

Case Study 1: An Evidence-Based Practice Review Report

Theme: Interventions Implemented by Parents

What do we know about the effectiveness of parent shared book reading behaviours for language outcomes in children who are deaf or hearing impaired?

Summary

Reading is an activity that has many benefits for children and is often common practice in the home. Whereas children with normal hearing (NH) may find it easier to pick up language, those who are deaf/hearing impaired (DHI) need additional support from a young age to develop their language skills. This review sought to explore the language benefits of parent reading behaviours for children who are DHI. A search of the literature was carried out and the 5 studies identified were assessed using an established framework for reviews (Gough, 2007). Three studies were awarded a high rating and two a medium rating. Appraisal of the evidence suggests that parent behaviours, including frequency of joint book reading and interactive reading, are positively associated with language but where correlational research has been conducted we cannot infer causality. The evidence from intervention studies suggested benefits of a specific dialogic reading intervention, however more high quality research will need to be carried out to confirm this. Recommendations for practice and future research are discussed.

Introduction

Reading Interventions and Behaviours

Reading interventions are widely used in both education settings and by parents and carers at home; often on the advice of a teacher or another professional. For many families, reading is an activity that parents undertake with their children from a very young age and this forms part of the wider home literacy environment that shapes the development of the child's own language and literacy skills (Burgess, Hecht, & Lonigan, 2002; Weigel, Martin, & Bennett, 2006). There may be a plethora of reading interventions and schemes available for parents, however the simple act of joint, or shared, book reading (JBR/SBR) is a behaviour that is associated with benefits for children's oral language development (Dunst, Gorman, & Trivette, 2010) and literacy skills (Bus, van IJzendoorn, & Pellegrini, 1995). Importantly, longitudinal research by Raikes et al. (2006) found that frequency of SBR predicted the development of language and cognition of children with normal hearing (NH).

In addition to JBR frequency, characteristics of JBR also seem to be important for language development. Parent behaviours that have been found to positively impact early literacy skills and language include expression whilst reading, asking open-ended questions and expanding children's utterances, for example if the child was to say 'bus drive' the parent might respond 'The bus is driving' (Desjardin et al., 2014; Sonnenschein & Munsterman, 2002). These 'facilitative language techniques' (Desjardin et al., 2014) make JBR more engaging and encourage the child to actively participate in the activity. Whitehurst and colleagues (Whitehurst et al., 1988) attempted to isolate and

promote parent behaviours that make JBR effective; creating a strategy called dialogic reading (DR). DR encompasses language, feedback and scaffolding techniques within parent-child book reading (Zevenbergen & Whitehurst, 2003). It centres on 4 principles; prompting, evaluating, expanding and repeating (PEER) to maximise the role of the parent during parent-child reading. A number of studies have found positive impacts of DR for children with no additional needs. Some reported benefits of this approach include improved reading comprehension (Zevenbergen & Whitehurst, 2003), language skills (Valdez-Menchaca & Whitehurst, 1992) and receptive vocabulary (Hargrave & Sénéchal, 2000).

Psychological Theory - Language Development in the Deaf/Hearing Impaired Population

Neuroimaging studies suggest that children who are deaf or hearing impaired (DHI) are born with the same capacity for language learning as their NH peers, as long as there are no additional learning needs present, but a lack of stimulation impacts on the maturation of the brain in areas associated with language (Gordon et al., 2011; Sharma & Campbell, 2011). Although the causes of hearing loss and the level of associated need make it extremely difficult to consider the DHI population an homogenous group, this theory of a 'critical period' (Newport, 1990) underlies the common finding that DHI children present with delayed expressive and receptive oral language. Children who are DHI are not as easily able to access spoken language in early life and may therefore develop atypically with regard to skills such as phonological processing and speech production. Evidence from cochlear implantation

studies supports this, as children who undergo this procedure at an early age generally develop better spoken language skills (Stacey, Fortnum, Barton, & Summerfield, 2006).

Communication mode for DHI children may be heavily dependent on need and there is much disagreement about what is optimal (Gravel & O’Gara, 2003). Whilst some children have sign-language as their first language, others may use only oral language. Many children will be exposed to a combination of communication modes across their development and use them interchangeably or for different purposes. The development of amplification technology and cochlear implants as an intervention, means that children can access spoken language that they may not otherwise have had adequate access to. The evidence surrounding early access to sensory aids suggests that there are benefits of this for oral language development (Stacey et al., 2006; Svirsky, Robbins, Kirk, Pisoni, & Miyamoto, 2000; Tomblin, Oleson, Ambrose, Walker, & Moeller, 2014).

Rationale and Relevance

The importance of language cannot be underestimated. Language is a prerequisite for other skills such as literacy skills which may also develop differently in DHI compared to their NH peers (Cupples, Ching, Crowe, Day, & Seeto, 2014). Furthermore, better spoken language in the DHI population has been associated with fewer peer relationships difficulties in adolescence (Fellinger, Holzinger, Beitel, Laucht, & Goldberg, 2009) and social, emotional

and mental health (SEMH) (Dammeyer, 2009; Fellingner, Holzinger, Fellingner, Holzinger, & Pollard, 2012). Understanding both the factors that influence language in the DHI population and the impact of this, benefits Educational Psychologists (EPs) when they are making recommendations as part of consultation or working as part of multi-disciplinary teams to support children and young people (CYP).

