different treatments. At present, the only randomized trial involving the Lidcombe program is the Rotterdam Evaluation Study of Stuttering Therapy (RESTART) trial (De Sonnevile-Koedoot et al., 2015). In this trial, no evidence was found for any outcome differences between the Lidcombe Program and

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122
123 the Rotterdam Evaluation Study of Stuttering Therapy-Demands and Capacities Model
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125 (RESTART-DCM) treatment.
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128 While reported outcomes for the Lidcombe Program are sound, the nature of the
129 program may not suit all families. Children need to comply with parent verbal contingencies
130 presented during practice sessions and during everyday life, and they need to comply with
131 parents prompting them to not stutter and to self-correct stuttering moments when their
132 parents ask them to. Parents need to learn accurate identification of the child's stuttering
133 moments and to monitor during each day for those stuttering moments and for periods of
134 stutter-free speech. Additionally, during the early stages of treatment, parents need to find
135 time for 10-minute dedicated periods of daily practice sessions with the child. Indeed, there is
136 evidence that the Lidcombe Program can be challenging for some families (Hayhow, 2009),
137 and families may experience a range of perceptions and emotions about it, not all of which
138 are necessarily positive (Goodhue, Onslow, Quine, O'Brian, & Hearne, 2010).
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151 *1.2 The Westmead Program*

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153 An alternative behavioral treatment has been developed for pre-schoolers: the
154 Westmead Program. Although it also is parent delivered, this program involves a completely
155 different treatment process from the Lidcombe Program. The Westmead Program
156 incorporates a well-known and simple treatment agent, namely syllable-timed speech (STS).
157 This speech pattern has a long history of use as a fluency enhancer in behavioral treatments
158 for adults who stutter (for overviews see Ingham, 1984; Packman, Onslow, & Menzies,
159 2000). Despite that, there has been little historical interest in STS as a stuttering intervention
160 for pre-schoolers, with the exception of a promising clinical experiment with three children
161 using programmed instruction (Coppola & Yairi, 1982). The Westmead Program is the first
162 use of STS in clinical trials with pre-school-age children. The parent learns to use STS during
163 weekly visits to the SLP and then prompts the child to use it in everyday speaking situations
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183 many times each day. The frequency of visits to the SLP reduces to fortnightly once the
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185 parent and child are using STS safely and correctly, as judged by the SLP. This treatment is
186
187 potentially less burdensome to parents because, unlike the Lidcombe Program, parents
188
189 provide all STS procedures during everyday conversations; there are no dedicated practice
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191 sessions each day.
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194 There are three preliminary, non-randomized, sources of support for the Westmead
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196 Program (Trajkovski, Andrews, O'Brian, Onslow, & Packman, 2006; Trajkovski et al., 2009;
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198 Trajkovski et al., 2011) Initially, Trajkovski et al. (2006) reported a case study for a 3-year-
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200 old. Independent, blinded measures showed a reduction in stuttering frequency to below 1.0
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202 percent syllables stuttered (%SS) after 7 weeks. Subsequently, Trajkovski et al. (2009)
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204 reported outcomes for an experimental multiple baseline design with three participants, again
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206 aged 3 years. Independent, blinded measures indicated that the children required a mean of
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208 six clinic visits to reach and sustain a beyond-clinic %SS below 1.0. Finally, Trajkovski et al.
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210 (2011) reported outcomes for the Westmead Program in a Phase II clinical trial involving 17
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212 participants, ages 3–5 years. Independent, blinded measures showed a mean stuttering
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214 reduction of 96% at 12 months post-treatment for the eight children who completed
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216 treatment. This large effect size was obtained with a mean of 12 clinic visits for the first stage
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218 of the program. That value is below the median number of 16 clinic visits for the Lidcombe
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220 Program (N=868) (Onslow, 2019). However, a significant issue in this study was the drop-
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222 out rate of 53%.
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225 226 *1.3 The present study* 227

