

Management options for pediatric patients who stutter: current challenges and future directions

Michelle A Donaghy¹
Kylie A Smith^{2,3}

¹Faculty of Health Sciences, Australian Catholic University, North Sydney, NSW, ²Murdoch Childrens Research Institute, Royal Childrens Hospital, ³Department of Paediatrics, University of Melbourne, Parkville, VIC, Australia

Abstract: Stuttering is a speech disorder, with onset often occurring in the preschool years. The prevalence of stuttering in young children is much higher than that in the general population, suggesting a high rate of recovery. However, we are unable to predict which children will recover without treatment, and it is widely acknowledged that stuttering therapy during childhood provides the best safeguard against chronic stuttering. This review reports on current evidence-based stuttering treatment options for preschoolers through to adolescents. We discuss the clinical challenges associated with treating pediatric clients who stutter at different stages of development and explore potential areas of treatment research that might serve to advance current clinical practice in the future.

Keywords: stuttering, stammering, pediatric, therapy, evidence based

Introduction

Stuttering is most likely the result of disturbances in the neural timing required for speech production.¹⁻⁴ Although genetic studies have found some chromosomal linkage to stuttering within family and twin studies, these links have been found to be inconclusive as causative.⁵ There are many causal theories about stuttering, which have provided underpinnings for treatment options; however, none have been empirically validated. The onset of stuttering usually occurs between 2 years and 4 years of age, coinciding with a time of rapid language development. Although the incidence of stuttering in preschool children may be as high as 11%,⁶ natural recovery is likely to occur in approximately two-thirds of cases.⁷ Some authors have alluded to possible factors that foreshadow persistent stuttering;⁸⁻¹¹ however, prognostic indicators have not been clearly established, and we cannot predict who will recover from stuttering without intervention. Early intervention offers the best chance of ameliorating stuttering. However, the uncertainty regarding natural recovery; the significant changes that occur in cognition, physiology, behavior, and communication during childhood; and the reducing tractability as the child ages mean that treatment in the pediatric population is complex. This review explores stuttering treatments for preschoolers, school-age children, and adolescents with a focus on those with the most recent and compelling evidence base. We critically reflect on current challenges in the management of pediatric stuttering and discuss how these challenges might best direct future research.

Correspondence: Michelle A Donaghy
School of Allied Health, Australian Catholic University, Level 6, 33 Berry Street, North Sydney, NSW 2060, Australia
Tel +61 2 9739 2622
Email michelle.donaghy@acu.edu.au

Treatment options for preschoolers

The most efficacious options for early stuttering intervention are parent delivered, with the clinician playing the role of a facilitator. Intervention for preschool children who stutter can be broadly divided into two categories: 1) direct treatments, ie, intervention directly targeting the amelioration of stuttering and 2) multifactorial treatments, ie, approaches that address multiple factors in the child's environment presumed to be triggers for stuttering.

Direct treatments

Direct treatments focus on the elimination of stuttering and the maintenance of stutter-free speech. Treatment goals and procedures are determined by fluency progress. Theoretically, reductions in stuttering are believed to occur because of operant methods, motoric practice of stutter-free speech, or a combination of these two elements.

The Lidcombe Program

The Lidcombe Program¹² is arguably the most extensively researched treatment for early stuttering. The efficacy of this intervention has been demonstrated in several randomized controlled trials (RCTs),^{13–16} clinical audits,^{17–19} and investigations on group²⁰ and telehealth^{16,21,22} service models. Further evidence of the effectiveness of the Lidcombe Program comes from case and small group studies from around the globe^{15,23–27} and a community translation study.²⁸

The Lidcombe Program involves treatment sessions where the parent provides responses known as verbal contingencies to the child's stuttered and stutter-free speech. As the child's stutter-free speech increases, the treatment conversations become less structured and the verbal contingencies are administered in general conversation across the day. The Lidcombe Program guide is available online;¹² however, further professional development is recommended.

The Westmead Program

The Westmead Program is a treatment based on rhythmic or syllable-timed speech. This program uses a technique reported to have been used to "cure" stuttering as far back as fourth century BCE.²⁹ The child is taught a speech pattern that gives every syllable the same duration, and parents facilitate the practice of syllable-timed speech several times daily. Early studies investigating this technique used a metronome to enable even syllabic lengths in speech³⁰ but this has been deemed no longer necessary to achieve treatment outcomes. Treatment procedure information is limited to appendices in

published trial articles^{31–33} and one book chapter.³⁴ Clinical studies have reflected successful fluency outcomes, but more research is required to determine the long-term outcomes and optimal treatment procedures.