Introduction of the Newborn Hearing Screen in the UK has enabled hearing impairments to be identified soon after birth and therefore families can access early intervention services to support their DHI child (Davis & Hind, 2003). Most DHI children are born to hearing parents and additional evidence suggests that parental involvement in their DHI child's early intervention programmes is associated with positive outcomes; including language (Calderon, 2000). For this reason, parent reading behaviours with their young DHI child would likely lead to positive outcomes for language development. Since EPs are involved in supporting CYP aged 0-25 with special educational needs and disabilities (SEND) (Department for Education & Department of Health, 2015) there is a role for educational psychologists (EPs) in supporting parents of DHI children through early intervention programmes and parent training courses.

The role of parent mediation during parent-child reading is something that has the potential to promote language development in both NH and DHI children. Vygotsky's Zone of Proximal Development theory (Vygotsky, 1934) suggests that mediation plays a role in learning and development (Shabani, Khatib, &

Ebadi, 2010). In order to improve language and reading ability, a parent may mediate the child's reading by supporting with skills such as decoding or comprehension. In doing this, the child is likely to be able to carry out these skills independently the next time they are presented with a similar task. It is hugely important to consider how parents of children who are DHI may differ in their levels of mediation when reading with their child. The dialogic reading principles clearly suggest some techniques involved in successful mediation during parent-child reading and we should therefore consider that such mediation strategies might have similar relevance for DHI children. Although some studies have investigated specific reading interventions, such as dialogic reading, with the DHI population (Continisio et al., 2018; Fung, Wing-Yin Chow, & McBride-Chang, 2005), there is still a certain paucity of research on this subject. EPs undergo additional training that renders them a huge resource for educating parents on the sorts of behaviours that will nurture language development in CYP. Their role as evidence-based practitioners also gives them an advantage of considering the literature to inform their recommendations. Through understanding the research around language development and how this differs in DHI children, EPs can be involved in teaching parents how to mediate effectively when reading with their DHI children and this has the potential to promote language development.

Review Question

This review addresses the following question: 'What do we know about the effectiveness of parent shared book reading behaviours for language outcomes in children who are deaf or hearing impaired?'

Critical Review of the Evidence Base

Literature Search

A search of the literature was conducted between 30th December 2018 and 3rd January 2019 using three electronic databases; Web of Science, ERIC and PsycINFO. Table 1 shows the search terms used to identify relevant studies. Where possible, a filter for peer-reviewed journal articles was applied to the search results to satisfy the 'Publication Type' inclusion criterion.

Table 1

Search terms applied to electronic databases

1		2		3		4
parent*		reading		deaf*		
OR	AND	OR	AND	OR	AND	language
carer*		literacy		hearing		
				impair*		

Note Table 1: * denotes a wild card for word endings. All letters before the asterix are included with the potential for alternative endings. For example, parent* could be 'parents' or 'parental'.

Selection of Review Studies

The total number of studies identified across all three databases was 242 and these were carefully screened for duplication and relevance. Firstly, 50 duplicated studies were removed leaving 192 studies for consideration. The titles and abstracts of these studies were then screened for relevance to the review question and 124 were removed at the title screen stage and 40 at the abstract screen stage. The remaining 28 studies were included in a full text screening and 23 were excluded (Appendix A) based on the inclusion and exclusion criteria in Table 2. The remaining 5 studies were included in this

review (Table 3). Figure 1 is a visual depiction of the search and screening process.

Table 2

Inclusion and exclusion criteria

	Inclusion	Exclusion	Rationale
1. Date	After 1 st January 1994	Before 1 st January 1994	The reviewer is interested in research conducted after the introduction of the UK SEN Code of Practice (1994).
2. Language	Article published in English.	Article published in a language that is not English.	Difficult to locate accurate translations of text.
3. Study type	Quantitative.	Qualitative.	The reviewer is only interested in quantitative studies.
4. Publication type	The study has been published in a peer-reviewed journal.	The study has not been published in a peer reviewed journal.	Peer-reviewed articles have been subject to a more rigorous review process and therefore are likely to meet certain quality standards.
5. Data	The study must involve the collection and analysis of data.	The study did not involve the collection and analysis of data.	Only empirical studies that have collected and analysed data can be used for the systematic literature review.
6. Participants	Participants are early years or primary age.	Participants are older than primary age.	Since language development in early childhood is important, the researcher is interested in children who are preschool or primary age.
7. Intervention	The study reports on parent reading or literacy	Does not report on parent reading or literacy	The reviewer is interested in the association between

	Inclusion	Exclusion	Rationale
	intervention, programme or behaviour.	intervention, programme or behaviour.	reading and language outcomes, so studies must contain a parent reading or literacy intervention, programme or behaviour.
8. Outcome measures	Expressive and/or receptive oral language outcomes have been measured in the study.	Does not measure language outcomes or measures sign language outcomes.	The reviewer is interested in the association between reading and language outcomes, so studies must contain a language measure.