228 In short, the Westmead Program shows potential as an intervention that requires less
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230 treatment time than the Lidcombe Program but has the caveat that non-randomized evidence
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232 suggests a substantive withdrawal rate. The present trial was designed to develop randomized
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234 clinical evidence by comparing the Westmead Program to a Lidcombe Program control
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group. For the trial we developed a third treatment for evaluation. That treatment comprised the Westmead Program with the addition of verbal contingencies for stutter-free speech and for stuttering, as occurs in the Lidcombe Program. In addition, contingencies are also delivered for the use of STS within the treatment process. The rationale for this derives from the Trajkovski et al. (2011) report, where we noted “that families tended to withdraw from treatment at the point when low-level stuttering severity had been attained but not stabilized. ... It may be that, for such cases, the final stages of clinical progress need to be hastened with the addition of contingencies for stuttered and stutter-free speech” (p. 507). We reasoned that engagement with the treatment might increase if that plateau of children’s responses could be overcome.

Outcome measures were made at 9 months after randomization, so that children could have access to other interventions if they were not progressing through the programs at a satisfactory rate.

2. Method

2.1 Design

The design was a three-arm randomized controlled trial with blinded outcome assessments at 9 months post-randomization. The two experimental arms were Westmead Program (Westmead-1) and Westmead Program plus verbal contingencies (Westmead-2). The control arm was the Lidcombe Program. The study was conducted across four sites in Sydney and Melbourne, Australia—two university research clinics and two community clinics—with seven treating SLPs. All SLPs had received Lidcombe Program Consortium training (www.lidcombeprogram.org) and all received training and supervision in the Westmead Program from the SLP who conducted the treatment in the three published research studies.

2.2 Participants

Participants were pre-school children recruited in wait-list order from the research and community clinics. At an initial clinic assessment, the children were identified as stuttering by consensus between the assessing SLP and one or both parents. There were 91 children who stutter recruited to the trial, who were 5 years 11 months or younger. There were 61 boys and 30 girls. This was a pragmatic trial with no lower age limit or stuttering severity criteria, and children with concomitant speech, language, or developmental disorders were not excluded. Children were recruited if a diagnosis of stuttering could be made in the clinic and parent reports indicated that stuttering had been present for at least 6 months without any previous treatment.

An external, independent randomization service was used to distribute participants, stratifying for age above or below 42 months and severity greater or less than 5.0 %SS according to the assessing SLP. This resulted in 33 children in the Lidcombe Program arm, 28 children in the Westmead-1 arm, and 30 children in the Westmead-2 arm. Baseline variables, except for gender, appeared similar for each of the three randomized treatment groups, as shown in Table 1. To confirm the randomization procedure for stuttering severity, Table 1 contains parent measures of typical stuttering severity during the week prior to baseline. The measure used was the 10-point Lidcombe Program stuttering severity rating scale where 1 = *no stuttering*, 2 = *extremely mild stuttering* and 10 = *extremely severe stuttering*.

INSERT TABLE 1 HERE

2.3 Treatments

For the Lidcombe Program control group, the trial protocol used was from the edition of Lidcombe Program treatment guide (Onslow et al., 2019) that was available at the time of

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362
363 treatment from 2010 onward. Westmead-1 treatment involved parents encouraging children
364 to practice STS and use it in everyday conversations frequently each day. The SLP instructs
365 the parent and child at weekly clinic visits, without programmed instruction, in the use of
366 STS through demonstration, imitation, and practice at near normal speech rate and with
367 normal intonation. With similar methods to the Lidcombe Program, Westmead-1 treatment
368 involved parents measuring the child's stuttering severity each day using a 10-point scale,
369 and the treatment is divided into Stage 1 (instatement) and Stage 2 (maintenance).
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372 Westmead-2 treatment is similar to that of Westmead-1 except that parents give Lidcombe
373 Program verbal contingencies for stutter-free speech and stuttering moments. For Westmead-
374 2, parents also give verbal contingencies for their children's use of STS during everyday
375 conversations. Details of Westmead-1 and Westmead-2 treatments are presented in
376 Appendices A and B.
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378 *2.4 Primary Outcome*