Multifactorial treatments

In multifactorial approaches, treatment aims to address environmental factors believed to be associated with stuttering and to reduce stuttering.³⁵ The theoretical basis derives from the "Demands and Capacities Model" (DCM).^{36–39} This theory attributes the onset of early stuttering to the child's diminished capacity to produce fluent speech when faced with environmental, linguistic, emotional, and/or cognitive demands.³⁹ Treatment focuses on changing parent behaviors and family routines that are likely to decrease these demands. Multifactorial treatments are often referred to as "indirect" because treatment targets do not directly address stuttering behaviors.

Palin parent–children interaction therapy

Palin parent–child interaction therapy (PCIT) was developed in the UK at the Michael Palin Centre for Stammering.⁴⁰ In this treatment, parents are observed interacting with the child who stutters and given strategies to target in 15-minute conversations, several times a week. Parent targets include reducing parental speech rate, following the child's lead and pace in play, turn taking, increasing praise, and using comments over questions in conversation.^{41,42} Treatment may also involve addressing factors related to child behavior management, sleeping patterns, and family routines.⁴¹ Although PCIT is primarily indirect, if family strategies do not bring about a reduction in stuttering, parents may be instructed to use direct strategies, eg, prompting the child to slow their speech rate or pause more frequently in treatment activities.⁴¹ PCIT has been developed over the last two decades, with favorable outcomes reported in a handful of well-designed, but small group studies.^{43–45}

RESTART-DCM

RESTART-DCM is a treatment developed in the Netherlands directly based on the DCM approach, following the publication of a Dutch translation of Starkweather et al's⁴⁶ clinical method in 1990. This approach involves facilitating changes in linguistic, motoric, emotional, and cognitive aspects of the child and the child's environment.⁴⁷ Treatment efficacy has been tested in two studies; a small 12-week experiment⁴⁸ and a randomized trial of 199 participants.²⁴ In both studies, DCM treatment was compared with the Lidcombe Program,

with the latter study finding little difference in therapeutic outcomes between the two approaches after 18 months. The RESTART-DCM treatment manual is publicly available online;⁴⁷ however, the authors recommend further training prior to administering treatment.

Treatment options for school-age children

Effective management of stuttering in children from early school age to late adolescence requires consideration of many factors including stuttering severity, stuttering tractability, and the child's developmental stage. For younger school-age children, research has predominantly focused on adaptations of stuttering treatments for preschoolers. According to developmental psychology, from the age of ~12 years children shift from a desire to master short-term goals and gain parental approval to a focus on performance-related peer conformity;⁴⁹ therefore, treatment research for this age group tends to focus on adult treatment studies that include adolescent participants.

Early school-age stuttering management

The Lidcombe Program for school-age children (6–12 years) has been investigated in two Phase I trials,^{50,51} with a total of 23 children. Both trials reported successful outcomes for the majority of school-age children; however, greater variability of treatment outcomes was observed when compared with preschooler studies. Similarly, in a Phase I Westmead Program trial of ten school-age children (6–11 years),⁵² all but two children made reductions in stuttering severity. Once again, there was notable variability between participants, and only one participant was assessed as stutter-free after 9 months of treatment.

Adolescent stuttering management

The Camperdown Program

Recent treatment studies with adolescents who stutter have focused on variants of speech restructuring. This involves the practice of a new speech pattern to replace stuttered speech, usually by slowing speech (prolonged speech) or using techniques to alter the way speech is delivered to overcome moments of stuttering (fluency shaping). The Camperdown Program is one such treatment for adults, with efficacy reflected in Phase I and II trials.^{53–56} In this treatment, through regular practice and by gradually increasing the naturalness of the prolonged speech technique, the speaker is able to control stuttering in everyday conversations. The Camperdown Program has been tested in Phase I and II

trials with children aged from 12 years to 17 years, with the majority of participants treated using webcam delivery. Findings revealed overall reductions in stuttering severity, but variability in efficiency of treatment effect.^{57–59}

Comprehensive Speech Program

Evidence to support the Comprehensive Speech Program as a treatment for adolescents comes from adult trials including a small number of adolescent participants.^{60,61} This program not only focuses on speech restructuring in order to reduce stuttering behaviors but also addresses goal setting and dealing with attitudinal responses to stuttering. The developers anecdotally cite over two decades of success using this program and adaptations of it for early school-age children;⁶² however, more research is recommended to determine the efficacy for this population.

Time-out and self-imposed time-out

“Time-out” and a variant “self-imposed time-out” have been investigated in studies of adults and adolescents from the age of 14 years.^{63,64} As in the Lidcombe Program, this approach is based on the behavioral theory that responses contingent on stuttering behavior may play a role in stuttering reduction. In time-out, children are given a signal by their clinician or parent when they stutter, the child then stops speaking and pauses before continuing fluently. In self-imposed time-out, the onus is on the client to self-monitor and pause following the stuttering moment. Studies on this treatment show success for some participants, but like other treatment options for early school-age and adolescent children, variability in treatment success is present.