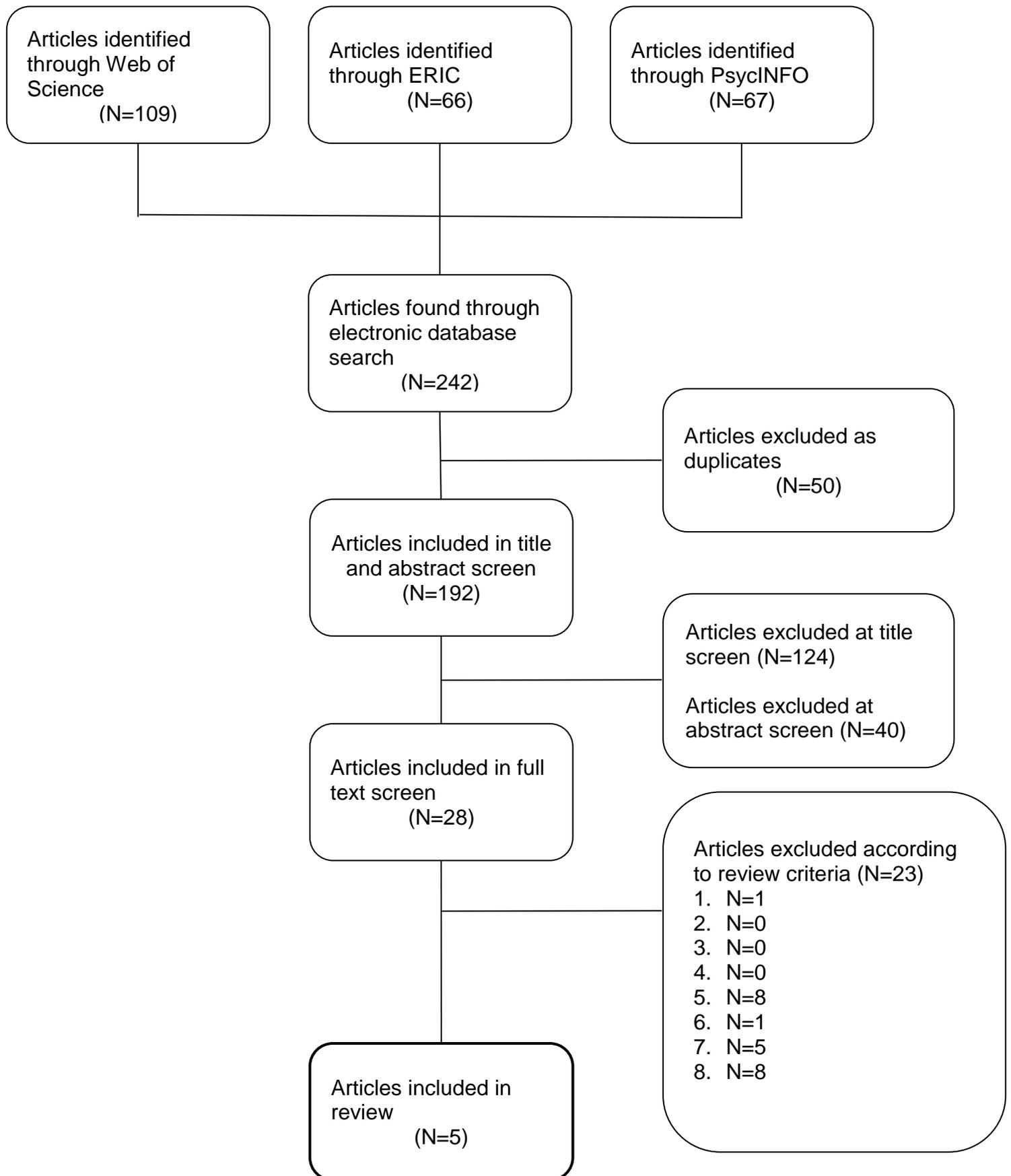
Table 3

List of included studies

Included studies
Aram, D., Most, T., & Mayafit, H. (2006). Contributions of Mother–Child Storybook Telling and Joint Writing to Literacy Development in Kindergartners With Hearing Loss. <i>Language Speech and Hearing Services in Schools</i> , 37(3), 209.
Continisio, G. I., Mattiello, A., Toscano, S., Continisio, P., Paternoster, M., Guarino, A., ... Marciano, E. (2018). Dialogic reading in the rehabilitation of Children with Hearing Loss and the “Born to Read” Project: A pilot study. <i>Scandinavian Journal of Psychology</i> , 59(5), 518–523.
Desjardin, J. L., Doll, E. R., Stika, C. J., Eisenberg, L. S., Johnson, K. J., Ganguly, D. H., ... Henning, S. C. (2014). Parental support for language development during joint book reading for young children with hearing loss. <i>Communication Disorders Quarterly</i> , 35(3), 167–181.
DesJardin, J. L., Stika, C. J., Eisenberg, L. S., Johnson, K. C., Hammes Ganguly, D. M., Henning, S. C., & Colson, B. G. (2017). A Longitudinal Investigation of the Home Literacy Environment and Shared Book Reading in Young Children With Hearing Loss. <i>Ear and Hearing</i> , 38(4), 441–454.
Fung, P.-C., Wing-Yin Chow, B., & McBride-Chang, C. (2005). The Impact of a Dialogic Reading Program on Deaf and Hard-of-Hearing Kindergarten and Early Primary School-Aged Students in Hong Kong. <i>Journal of Deaf Studies and Deaf Education</i> , 10(1), 82.

Figure 1

Flowchart representation of the search and screening process



Appraisal of quality and relevance

The studies included in this review were each appraised using the framework by Gough (2007). This framework structures the appraisal of studies according to 4 criteria; weight of evidence (WoE) A, which pertains to the quality of a study according to agreed criteria, WoE B, which considers the methodological relevance of the each study to the review question, WoE C, which appraises how relevant the focus of each study is to the review question, and WoE D which provides an overall rating for the study by taking an average of the first three categories. WoE ratings are summarised in Table 4, protocols for WoE A and further information about the WoE judgements can be found in Appendix C.