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380 The primary outcome for the trial was %SS at 9 months post-randomization. Two 10-
381 minute speech samples of the children were recorded by a research assistant over the
382 telephone using the procedure described by O'Brian et al. (2010). One recording was of the
383 child speaking to an adult family member at home and the other was of the child speaking to
384 an adult non-family member away from home. Mean %SS was calculated from these two
385 recordings by a SLP, experienced in measuring stuttering, who was independent of the study
386 and blinded to the identity and treatment status of each child.
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389 To assess intra-observer agreement for %SS, 10% of the recordings across the three
390 arms were randomly selected and re-presented blind to the SLP two weeks after the original
391 measures were made. Inter-observer agreement was determined by presenting another 10% of
392 recordings to a second, independent, blinded SLP for measurement.
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All intra-observer pairs of measures differed by less than 0.4 %SS. The Pearson correlation between the original ratings and re-ratings was .99. All inter-observer pairs of measures differed by less than 0.6 %SS. The Pearson correlation between the scores of the original observer and second observer was .96. Hence, the %SS measures were deemed to be reliable.

2.5 Secondary outcome

At the completion of Stage 1 of their respective programs, the number of clinic visits required to complete Stage 1 was calculated for each child.

3. Results

3.1 Participant progress through the trial

At 9 months post-randomization there were substantive dropouts: 9 of 33 (27.3%) for the Lidcombe Program arm, 12 of 28 (42.9%) for the Westmead-1 arm, and 13 of 30 (43.3%) for the Westmead-2 arm. Table 2 presents numbers of dropouts and their demographic information at 9 months post-randomization, organized for the three trial arms, along with numbers of children who completed and did not complete Stage 1 of treatment and their demographic information. Figure 1 presents the flow chart for the trial.

INSERT TABLE 2 HERE

INSERT FIGURE 1 HERE

3.2 Analyses of 9 months post-treatment outcomes

At 9 months post-treatment the %SS scores for the treatment arms were as follows: Lidcombe Program, 1.35 (SD 0.92); Westmead-1, 2.02 (SD 1.17), Westmead-2, 1.99 (SD 1.83) (See Table 3).

Median numbers of clinic visits for each group to complete Stage 1 were, respectively, 30 (range 7–47), 18 (range 9–28) and 16 (range 4–34). Consistent with the Trajkovski et al. (2011) trial, it took more clinic visits in the present trial for children in the Lidcombe Program group to complete Stage 1 than for children in both the Westmead and Westmead-1 treatment groups. However, this comparison ignores drop outs, which were greater in the Westmead groups.

Linear regression is equivalent to ANOVA, however, it provides treatment effect estimates. Data were analyzed with simple linear regression of %SS at 9 months using dummy variables for treatment group. The two experimental Westmead treatments were of interest in relation to the Lidcombe Program group. Hence Lidcombe Program was the reference group for analyses.

The results in Table 4 show insufficient evidence of a difference between Lidcombe Program and Westmead-1 or between Lidcombe Program and Westmead-2. For analyses taking account of missing data, linear regression after multiple imputation (Stern et al., 2009) was performed. The Proc MI command in SAS was used to create five imputed datasets. Multiple imputation uses multivariate correlations within participants to predict the missing data distribution. Because %SS is likely to correlate strongly with SR scores at 9 months and at baseline, parent severity ratings at pre-randomization and 9 months post-randomization were included in the imputation model for %SS at 9 months. The results in Table 5 show that after multiple imputation similar results are obtained to Table 4. There was insufficient evidence of a difference between Lidcombe Program and Westmead-1 or between Lidcombe Program and Westmead-2. All these estimates show %SS was higher for Westmead-1 and Westmead-2 than Lidcombe Program at 9 months, but that the differences were modest and not statistically significant.

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549 550 551 552 **4. Discussion**

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554 It was of interest to determine whether the addition of parental verbal contingencies to
555 the Westmead Program would reduce the 53% participant withdrawal rate reported in the
556 2011 clinical trial of the program (Trajkovski et al., 2011). However, only a slight
557 improvement was observed, with a 42.9% dropout rate for the Westmead-1 arm and 43.4%
558 for the Westmead-2 arm. The dropout rate for the Lidcombe Program was less than those for
559 the two Westmead programs at 27.3%. This was greater, overall, than for previous clinical
560 trials where children were randomized to individualized, in-clinic Lidcombe Program
561 treatment (Arnott et al., 2014, 26%; Jones et al., 2005, 7%; Onslow et al., 1994, 33%;
562 Rousseau et al., 2007, 15%). We speculate that there are three reasons to explain the
563 substantive dropout rates for this clinical trial.