Clinical challenges

Treat or monitor?

In the case of preschool children who stutter, the initial challenge for clinicians is to determine the optimal time to commence treatment considering the likelihood of natural recovery. Although stuttering frequency, severity and typology, time since onset, family history, the impact on the child's ability to communicate, and the child's level of frustration or anxiety about the stutter are all considered during the assessment process, no one factor has been proven as causal or predictive. However, all these factors have been cited as potential markers of persistent stuttering.¹¹

Generally, speech pathologists are likely to take a monitoring approach if stutter onset is within 6 months and stuttering is not adversely affecting the preschooler or parent.⁶⁵ Depending on the variables mentioned earlier and how close

the child is to school age, treatment may be delayed for up to 12 months after stuttering onset without impacting on treatment duration.¹⁸ To date, pretreatment severity is the only known predictor of treatment duration.^{17–19} Parent education about clinical challenges and prognosis is critical to ensure parents can participate in informed decision making regarding starting treatment or monitoring stuttering.

Treatment dosage

The amount of treatment required to reduce or eliminate stuttering varies across the different programs discussed. Clinicians cannot predict with certainty the amount of clinic time or home practice required to achieve stutter-free speech. Although Lidcombe Program developers maintain that it is likely to take a median of 16 clinic visits for the child to achieve stutter-free speech, 10% of cases are likely to take >26 weeks,⁶⁶ and little is known about those children who appear to be treatment resistant. One Westmead Program study cites a 96% mean reduction in stuttering with an average of clinical hours for participants to achieve little or no stuttering.³² However, over half of the participants withdrew from this study prior to achieving stutter-free speech, with the authors suggesting that the parental practice schedule may have been prohibitive in sustaining treatment adherence. In multifactorial treatments, PCIT visits occur weekly for 6 weeks, and then at wider intervals, whereas RESTART-DCM visits continue until the child's speech is deemed acceptable by the clinician and parents.⁴⁶ If the clinician administers either the Lidcombe or Westmead Programs within the parameters of evidence-based practice, the dosage is potentially much higher than that of PCIT and RESTART-DCM in order to achieve the goal of stutter-free speech, as opposed to a mere reduction in stuttering. Regular home treatment practice can also be challenging, particularly when both parents work, if parents are separated, or when there are siblings, reducing the amount of time available. Private speech pathology fees are often costly and the financial burden for families also requires consideration. Likewise, clinicians face ethical dilemmas when they are unable to complete treatment as outlined in evidence-based research owing to fiscal and other workplace constraints.^{28,67,68}

Concomitant diagnoses

The impact of cognitive, behavioral, and/or other speech and language disorders on treatment duration and procedure is largely unknown as treatment research methodologies often exclude children with other diagnoses to avoid confounding variables. Nevertheless, there is evidence to suggest an

increased likelihood of stuttering for children who have been diagnosed with other communication disorders,^{69,70} autism spectrum disorder,⁷¹ and Down syndrome.⁷²

Recent discussion articles on this subject^{73,74} and one published case study on treatment for a school-age child with Down syndrome⁷⁵ provide some directions for clinical management. These articles offer frameworks for determining appropriate treatment pathways depending on client characteristics, mostly with a focus on hybrids of direct intervention strategies. However, clinicians must largely depend on their own clinical reasoning to determine treatment targets based on the child's individual characteristics.

Access to professional development and treatment resources

For speech pathologists treating pediatric stuttering, access to resources and professional development (as recommended by all treatment developers) largely depend on where the clinicians reside. The Lidcombe Program Trainers Consortium provides professional development on preschool treatment in ten countries. Training on the Lidcombe and Westmead Programs for school-age children is limited to Australia and New Zealand.⁷⁶ PCIT training is available in the UK and – less frequently – in North America,⁴⁰ and training for the RESTART-DCM program is currently limited to the Netherlands.⁴⁶ This presents a challenge to clinicians in Australia and New Zealand, where opportunities for professional development in evidence-based multifactorial treatments are either nonexistent or cost prohibitive. Nevertheless, as a companion to professional development, treatment guides are available for the Lidcombe Program and the Camperdown Program,¹² a comprehensive text is available for PCIT,⁴¹ and more recently a RESTART-DCM treatment protocol has been made available online.⁴⁶ The Westmead Program treatment literature is limited to brief descriptions of clinical procedures in clinical articles^{31–33} and book chapters.^{34,65}