Table 4

Summary of weight of evidence scores

Study	WoE A	WoE B	WoE C	WoE D
Aram, Most & Mayafit (2006)	2	1	2	1.7 (Medium)
Continiso et al. (2018)	0	3	2.7	1.9 (Medium)
Desjardin et al (2014)	2.25	2	2.3	2.29 (High)
Desjardin et al. (2017)	2.25	2	2.3	2.2 (High)
Fung, Wing-Yin & McBride-Chang (2005)	2	3	2	2.3 (High)

Participants

Across all the review studies, there were 240 child participants aged between 6 months, at age of enrolment, and 9 years 1 month. Of these, 146 were DHI children and 94 were NH children who acted as controls in some studies. The number of child participants in each study ranged from 26 to 105, however the number of DHI children in any one study ranged from 17 to 45.

In three out of five studies, there was an adequate description of child participants, however there was minimal information in Continisio et al. (2018) and Fung et al. (2005) about how participants' hearing loss had been assessed and categorised and this was reflected in the WoE A weighting. Studies were carried out in four different countries, two in the USA (Desjardin et al., 2014; DesJardin et al., 2017), one in Israel (Aram, Most, & Mayafit, 2006), one in Italy (Continisio et al., 2018) and one in Hong Kong (Fung et al., 2005). The ability to generalise the findings from these populations to the United Kingdom will vary and studies carried out in countries that are part of the Convention on the Organisation for Economic Co-operation and Development (OECD) were therefore given a higher WoE C rating.

Each study also involved the children's parents. Four of the five studies provided information about the parents. The exception is Continisio et al. (2018) where the lack of information about adult participants meant this study was given a lower WoE A rating. The parents whose information was included

were all reported to use spoken language as their primary form of communication with their child. This is important for comparing the participants across the review studies, as there are no differences in the predominant communication mode used between parents and children. Only a small number in each study reported having a HI themselves and these parents used amplification technology to support their hearing.

Design

Two of the studies in this review used a cross-sectional design (Aram et al., 2006; Desjardin et al., 2014), two used randomised control trials (RCTs) (Continisio et al., 2018; Fung et al., 2005) and one was a longitudinal study (DesJardin et al., 2017). Since only two studies were experimental in nature and involved the implementation of a reading intervention, we are only able to infer causality from these studies. This is reflected in a higher WoE B rating for Fung et al. (2005) and Continisio et al. (2018). Furthermore, the benefits for internal validity of random allocation to conditions (Barker, Pistrang, & Elliott, 2016), as seen in the RCTs (Continisio et al., 2018; Fung et al., 2005), is something that is viewed favourably in the Gersten et al. (2005) coding protocol and contributed to the WoE A scores for these studies. Use of a comparison group was present in all of the studies except Aram et al. (2006), but the nature of these groups varied. In Desjardin et al. (2014) and DesJardin et al. (2017), DHI children were compared to NH children and in Fung et al. (2005) and Continisio et al. (2018) the children were randomly assigned to the intervention or control groups. Thus Aram et al. (2006) was given a lower WoE B score due to the lack of control group.

Since children who are DHI may have additional learning needs, each study carefully controlled for other conditions or disabilities and these children did not make up the samples used for research. Families were, however, recruited very differently across the studies making it difficult to ascertain whether the samples are truly representative of the population as a whole. Researchers recruited from a range of sources including research groups, databases, non-profit organisations and schools. We must consider that, in some countries, researchers may have access to databases from routine hearing screens or national organisations that support the DHI population and their families. In others, however, children with SEND may be educated in specialist settings and so researchers may need to recruit from schools in local areas. The latter appears to be true for Fung et al. (2005) whose participants were mostly recruited from one school and therefore limits the ability to which their findings can be generalised. Similarly the study by Aram et al. (2006) used only children from central Israel and again this limits how the findings can be applied more widely. Random sampling was not used in any of the studies and the method used by most of the researchers was convenience sampling.

It is unclear whether any of the studies undertook a power analysis and therefore whether they were sufficiently powered. DesJardin et al. (2017) reported reduced power as a limitation of their study but the statistic was not reported and Fung et al. (2005) also commented that their sample size was small but, again, no power statistic was reported. The remaining studies did

not report any power calculations. The difficulty of recruiting from the DHI population may explain the small sample sizes of the studies in this review. We must therefore consider that any effects found in the review studies should be interpreted with caution as findings from inadequately powered studies may not reflect a true effect. It is important for researchers to calculate and report power analyses so that those reading the literature can make an informed judgement about the reliability and validity of the results.

Finally, where parents and their children were filmed as part of the study, we must consider that parents or children may have altered their behaviour either consciously or sub-consciously. We cannot conclude that parents' behaviours, measured for the purpose of the research, are an accurate representation of their natural behaviours.

Measures

Researchers employed a variety of measures to assess children's language. All studies measured receptive language, however only three measured both expressive and receptive language (Continisio et al., 2018; Desjardin et al., 2014; DesJardin et al., 2017). Measuring both expressive and receptive language enables additional conclusions to be drawn about the effects of reading on the children's language abilities. Studies that measured both types of language were scored higher on WoE C. Standardised measures of language were also employed to some extent by all studies. The Peabody Picture Vocabulary Test III (PPVT-III) was commonly used to assess receptive

language and the Griffiths and Pre-school Language Scales (PLS-4) were utilised as measures of expressive and receptive language. Although the benefit of standardised measures is well documented, the measures are not necessarily standardised for the countries that they are used in. This issue is particularly pertinent for Fung et al. (2005), Continisio et al. (2018) and Aram et al. (2006) where there was a discrepancy between language spoken by participants and that of the standardisation sample. Thus translating the assessment may have been detrimental to its reliability and validity.