564
565 First, the trial incorporated community clinicians rather than using only clinicians
566 from dedicated university research clinics, as has been the case with randomized trials of
567 early intervention conducted by the current team to date (Arnott et al., 2014; Bridgman et al.,
568 2016; Jones et al., 2005; Lewis et al., 2008). Around a third (n=34) of the 91 participants
569 were treated in community clinics. It seems possible that the parents enrolling in a clinical
570 trial at a dedicated research university research facility were, overall, more research-
571 compliant than parents who had initially sought community treatment and subsequently were
572 enrolled in a trial.

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575 Second, unlike our previous randomized trials, this was a pragmatic trial with no
576 exclusion criteria. However, all child research participants at the Australian Stuttering
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603 Research Centre receive standard speech and language assessments. For the 78 children in
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605 the trial who were older than 3 years pre-treatment and tested with the Clinical Evaluation of
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607 Language Fundamentals Preschool (2nd Edition) (Wiig, Secord, & Semel, 2006), 14 had
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609 receptive language scores in the mild to severe impairment range, and 16 had scores in that
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611 range for expressive language. For those 78 children who were tested with the Diagnostic
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613 Evaluation of Articulation and Phonology (Dodd, Hua, Crosbie, Holm, & Ozanne, 2002), 14
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615 were more than 1 standard deviation from the normative mean score for percentage of
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617 phonemes correct. Those children would have been excluded from our previous trials, and it
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619 is possible that those speech and language issues comorbid with stuttering were associated
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621 with reduced treatment response, and hence dropout. For example, all treatments concerned
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623 involve parent instruction to children, and language comprehension might have impaired
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625 their treatment processes.
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629 Finally, unlike our previous trials, 13 of the children in this trial were younger than 3
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631 years of age, and this also may have been associated with reduced treatment response and
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633 hence dropout. Both treatments involve considerable compliance from children, and hence it
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635 might be expected that 2-year-olds would be much less compliant in general than 3–5 year-
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637 olds. Indeed, regression analyses of clinical response to the Lidcombe Program (N=316)
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639 contain an indirect link between age and responsiveness to treatment (Kingston, Huber,
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641 Onslow, Jones & Packman, 2003). Children who had been stuttering for less than 12 months
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643 require more clinic visits to complete the treatment than children who have been stuttering
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645 for more than 12 months.
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649 The substantive dropout rate for all three arms in this trial means that any conclusions
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651 about the 9-month stuttering outcomes must be regarded as tentative. In terms of %SS at 9
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653 months post-randomization, there were no apparent differences between the Lidcombe
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655 Program control group and the two experimental Westmead Program treatments. This result
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663 occurred with the simple analyses and with the analyses taking account of the treatment
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665 withdrawal rates for all treatments.
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667 *4.1 Future directions*

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670 Given the promise of the initial research into the Westmead Program, and the ease
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672 with which children can use STS, we intend to continue exploring possible clinical
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674 applications in future research. This is prompted by the findings in this study that even very
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676 young children may benefit from the treatment and so it has potential as a very early
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678 behavioral intervention.
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681 One line of future research is to make the Westmead Program more interesting for
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683 both parents and children, as once the child can use STS effectively, parents and children
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685 may simply find the treatment boring. Weekly and then fortnightly visits to the SLP may
686
687 even seem unproductive. To this end, we are in the process of developing an internet-based
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689 version of the Westmead Program, which we are hoping may keep parents and children more
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691 engaged in the treatment process. This internet treatment development is incorporating user
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693 trialing by parents to determine what works well to keep them and their children engaged
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695 during the treatment process.
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Table 1.

Baseline variables by treatment group. LP = Lidcombe Program; W1 = Westmead-1; W2 = Westmead-2.

Treatment Group	LP (n=33)	W1 (n=28)	W2 (n=30)
Age in months (mean, range)	48.8 (30–70)	50.3 (33–71)	47.3 (31–71)
Girls	9 (27%)	9 (32%)	12 (40%)
Severity Rating (mean, range)	4.93 (1–9)	4.92 (2–10)	4.59 (2–8)

Table 2.