Psychosocial consequences

Stuttering is associated with a range of psychosocial consequences across the preschool and school-age years. These include negative evaluation by nonstuttering peers,⁷⁷ stereotyping by teachers,^{78,79} and increased risk of being the victim of teasing and bullying.^{80–82} Exposure to negative social consequences such as these has been identified as a risk factor for the development of anxiety. Indeed, adults who stutter are significantly more likely to have a diagnosis of social anxiety disorder than nonstuttering controls.⁸³ The literature

is currently unclear as to when anxiety onset in stuttering occurs however, it is likely that the risk of anxiety increases as stuttering children approach adolescence and adulthood.⁸⁴ In lieu of evidence to guide clinical practice, clinicians must be cognizant of the potential impact of stuttering on mental health in the pediatric population and refer to a psychologist if necessary and appropriate.

Future directions

Stuttering treatment researchers are often divided about which components of stuttering treatment actively reduce stuttering in the pediatric population.^{42,85} For example, as a treatment tested in numerous randomized controlled experiments,^{14,20,24,86} the Lidcombe Program is regarded as highly efficacious, but it is not known which components of this treatment reduce stuttering. A recent RCT suggests parity in the treatment effect between divergent Lidcombe Program and DCM approaches,²⁴ but multifactorial treatments such as DCM carry multiple treatment components. Without supporting evidence to test component utility, some DCM components may be redundant. Recent Lidcombe Program studies have begun to reveal challenges to the long-held theoretical belief that operant mechanisms drive therapeutic success.^{86–89} Such discoveries are important, as knowledge about which components of a treatment are useful will enable ease of clinical problem solving and increase treatment efficiency. Furthermore, such knowledge may assist in individualizing treatment to better serve individual client differences associated with concomitant disorders and treatment-resistant cases.

Treatment process knowledge is also likely to reduce the variability in outcome success reflected in school-age and adolescent populations. Recent discussion in both pediatric stuttering and the field of psychology asserts that treatment efficacy solely based on RCTs when treatment mechanisms are unknown can only provide a justification for use⁹⁰ – particularly when behavior change is the desired outcome.^{91,92} In the future, clinical practice will benefit from research methodologies that enable therapeutic agency to be revealed either by testing components directly or by revealing patterns of successful clinical processes through case series studies.

Conclusion

There are currently a number of stuttering treatments available for the pediatric population, but there are varying levels of evidence to support their success. Although the Lidcombe Program is the most extensively researched treatment for preschool stuttering, studies comparing the Lidcombe Program with RESTART-DMC show similar

treatment outcomes. For school-age children and adolescents who stutter, therapies are predominately adaptations of treatments designed for preschools or adults who stutter. There is, however, a dearth of clinical trial investigations to support treatment efficacy of any treatment for school-age children and adolescents who stutter. Similarly, depending on the location of the clinician, poor access to professional development can limit clinician's ability to become proficient in all treatment options.

Clinicians are faced with a number of challenges when servicing the pediatric population. These include complex decision making regarding optimal time to treat, lack of information on treating stuttering in those with concomitant disorders, and uncertainty regarding optimal therapy dosage and long-term outcomes. Future research needs to address these challenges and investigate the mechanisms underlying therapeutic success.

Overall, clinicians working in the field of stuttering can feel heartened that there are a range of treatment options available for pediatric stuttering, but special care is required when determining the most appropriate treatment for the individual child. Future research directed at the treatment process may serve to diminish current challenges and help to achieve the best possible outcomes for this population.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Brown S, Ingham RJ, Ingham JC, Laird AR, Fox PT. Stuttered and fluent speech production: an ALE meta-analysis of functional neuroimaging studies. *Hum Brain Mapp.* 2005;25(1):105–117.
2. Chang SE, Zhu DC. Neural network connectivity differences in children who stutter. *Brain.* 2013;136(pt 12):3709–3726.
3. Etehell AC, Johnson BW, Sowman PF. Behavioral and multimodal neuroimaging evidence for a deficit in brain timing networks in stuttering: a hypothesis and theory. *Front Hum Neurosci.* 2014;8:467.
4. Sommer M, Koch MA, Paulus W, Weiller C, Büchel C. Disconnection of speech-relevant brain areas in persistent developmental stuttering. *Lancet.* 2002;360(9330):380–383.
5. Kang C. Recent advances in genetic studies of stuttering. *J Genet Med.* 2015;12(1):19–24.
6. Reilly S, Onslow M, Packman A, et al. Natural history of stuttering to 4 years of age: a prospective community-based study. *Pediatrics.* 2013;132(3):460–467.
7. Yairi E, Ambrose N. Epidemiology of stuttering: 21st century advances. *J Fluency Disord.* 2013;38(2):66–87.
8. Curlee RF. Identification and case selection guidelines for early childhood stuttering. In: Conture EG, Curlee RF, editors. *Stuttering and Related Disorders of Fluency.* New York: Thieme; 2007:3–22.
9. Guitar B. *Stuttering: An Integrated Approach to its Nature and Treatment.* 4th ed. Baltimore MD: Lippincott Williams & Wilkins; 2014.
10. Spencer C, Weber-Fox C. Preschool speech articulation on nonword repetition abilities may help predict eventual recovery or persistence of stuttering. *J Fluency Disord.* 2015;41:32–46.
11. Yairi E, Ambrose NG. *Early Childhood Stuttering: For Clinicians by Clinicians.* Austin, TX: Pro-Ed; 2005.