Parent reading behaviours were also operationalised and measured differently between studies. Two studies reported on the frequency of JBR with the DHI children and their NH controls (Desjardin et al., 2014; DesJardin et al., 2017). This is an important measure to consider as it may prove to be a confounding variable when analysing the relationship of other reading behaviours, such as dialogic reading, with language. In other words, the quantity of reading may have mediated the impact of the quality. Aside from JBR frequency, parent reading behaviours that were measured in the review studies included dialogic reading, interactive reading and facilitative language techniques (FLT). These relate to the way the parent reads to the child and the language-related strategies they employ whilst reading to them. In the cross-sectional and longitudinal studies, multiple measures were employed to measure parent reading behaviours; giving a clearer understanding of parent behaviours which can promote language in DHI children. Studies that examined multiple parent behaviours were therefore awarded a higher WoE C score.

Outcomes

The studies included in this review utilised different designs and measures and thus a variety of data analyses were carried out by the authors. Studies that contained a detailed description of their measures, such as including reliability coefficients, were considered to be of higher quality and were therefore weighted higher for WoE A. In addition to the variety of reported statistics, some of the studies included in this review did not report effect sizes and where possible in these cases, effect sizes were calculated using the Campbell Collaboration calculator (Wilson, 2015). In the case of correlational research, the variables that had been measured were carefully considered to ascertain both which were the most relevant to the review and which were the most comparable across the included studies. Due to the complexity of the variables measured and lack of composite scores for parent shared book reading behaviours in Desjardin et al. (2017), it was decided to use only the expressive and receptive language scores reported at the 36 month time point. This time point is the most comparable in terms of participant age for the purpose of this review. Table 5 contains the effect sizes of the outcomes measured and discussion of outcomes is organised according to the type of language measured.

Table 5

Effect sizes for review studies. Joint Book Reading (JBR), Shared Book Reading (SBR), Facilitative Language Techniques (FLT), Peabody Picture Vocabulary Test (PPVT), Deaf/Hearing Impaired (DHI), Normal Hearing (NH)

Study	Sample size	Outcome measure(s)	Reported effect size or statistic	Converted effect size (Cohen's d)	Method of effect size calculation or conversion	Effect size descriptor (Small = 0.2, Medium = 0.5, Large = 0.8)	Overall WoE D rating
Aram, Most & Mayafit (2006)	30 DHI children (14 boys, 16 girls) and their NH mothers	Interactive Reading and Phonological Awareness	$r = 0.43$	0.95	Correlations extracted from paper and converted using Campbell Collaboration Calculator	Large	1.7 (Medium)
		Interactive Reading and Receptive Vocabulary	$r = 0.33$	0.70		Medium	
		Dialogic Reading and Receptive Vocabulary	$r = 0.32$	0.68		Medium	
		Dialogic Reading and Phonological Awareness	$r = 0.27$	0.56		Medium	
Continiso et al. (2018)	26 DHI children and their parents (14 intervention, 12 control)	Receptive/Expressive language (using Griffiths Scales)	None	N/A	Data not available for calculation of effect size	N/A	1.9 (Medium)

Desjardin et al (2014)	45 DHI children and their parents	Frequency of JBR and receptive language (for DHI children)	$r = 0.39$	0.85	Correlations extracted from paper and converted using Campbell Collaboration Calculator	Large	2.29 (High)
	60 NH children and their parents	Higher level FLT's and receptive language (for DHI children)	$r = 0.49$	1.12		Large	
		Higher level FLT's and expressive (for DHI children)	$r = 0.47$	1.07		Large	
Desjardin et al. (2017)	17 DHI children and their parents	Interactive reading and receptive language at 36 months	$r = 0.70$	1.96	Correlations extracted from paper and converted using Campbell Collaboration Calculator	Large	2.2 (High)
		Interactive reading and expressive language at 36 months	$r = 0.71$	2.02		Large	
	34 NH children and their parents	SBR frequency and receptive language at 36 months	$r = 0.15$	0.30		Small	
		SBR frequency and expressive language at 36 months	$r = 0.26$	0.54		Medium	
		High FLT's at 12 months and receptive language at 36 months	$r = 0.65$	1.71		Large	

		Low FLT's at 12 months and receptive language at 36 months	$r = -0.30$	-0.63		Medium negative	
		High FLT's at 12 months and expressive language at 36 months	$r = 0.24$	0.49		Small	
		Low FLT's at 12 months and expressive language at 36 months	$r = -0.29$	-0.61		Medium negative	
Fung, Wing-Yin & McBride-Chang (2005)	28 DHI children	Receptive vocabulary (using PPVT)	$\eta^2 = 0.276$	1.23	Extracted from paper and converted using Campbell Collaboration Calculator	Large	2.3 (High)

Receptive Language

Frequency of JBR was considered by two studies. A small effect was found by Desjardin et al. (2017) but a large effect by Desjardin et al. (2014). This should be considered alongside other measures, as set out in WoE C where studies with multiple measures were given a higher weighting than studies who simply measured JBR frequency. The second parent reading behaviour that was considered was interactive reading which was judged using videoed footage of parent-child JBR and correlated with receptive language measures. Medium to large effect sizes were found across two studies for interactive reading. This suggests that parents successfully promote their child's language and understanding by asking questions and discussing the book. Finally, the effect of dialogic reading on children's receptive language was the most widely reported parent behaviour across the review studies. Effect sizes were available for Aram et al. (2006) and Fung et al. (2005), however Continisio et al. (2018) did not report any data that could be used to calculate an effect. This lack of data meant that Continisio et al. (2018) scored lower on the WoE A coding for this study. Continisio et al. (2018) reported improved language scores for 36% of children who received the dialogic reading programme versus 25% of controls. We must consider that receptive and expressive language have been combined within the reported Griffiths C measure in this paper and so we cannot infer the benefits of the dialogic reading intervention for either language type.