Demographic data for the three trial arms. LP = Lidcombe Program; W1 = Westmead-1; W2 = Westmead-2.

		Status at 9 Months Post-randomization		
		Dropped Out	Stage 1 Incomplete	Stage 1 Complete
		n=34	n=21	n=36
Percentage of Boys	LP	78	75	69
	WP-1	67	80	64
	WP-2	69	50	56
Percentage Family History	LP	44	75	56
	WP-1	67	60	73
	WP-2	69	88	56
Mean Age (SD)	LP	50.4 (13.6)	50.6 (5.7)	46.7 (9.8)
	WP-1	50.8 (9.3)	44.6 (16.6)	52.2 (11.3)
	WP-2	50.0 (12.4)	43.6 (13.5)	46.8 (8.8)
Baseline Severity Rating (SD)	LP	5.3 (2.6)	4.5 (1.8)	5.0 (2.4)
	WP-1	5.0 (1.9)	5.0 (1.2)	4.8 (2.1)
	WP-2	4.6 (1.7)	4.4 (1.5)	4.8 (1.9)
9 Months Post %SS (SD)	LP	- ^a	1.6 (0.7)	1.1 (1.0)
	WP-1	2.9 (0.1)	1.9 (1.6)	1.6 (1.0)
	WP-2	3.1 (2.7)	1.7 (1.1)	1.1 (0.5)

^a = insufficient data

Table 3.

Descriptive statistics on speech outcomes at 9 months post-randomization. LP = Lidcombe Program; W1 = Westmead-1; W2 = Westmead-2.

Treatment group	Variable	n	Mean	Std. Dev.	Min.	Max.
LP	Severity Rating	14	1.50	0.65	1.0	3.0
	%SS	22	1.35	0.92	0.1	3.1
W1	Severity Rating	9	1.67	0.71	1.0	3.0
	%SS	16	2.02	1.17	0.4	4.6
W2	Severity Rating	20	2.40	1.54	1.0	7.0
	%SS	24	1.99	1.83	0.2	7.4

Table 4.

Linear regression analysis of percent syllables stuttered (%SS) at 9 months, with Westmead-1 and Westmead-2 estimates of average difference from Lidcombe Program %SS scores.

Parameter	Estimate	Standard Error	t Value	P-value
Intercept	1.35	0.298	4.53	<.0001
Westmead-1	0.67	0.459	1.46	0.15
Westmead-2	0.64	0.412	1.55	0.13

Table 5.

Linear regression analysis of percent syllables stuttered (%SS) at 9 months, after multiple imputation, with Westmead-1 and Westmead-2 estimates of average difference from Lidcombe Program %SS scores.

Parameter	Estimate	Standard Error	T Value	P-value
Intercept	1.74	0.271	6.42	<.0001
Westmead-1	0.47	0.398	1.17	0.26
Westmead-2	0.33	0.385	0.87	0.40

Appendix A.

Westmead-1 Treatment Summary

Stage	Procedure
1a	<p data-bbox="496 562 584 595">Goals:</p> <p data-bbox="496 618 1246 651">Child and parent learn to use syllable timed speech (STS).</p> <p data-bbox="496 696 770 730">Progression criteria:</p> <p data-bbox="496 752 1394 842">Child and parent practice the STS technique four to six times per day for 5-10 minutes.</p> <p data-bbox="496 887 1310 920">Parent prompts the child to use STS between practice sessions.</p>
1b	<p data-bbox="496 1021 584 1055">Goals:</p> <p data-bbox="496 1077 1018 1111">The frequency of clinic visits is reduced.</p> <p data-bbox="496 1155 1394 1245">Child and parent continue practicing STS technique four to six times per day for 5-10 minutes.</p> <p data-bbox="496 1290 1350 1379">Parent continues prompting the child to use STS between practice sessions.</p> <p data-bbox="496 1424 778 1458">Progression Criteria:</p> <p data-bbox="496 1480 1294 1514">Within-clinic %SS < 1.0 over 2 consecutive fortnightly visits.</p> <p data-bbox="496 1559 1198 1592">Beyond-clinic mean SR < 2 over 4 consecutive weeks.</p>
2	<p data-bbox="496 1693 584 1727">Goals:</p> <p data-bbox="496 1749 1214 1783">Parent gradually withdraws STS practice with the child.</p> <p data-bbox="496 1827 1015 1861">Parent prompts STS if a stutter is heard.</p>

Appendix B.