12. Packman A, Onslow M, Webber M [webpage on the Internet], et al. *The Lidcombe Program Treatment Guide*. 2015. Available from: http://sydney.edu.au/health-sciences/asrc/docs/lp_treatment_guide_2015.pdf. Accessed February 22, 2016.
13. Harris V, Onslow M, Packman A, Harrison E, Menzies R. An experimental investigation of the impact of the Lidcombe Program on early stuttering. *J Fluency Disord*. 2002;27(3):203–214.
14. Jones M, Onslow M, Packman A, et al. Randomised controlled trial of the Lidcombe programme of early stuttering intervention. *BMJ*. 2005;331(7518):659–661.
15. Lattermann C, Euler HA, Neumann K. A randomized control trial to investigate the impact of the Lidcombe Program on early stuttering in German-speaking preschoolers. *J Fluency Disord*. 2008;33(1):52–65.
16. Lewis C, Packman A, Onslow M, Simpson JM, Jones M. A phase II trial of telehealth delivery of the Lidcombe Program of early stuttering intervention. *Am J Speech Lang Pathol*. 2008;17(2):139–149.
17. Jones M, Onslow M, Harrison E, Packman A. Treating stuttering in young children: predicting treatment time in the Lidcombe Program. *J Speech Lang Hear Res*. 2000;43(6):1440–1450.
18. Kingston M, Huber A, Onslow M, Jones M, Packman A. Predicting treatment time with the Lidcombe Program: replication and meta-analysis. *Int J Lang Commun Disord*. 2003;38(2):165–177.
19. Koushik S, Hewat S, Shenker RC, Jones M, Onslow M. North-American Lidcombe Program file audit: replication and meta-analysis. *Int J Speech Lang Pathol*. 2011;13(4):301–307.
20. Arnott S, Onslow M, O'Brian S, Packman A, Jones M, Block S. Group Lidcombe Program treatment for early stuttering: a randomized controlled trial. *J Speech Lang Hear Res*. 2014;57(5):1606–1618.
21. Wilson L, Onslow M, Lincoln M. Telehealth adaptation of the Lidcombe Program of early stuttering intervention: five case studies. *Am J Speech Lang Pathol*. 2004;13(1):81–93.
22. O'Brian S, Smith K, Onslow M. Webcam delivery of the Lidcombe Program for early stuttering: a phase I clinical trial. *J Speech Lang Hear Res*. 2014;57(3):825–830.
23. Bakhtiar M, Packman A. Intervention with the Lidcombe Program for a bilingual school-age child who stutters in Iran. *Folia Phoniatr Logop*. 2009;61(5):300–304.
24. de Sonnevile-Koedoot C, Stolk E, Rietveld T, Franken M-C. Direct versus indirect treatment for preschool children who stutter: the RESTART randomized trial. *PLoS One*. 2015;10(7):e0133758.
25. Femrell L, Åvall M, Lindström E. Two-year follow-up of the Lidcombe Program in ten Swedish-speaking children. *Folia Phoniatr Logop*. 2012;64(5):248–253.
26. Miller B, Guitar B. Long-term outcome of the Lidcombe Program for early intervention. *Am J Speech Lang Pathol*. 2009;18(1):42–49.
27. Guitar B, Kazenski D, Howard A, Cousins SF, Fade E, Haskell P. Predicting treatment time and long-term outcome of the Lidcombe Program: a replication and reanalysis. *Am J Speech Lang Pathol*. 2015;24(3):533–544.
28. O'Brian S, Iverach I, Jones M, Onslow M, Packman A, Menzies R. Effectiveness of the Lidcombe Program for early stuttering in Australian community clinics. *Int J Speech Lang Pathol*. 2013;15(6):593–603.
29. Klingbeil GM. The historical background of the modern speech clinic. *J Speech Disord*. 1939;4:115–132.
30. Greenburg JB. The effect of a metronome on the speech of young stutterers. *Behav Ther*. 1970;1:240–244.
31. Trajkovski N, Andrews C, O'Brian S, Onslow M, Packman A. Treating stuttering in a preschool child with syllable timed speech: a case report. *Behav Change*. 2006;23(4):270–277.
32. Trajkovski N, Andrews C, Onslow M, O'Brian S, Packman A, Menzies R. A phase II trial of the Westmead Program: syllable-timed speech treatment for preschool children who stutter. *Int J Speech Lang Pathol*. 2011;13(6):500–509.
33. Trajkovski N, Andrews C, Onslow M, Packman A, O'Brian S, Menzies R. Using syllable-timed speech to treat preschool children who stutter: a multiple baseline experiment. *J Fluency Disord*. 2009;34(1):1–10.