Expressive Language

Some studies included an assessment of expressive language in addition to receptive measures. These studies were awarded a higher WoE C rating as designs with a wider range of measures allow us to gain a more holistic picture of language skills for the review question. The Continisio et al. (2018) paper did not give particularly clear evidence to support the benefits of a dialogic reading intervention for language skills, so the findings from this review are taken from correlations in Desjardin et al. (2017) and Desjardin et al. (2014). Nonetheless, a large effect size was found for interactive reading and a medium effect size for frequency of JBR, suggesting that there are similar benefits associated with these behaviours as there are for receptive language. Interestingly, there were varied effect sizes for FLT's measures and expressive language. In Desjardin et al. (2017) there was only a small effect for parents who utilised high FLT's, however, Desjardin et al. (2014) found a large effect. Furthermore, there was a medium negative effect for low FLT's and expressive language suggesting that a lack of FLT's are associated with negative expressive language outcomes. The results of this review seem less clear for expressive language than for receptive and only tentative conclusions can be made regarding this outcome.

Phonological Awareness

Aram and colleagues (2006) also included phonological awareness as a measure of linguistic skills in their study. The researchers reported medium and large effects for dialogic reading and interactive reading respectively. The level of hearing impairment of each child was taken into account by presenting

the words as images whilst assessing phonological awareness. This is a strength of the design in this study and we can conclude that the two parent behaviours measured are associated with better phonological awareness in their child. The mechanisms for this might be unknown, however the codes used by the researchers for both dialogic and interactive reading imply that significant mediation and support for the child is applied by parents who scored highly on these measures.

Conclusion and Recommendations

Conclusions

This review aimed to explore the parent reading behaviours associated with language development in DHI children. Overall, there is good evidence that particular parent reading behaviours are associated with the development of both receptive language and phonological awareness in children who are DHI, but the findings around expressive language are somewhat unclear. The lack of experimental research makes it more difficult to attribute positive language outcomes to the specific reading behaviours measured in the review studies. Conclusions can therefore be drawn about the associations between parent-child reading behaviours and language but not necessarily the effects of these behaviours.

Recommendations

Early intervention programmes and parent involvement in these are important for DHI children's outcomes (Calderon, 2000). This review suggests that there

are language benefits of frequent JBR between DHI children and their parents (Desjardin et al., 2014; DesJardin et al., 2017). The importance of regular JBR is something that can be promoted as part of early intervention services and EP advice. Evidence from the review studies suggests that parents reading more frequently with their children (Continisio et al., 2018) is associated with positive language development.

This review also highlights a number of beneficial behaviours that parents can be taught to employ whilst reading with their DHI child. Mediation, as seen in the dialogic reading principles, is an important behaviour for promoting language. The role of facilitative language techniques, such as asking open-ended questions, can also benefit language in DHI children. Teaching and modelling these behaviours to parents of DHI children would hopefully support them when reading with their children. There may also be benefits of these techniques for child engagement and where children are more engaged with reading, this would likely increase the frequency with which they participate in reading activities.

Future Research

Further research regarding reading interventions specifically for young DHI children is needed. This review found a paucity of studies investigating specific reading interventions in the DHI population and additional research is required to ascertain whether such interventions have a positive impact on DHI children's language. Two studies examined the impact of dialogic reading

programmes, but more research will need to be carried out to clarify whether this type of home reading intervention is effective for DHI children's language. Increased longitudinal research will also contribute to the current knowledge base on this subject. Whilst it would be unethical to withhold a potentially beneficial intervention from children over a long period of time, tracking the language development of DHI children whose parents are employing a targeted reading programme will assess whether initial benefits are sustained.

None of the studies in this review were carried out in the United Kingdom (UK) and we are therefore limited in the extent to which we can generalise the findings to the UK DHI population. It will be beneficial for researchers in the UK to investigate the effectiveness of parent reading behaviours and interventions for child language development.

References and Appendices

References

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picture book reading intervention for preschoolers. In *On reading books to children: Parents and teachers* (pp. 177–200).