Westmead-2 Treatment Summary

Stage	Procedure
1a	<p data-bbox="496 546 584 580">Goals:</p> <p data-bbox="496 622 1382 712">Child and parent learn to use syllable timed speech (STS) and attend the clinic weekly.</p> <p data-bbox="496 757 927 790">Progression criteria to Stage 1b:</p> <p data-bbox="496 835 1382 976">After 4 weeks or once it can be established that the child and parent are practicing the STS technique four to six times per day for 5-10 minutes intervals.</p>
1b	<p data-bbox="496 1061 584 1095">Goals:</p> <p data-bbox="496 1140 959 1173">Weekly clinic visits are maintained.</p> <p data-bbox="496 1218 1350 1308">Child and parent continue practicing the STS technique four to six times per day for 5-10 minute intervals.</p> <p data-bbox="496 1352 1350 1494">Parent provides child with feedback on speech performance for an additional 5-10 minutes immediately after practicing the STS technique.</p> <p data-bbox="496 1538 1350 1628">Parent continues prompting the child to use STS between practice sessions.</p> <p data-bbox="496 1673 1382 1762">Parent provides feedback on speech performance in between practice sessions.</p> <p data-bbox="496 1807 927 1841">Progression Criteria to Stage 1c:</p> <p data-bbox="496 1886 1318 1975">Once it can be established that the goals for Stage 1b have been achieved.</p>

1c**Goals:**

The frequency of clinic visits is reduced to fortnightly.

Treatment continues as per Stage 1b.

Progression Criteria to Stage 2:

Within-clinic mean %SS < 1.0 over 2 consecutive fortnightly clinic visits.

Beyond-clinic mean SR < 2 over 4 consecutive weeks.

2**Goals:**

Parent gradually withdraws STS practice and feedback on speech performance with the child.

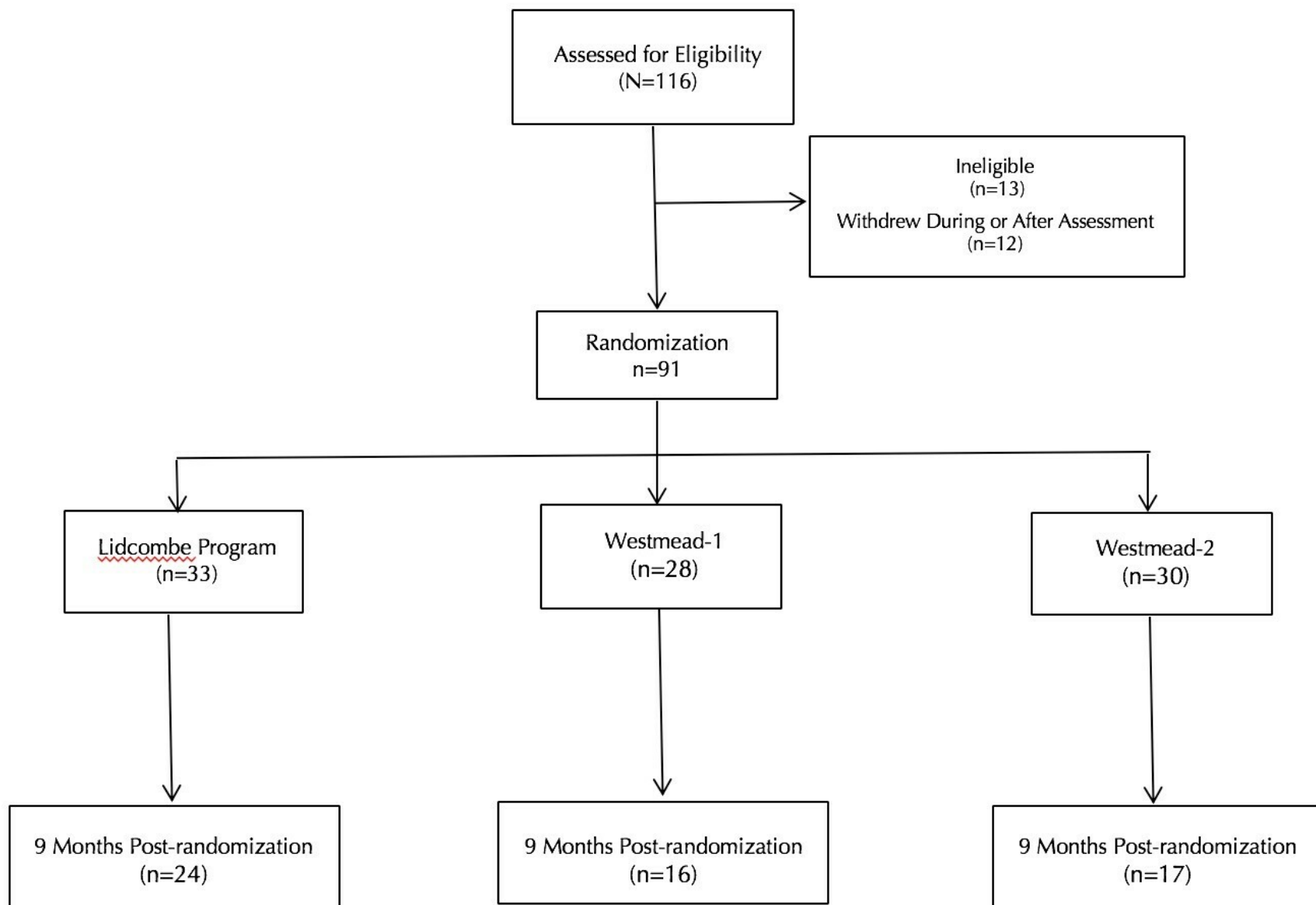
Parent prompts STS if a stutter is heard.