34. Trajkovski N. The Westmead Program. In: Jakšić SJ, Onslow M, editors. *The Science and Practice of Stuttering Treatment*. West Sussex, UK: Wiley-Blackwell; 2012:195–206.
35. Yarus J. The role of performance in the demands and capacities model. *J Fluency Disord*. 2000;25:347–358.
36. Adams MR. The demands and capacities model I: theoretical elaborations. *J Fluency Disord*. 1990;15:135–141.
37. Gottwald SR. Stuttering prevention and early intervention: a multidimensional approach. In: Guitar B, McCauley R, editors. *Treatment of Stuttering: Established and Emerging Interventions*. Baltimore, MD: Lippincott Williams & Wilkins; 2010:91–117.
38. Starkweather CW, Armson JM, Amster BJ. An approach to the study of motor speech mechanisms in stuttering. In: Rustin L, Purser H, Rowley D, editors. *Progress in the Treatment of Fluency Disorders*. London: Taylor and Francis; 1987:43–58.
39. Starkweather CW, Gottwald SR. The demands and capacities model II: clinical applications. *J Fluency Disord*. 1990;15(3):143–157.
40. Stammeringcentre.org [webpage on the Internet]. *Action for Stammering Children*. London: c2000–c2016. Available from: <http://www.stammeringcentre.org/association-home>. Accessed January 29, 2016.
41. Kelman E, Nicholas A. *Practical Intervention for Early Childhood Stammering: Palin PCI Approach*. Milton Keynes: Speechmark Publishing; 2008.
42. Onslow M, Millard S. Palin parent child interaction and the Lidcombe Program: clarifying some issues. *J Fluency Disord*. 2012;37(1):1–8.
43. Millard SK, Edwards S, Cook FM. Parent-child interaction therapy: adding to the evidence. *Int J Speech Lang Pathol*. 2009;11:61–76.
44. Matthews S, Williams R, Pring T. Parent-child interaction therapy and dysfluency: a single-case study. *Int J Lang Commun Disord*. 1997;32(3):346–357.
45. Millard SK, Nicholas A, Cook FM. Is parent-child interaction therapy effective in reducing stuttering? *J Speech Lang Hear Res*. 2008;51(3):636–650.
46. Starkweather CW, Gottwald SR, Halfond MM. *Stuttering Prevention: A Clinical Method*. Engle-wood Cliffs, NJ: Prentice Hall; 1990.
47. Franken M-C, Putker-de Bruijn D [webpage on the Internet]. *Restart-DCM Method. Treatment Protocol Developed within the Scope of the ZonMW Project Cost-Effectiveness of the Demands and Capacities Model Based Treatment Compared to the Lidcombe Programme of Early Stuttering Intervention: Randomised trial*. 2007. Available from: <http://www.nedverstottertherapie.nl/pdf/RESTART-DCM.Method.incl.bijlagen04-12-11.pdf>. Accessed May 23, 2016.
48. Franken MJ, Kielstra-Van de Schalk CJ, Boelens H. Experimental treatment of early stuttering: a preliminary study. *J Fluency Disord*. 2005;30(3):189–199.
49. Sigelman CK, Rider EA. *Life-Span Human Development*. 6th ed. Belmont: Wadsworth Cengage Learning; 2011.
50. Koushik S, Shenker R, Onslow M. Follow-up of 6–10 year-old stuttering children after Lidcombe Program treatment: a phase I trial. *J Fluency Disord*. 2009;34(4):279–290.
51. Lincoln M, Onslow M, Lewis C, Wilson L. A clinical trial of an operant treatment for school-age children who stutter. *Am J Speech Lang Pathol*. 1996;5:73–85.
52. Andrews C, O'Brian S, Harrison E, Onslow M, Packman A, Menzies R. Syllable-timed speech treatment for school-age children who stutter: a phase I trial. *Lang Speech Hear Serv Sch*. 2012;43(3):359–369.
53. Carey B, O'Brian S, Onslow M, Block S, Jones M, Packman A. Randomized controlled non-inferiority trial of a telehealth treatment for chronic stuttering: the Camperdown Program. *Int J Lang Commun Disord*. 2010;45(1):108–120.
54. Cocomazzo N, Block S, Carey B, et al. Camperdown Program for adults who stutter: a student training clinic phase I trial. *Int J Lang Commun Disord*. 2012;47(4):365–372.
55. O'Brian S, Onslow M, Cream A, Packman A. The Camperdown Program: outcomes of a new prolonged-speech treatment model. *J Speech Lang Hear Res*. 2003;46(4):933–946.