Appendix A: List of excluded studies

Excluded Study (Full Reference)	Exclusion Criteria	Exclusion Description
Andrews, J. F., & Zmijewski, G. (1997). How parents support home literacy with deaf children. <i>Early child development and care</i> , 127(1), 131-139.	8	The study did not measure language outcomes.
Borg, E., Edquist, G., Reinholdson, A. C., Risberg, A., & McAllister, B. (2007). Speech and language development in a population of Swedish hearing-impaired pre-school children, a cross-sectional study. <i>International journal of pediatric otorhinolaryngology</i> , 71(7), 1061-1077.	7	The study did not involve a parent-led reading intervention or analysis of parent reading behaviours.
Brown, P. M., & Watson, L. M. (2017). Language, play and early literacy for deaf children: the role of parent input. <i>Deafness & Education International</i> , 19(3-4), 108-114.	5	The study was not empirical in nature and therefore did involve the collection of raw data.
Cannon, J. E., Fredrick, L. D., & Easterbrooks, S. R. (2010). Vocabulary instruction through books read in American Sign Language for English-language learners with hearing loss. <i>Communication Disorders Quarterly</i> , 31(2), 98-112.	7	The study did not involve a parent-led reading intervention or analysis of parent reading behaviours.
DesJardin, J. L., & Ambrose, S. E. (2010). The importance of the home literacy environment for developing literacy skills in young children who are deaf or hard of hearing. <i>Young Exceptional Children</i> , 13(5), 28-44.	5	The study was not empirical in nature and therefore did involve the collection of raw data.
Dirks, E., & Wauters, L. (2018). It takes two to read: Interactive reading with young deaf and hard-of-hearing children. <i>The Journal of Deaf Studies and Deaf Education</i> , 23(3), 261-270.	8	The study did not measure language outcomes.
Lederberg, A. R., Schick, B., & Spencer, P. E. (2013). Language and literacy development of deaf and hard-of-hearing children: successes and challenges. <i>Developmental psychology</i> , 49(1), 15.	5	The study was not empirical in nature and therefore did involve the collection of raw data.

Lutz, L. (2017). The Early Years: Parents and Young Deaf Children Reading Together. <i>Odyssey: New Directions in Deaf Education</i> , 18, 4-10.	5	The study was not empirical in nature and therefore did not involve the collection of raw data.
Miller, P. F. (2000). Syntactic and semantic processing in Hebrew readers with prelingual deafness. <i>American Annals of the Deaf</i> , 145(5), 436-451.	6	The participants in the study were not primary or preschool age.
Moore, D. F., & Sweet, C. (1990). Relationships of English grammar and communicative fluency to reading in deaf adolescents. <i>Exceptionality: A Special Education Journal</i> , 1(2), 97-106.	1	The article was published before 1 st January 1994.
Mueller, V., & Hurtig, R. (2009). Technology-enhanced shared reading with deaf and hard-of-hearing children: The role of a fluent signing narrator. <i>Journal of Deaf Studies and Deaf Education</i> , 15(1), 72-101.	8	The study measured sign language outcomes not oral language outcomes.
Nielsen, D. C., Luetke, B., McLean, M., & Stryker, D. (2016). The English-language and reading achievement of a cohort of deaf students speaking and signing standard English: a preliminary study. <i>American Annals of the Deaf</i> , 161(3), 342-368.	7	The study did not involve a parent-led reading intervention or analysis of parent reading behaviours.
Rathmann, C., Mann, W., & Morgan, G. (2007). Narrative structure and narrative development in deaf children. <i>Deafness & Education International</i> , 9(4), 187-196.	5	The study was not empirical in nature and therefore did not involve the collection of raw data.
Robertson, L., Dow, G. A., & Hainzinger, S. L. (2006). Story retelling patterns among children with and without hearing loss: Effects of repeated practice and parent-child attunement. <i>Volta Review</i> , 106(2), 147.	8	The study did not measure language outcomes.
Sarant, J. Z., Holt, C. M., Dowell, R. C., Rickards, F. W., & Blamey, P. J. (2008). Spoken language development in oral preschool children with permanent childhood deafness. <i>Journal of Deaf</i>	7	The study did not involve a parent-led reading intervention or analysis of parent reading behaviours.

Studies and Deaf Education, 14(2), 205-217.

Stobbart, C., & Alant, E. (2008). Home-based literacy experiences of severely to profoundly deaf preschoolers and their hearing parents. <i>Journal of Developmental and Physical Disabilities</i> , 20(2), 139-153.	8	The study did not measure language outcomes.
Swanwick, R., & Watson, L. (2005). Literacy in the homes of young deaf children: Common and distinct features of spoken language and sign bilingual environments. <i>Journal of Early Childhood Literacy</i> , 5(1), 53-78.	5	The study was not empirical in nature and therefore did involve the collection of raw data.
Swanwick, R., & Watson, L. (2007). Parents sharing books with young deaf children in spoken English and in BSL: The common and diverse features of different language settings. <i>Journal of Deaf Studies and Deaf Education</i> , 12(3), 385-405.	8	The study did not measure language outcomes.
von Mentzer, C. N., Lyxell, B., Sahlén, B., Wass, M., Lindgren, M., Ors, M., ... & Uhlén, I. (2013). Computer-assisted training of phoneme–grapheme correspondence for children who are deaf and hard of hearing: Effects on phonological processing skills. <i>International Journal of Pediatric Otorhinolaryngology</i> , 77(12), 2049-2057.	8	The study did not measure language outcomes.
Waldner, H. M. (2004). Family Fun Night: Where Stories Come Alive!. <i>Odyssey: New Directions in Deaf Education</i> , 5(2), 32-33.	5	The study was not empirical in nature and therefore did involve the collection of raw data.
Watkins, S., Pittman, P., & Walden, B. (1998). The deaf mentor experimental project for young children who are deaf and their families. <i>American Annals of the Deaf</i> , 143(1), 29-34.	7	The study did not involve a parent-led reading intervention or analysis of parent reading behaviours.
Wauters, L., & Dirks, E. (2017). Interactive reading with young deaf and hard-of-hearing children in eBooks versus	8	The study did not measure language outcomes.

print books. *The Journal of Deaf Studies and Deaf Education*, 22(2), 243-252.