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Captions

Figure 1. CONSORT diagram of participant flow through the trial

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Bio-note

Natasha Trajkovski is researcher at the Australian Stuttering Research Centre. She has an interest in developing interventions for early stuttering. With other colleagues at the Australian Stuttering Research Centre, she has developed a treatment known as the Westmead Program. This treatment is the simplest developed to date and can be used soon after stuttering begins. Natasha is currently involved with adapting this intervention for the internet.

Dr Sue O'Brian is a Senior Researcher at the Australian Stuttering Research Centre. She has extensive experience in the field of stuttering treatment and research. Her current interests include the effectiveness of early stuttering intervention in community settings, development of treatments for adults who stutter and stuttering measurement.

Professor Mark Onslow is the foundation Director of the Australian Stuttering Research Centre. His research interests are epidemiology of early stuttering, mental health and stuttering, measurement of stuttering, and clinical trials for the disorder.

Professor Ann Packman is a Principal Research Fellow at the Australian Stuttering Research Centre. She has worked for more than 30 years in the area of stuttering as a clinician, teacher, and researcher. One of her current interests is on theories of the cause of stuttering.

Dr Robyn Lowe is a researcher at the Australian Stuttering Research Centre. Her research interests include exploring the psychological aspects associated with stuttering and how this impacts the long-term maintenance of speech treatment benefits. She is involved in the development and evaluation of online speech and anxiety treatment programs for stuttering.

Professor Ross Menzies is a clinical psychologist with an interest in the origins and management of anxiety. He has developed cognitive behaviour therapy packages for the treatment of obsessive compulsive disorders and published theories of the origins of phobias.

Dr Mark Jones is a Senior Lecturer in Biostatistics at Bond University, Australia. He obtained his PhD at the Australian Stuttering Research Centre, University of Sydney, and has a strong research interest in stuttering.

Dr Robyn Lowe is a researcher at the Australian Stuttering Research Centre. Her research interests include exploring the psychological aspects associated with stuttering and how this impacts the long-term maintenance of speech treatment benefits. She is involved in the development and evaluation of online speech and anxiety treatment programs for stuttering.

Sheena Reilly is Vice Chancellor (Health) at Griffith University, Australian. Her research interests are understanding speech, language and literacy development in children. She has received constant funding for her research projects. Sheena currently holds a number of prestigious honorary positions.