56. O'Brian S, Packman P, Onslow M. Telehealth delivery of the Camperdown Program for adults who stutter: a phase I trial. *J Speech Lang Hear Res.* 2008;51(1):184–195.
57. Hearne A, Packman A, Onslow M, O'Brian S. Developing treatments for adolescents who stutter: a phase I trial of the Camperdown Program. *Lang Speech Hear Serv Sch.* 2008;39(4):487–497.
58. Carey B, O'Brian S, Onslow M, Packman A, Menzies R. Webcam delivery of the Camperdown Program for adolescents who stutter: a phase I trial. *Lang Speech Hear Serv Sch.* 2012;43(3):370–380.
59. Carey B, O'Brian S, Lowe R, Onslow M. Webcam delivery of the Camperdown Program for adolescents who stutter: a phase II trial. *Lang Speech Hear Serv Sch.* 2012;45(4):314–324.
60. Langevin M, Hunick W, Kully D, Peters H, Lomheim H, Tellers M. A cross cultural, long term outcome evaluation of the ISTAR Comprehensive Stuttering Program across Dutch and Canadian adults who stutter. *J Fluency Disord.* 2006;31(4):229–256.
61. Langevin M, Kully D, Teshima S, Hagler P, Prasad N. Five-year longitudinal treatment outcomes of the ISTAR Comprehensive Stuttering Program. *J Fluency Disord.* 2010;35(2):123–140.
62. Langevin M, Kully D, Ross-Harold B. The Comprehensive Stuttering Program for school-age children with strategies for managing teasing and bullying. In: Conture EG, Curlee RF, editors. *Stuttering and Related Disorders of Fluency.* 3rd ed. New York: Thieme; 2007:131–149.
63. Franklin DE, Taylor CL, Hennessey NW, Beilby JM. Investigating factors related to the effects of time-out on stuttering in adults. *Int J Lang Commun Disord.* 2008;43(3):283–299.
64. Hewat S, Onslow M, Packman A, O'Brian S. A phase II clinical trial of self-imposed time-out treatment for stuttering in adults and adolescents. *Disabil Rehabil.* 2006;28(1):33–42.
65. O'Brian S, Onslow M. Clinical management of stuttering in children and adults. *BMJ.* 2011;342:d3742.
66. Onslow M [webpage on the Internet]. *Stuttering and its Treatment: Eleven Lectures.* The University of Sydney; 2016:c2002–c2016. [updated January 14, 2016]. Available from: <http://sydney.edu.au/health-sciences/asrc/downloads/index.shtml>. Accessed February 1, 2016.
67. Onslow M, Packman A. The Lidcombe Program of early stuttering intervention. In: Bernstein Ratner N, Healey EC, editors. *Treatment and Research: Bridging the Gap.* Mahwah, NJ: Lawrence Erlbaum; 1999:191–208.
68. Rousseau I, Packman A, Onslow M, Dredge R, Harrison E. Australian speech pathologists' use of the Lidcombe Program of early stuttering intervention. *ACQ Knowl Speech Lang Hear.* 2002;4:67–71.
69. Gregg BA, Yairi E. Phonological skills and disfluency levels in preschool children who stutter. *J Commun Disord.* 2007;40(2):97–115.
70. Unicomb R, Hewat S, Spencer E, Harrison E. Clinicians' management of young children with co-occurring stuttering and speech sound disorder. *Int J Speech Lang Pathol.* 2013;15(4):441–452.
71. Scaler Scott K, Tetnowski JA, Flaitz JR, Yaruss JS. Preliminary Study of disfluency in school-aged children with autism. *Int J Lang Commun Disord.* 2014;49(1):75–89.
72. Bloodstein O, Bernstein Ratner N. *A Handbook on Stuttering.* 6th ed. Clifton Park, NY: Thomson-Delmar; 2008.
73. Healey EC, Reid R, Donaher J. Treatment of the child who stutters with coexisting learning, behavior, and cognitive challenges. In: Lees R, Stark C, editors. *The Treatment of Stuttering in the Young School-Aged Child.* London: Whurr Publishers; 2005:178–196.
74. Logan KJ, LaSalle LR. Developing Intervention Programs for children with stuttering and concomitant impairments. *Semin Speech Lang.* 2003;24(1):13–20.
75. Harasym J, Langevin M. Stuttering treatment for a school-age child with Down syndrome: a descriptive case report. *J Fluency Disord.* 2012;37(4):253–262.
76. Australian Stuttering Research Centre (ASRC) [webpage on the Internet]. *Continuing Professional Education in Stuttering.* The University of Sydney; 2016:c2002–c2016. [updated January 13, 2016]. Available from: http://sydney.edu.au/health-sciences/asrc/continuing_education/index.shtml. Accessed February 1, 2016.
77. Ezrati-Vinacour R, Platzky R, Yairi E. The young child's awareness of stuttering-like disfluency. *J Speech Lang Hear Res.* 2001;44(2):368–380.
78. Lass NJ, Ruscello DM, Schmitt JF, et al. Teachers' perceptions of stutterers. *Lang Speech Hear Serv Sch.* 1992;23:78–81.
79. Ruscello DM, Lass NJ, Schmitt JF, Pannbacker MD. Special educators' perceptions of stutterers. *J Fluency Disord.* 1994;19(2):125–132.
80. Blood GW, Blood IM. Bullying in adolescents who stutter: communicative competence and self-esteem. *Contemp Issues Commun Sci Disord.* 2004;31:69–79.
81. Blood GW, Blood IM. Preliminary study of self-reported experience of physical aggression and bullying of boys who stutter: relation to increased anxiety. *Percept Mot Skills.* 2007;104(3 pt 2):1060–1066.
82. Langevin M, Kleitman S, Packman A, Onslow M. The Peer Attitudes Toward Children who Stutter (PATCS) scale: an evaluation of validity, reliability and the negativity of attitudes. *Int J Lang Commun Disord.* 2009;44(3):352–368.
83. Iverach L, O'Brian S, Jones M, et al. Prevalence of anxiety disorders among adults seeking speech therapy for stuttering. *J Anxiety Disord.* 2009;23(7):928–934.
84. Smith KA, Iverach L, O'Brian S, Kefalianos E, Reilly S. Anxiety of children and adolescents who stutter: a review. *J Fluency Disord.* 2014;40:22–34.
85. Onslow M, Yaruss JS. Differing perspectives on what to do with a stuttering pre-schooler and why. *Am J Speech Lang Pathol.* 2007;16(1):65–68.
86. Donaghy M, Harrison E, O'Brian S, et al. An investigation of the role of parental request for self-correction of stuttering in the Lidcombe Program. *Int J Speech Lang Pathol.* 2015;17(5):511–517.
87. Donaghy M, O'Brian S, Onslow M, et al. Removing verbal contingencies from the Lidcombe Program: a randomised controlled trial. Presented at: Speech Pathology Australia National Conference; May 18; 2015; Canberra, ACT.
88. Harrison E, Onslow M, Menzies R. Dismantling the Lidcombe Program of early stuttering intervention: verbal contingencies for stuttering and clinical measurement. *Int J Lang Commun Disord.* 2004;39(2):257–267.
89. Swift MC, Jones M, O'Brian S, Onslow M, Packman A, Menzies R. Parent verbal contingencies during the Lidcombe Program: observations and statistical modeling of the treatment process. *J Fluency Disord.* 2016;47:13–26.
90. Hayhow R. Does it work? Why does it work? Reconciling difficult questions. *Int J Lang Commun Disord.* 2011;46(2):155–168.
91. Rosen GR, Davison GC. Psychology should list empirically supported principles of change (ESPs) and not credential trademarked therapies or other treatment packages. *Behav Modif.* 2003;27(3):300–312.
92. Tarquinio C, Kivits J, Minary L, Coste J, Alla F. Evaluating complex interventions: perspectives and issues for health behavior change interventions. *Psychol Health.* 2014;30(1):35–51.

Pediatric Health, Medicine and Therapeutics

Publish your work in this journal

Pediatric Health, Medicine and Therapeutics is an international, peer-reviewed, open access journal publishing original research, reports, editorials, reviews and commentaries. All aspects of health maintenance, preventative measures and disease treatment interventions are addressed within the journal. Practitioners from all disciplines are invited to submit

Submit your manuscript here: <http://www.dovepress.com/pediatric-health-medicine-and-therapeutics-journal>

their work as well as healthcare researchers and patient support groups. The manuscript management system is completely online and includes a very quick and fair peer-review system. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.