Williams, C. (2012). Promoting vocabulary learning in young children who are d/Deaf and hard of hearing: Translating research into practice. *American annals of the deaf*, 156(5), 501-508.

5

The study was not empirical in nature and therefore did involve the collection of raw data.

Appendix B: Mapping the field

Author(s)	Research Aims	Study Design	Country	Participants (including age and degree of hearing loss)	Reading intervention or behaviour	Outcome measure(s)	Key findings
Aram, Most & Mayafit (2006)	To explore the mother-child story book reading and writing interactions that are associated with the development of literacy skills	Cross sectional design using videoed mother-child interactions and assessments of reading and writing skills	Israel	30 kindergartners with hearing loss (14 boys, 16 girls) and their hearing mothers	Story-book reading	Child: Alphabetic skills and linguistic skills	Higher parent mediation skills associated with better language skills
Continiso et al. (2018)	To examine the impact of a dialogic reading intervention on children with hearing loss	Pilot Study - Quasi experimental	Italy	26 children with hearing loss and their parents (14 intervention, 12 control)	Dialogic reading intervention	Griffiths Scales for expressive and receptive language and motor coordination	Positive impact of dialogic reading intervention on language
Desjardin et al (2014)	To explore the relationship between the home literacy	Cross-sectional design using videoed	USA	45 children with hearing loss and their parents		Preschool Language Scale	Higher FLTs associated with better language

	environment and observed parent-child behaviour	interactions, language assessments and parent questionnaires		60 children with normal hearing and their parents			Frequency of JBR positively correlated with language measures
Desjardin et al. (2017)	To explore the relationship between parent reading behaviours and the language development of children with hearing loss	Cross-sectional longitudinal	USA	17 children with hearing loss and their parents 34 children with normal hearing and their parents	Parent joint book reading frequency and behaviours	Preschool Language Scale	Parent measures predicted language over time Frequency of SBR positively correlated with language measures
Fung, Wing-Yin & McBride-Chang (2005)	To examine the impact of a dialogic reading intervention on children with hearing loss.	Quasi experimental	Hong Kong	28 children with hearing loss	Dialogic reading intervention	Peabody Picture Vocabulary Test 3	Positive impact of dialogic reading intervention on language

Appendix C: Weight of Evidence Criteria

The following papers were used for Weight of Evidence judgements

Correlational: Thompson, B., Diamond, K. E., McWilliam, R., Snyder, P., & Snyder, S. W. (2005). Evaluating the quality of evidence from correlational research for evidence-based practice. *Exceptional Children*, 71(2), 181-194.

Group experimental: Gersten, R., Fuchs, L. S., Compton, D., Coyne, M., Greenwood, C., & Innocenti, M. S. (2005). Quality indicators for group experimental and quasi-experimental research in special education. *Exceptional children*, 71(2), 149-164.

WoE framework: Gough, D. (2007). Weight of evidence: a framework for the appraisal of the quality and relevance of evidence. *Research papers in education*, 22(2), 213-228.

Weight of Evidence A – Methodological quality of the research

Two different protocols were used in this review due to the varying research designs employed by the researchers. For correlational research, a coding protocol was designed based on Thompson et al. (2005). For group experimental and quasi experimental research, the Gersten et al. (2005) was adapted to create a coding protocol. These papers offer suggested quality indicators for the type of research design employed in a study. They were therefore used as an indicator of quality in the present review.

[Coding Protocol for Correlational Research, taken from Thompson, Diamond, McWilliam, Snyder, & Snyder, 2005]

Name of coder:

Date:

Full study reference: Desjardin, J. L., Doll, E. R., Stika, C. J., Eisenberg, L. S., Johnson, K. J., Ganguly, D. H., ... Henning, S. C. (2014). Parental support for language development during joint book reading for young children with hearing loss. *Communication Disorders Quarterly*, 35(3), 167–181.

Quality Indicators A - Measurement

1. Score reliability coefficients are reported for all measured variables, based on induction from a prior study or test manual, with explicit and reasonable justifications as regards comparabilities of (a) sample compositions and (b) score dispersions.

Yes

N/A

No

Unknown/Could not Code

2. Score reliability coefficients are reported for all measured variables based on analysis of the data in hand in the particular study.

Yes

N/A

No

Unknown/Could not Code

3. Evidence is inducted, with explicit rationale, from a prior study or test manual that suggests scores are valid for the inferences being made in the study.

Yes

N/A

No

Unknown/Could not Code

4. Score validity is empirically evaluated based on data generated within the study.

Yes

N/A

No

Unknown/Could not Code

5. The influences of score reliability and validity on study interpretations are explicitly considered in reasonable detail.

Yes

N/A

No

Unknown/Could not Code

Quality Indicators B – Practical and Clinical Significance

1. One or more effect size statistics is reported for each study primary outcome, and the effect statistic used is clearly identified.

- Yes N/A
 No Unknown/Could not code

2. Authors interpret study effect sizes for selected practices by directly and explicitly comparing study effects with those reported in related prior studies.

- Yes N/A
 No Unknown/Could not code

3. Authors explicitly consider study design and effect size statistic limitations as part of effect interpretation.

- Yes N/A
 No Unknown/Could not code

Quality Indicators C - Avoidance of some common macro-analytic mistakes

1. GLM weights (e.g., beta weights) are interpreted as reflecting correlations of predictors with outcome variables only in the exceptional case that the weights indeed are correlation coefficients.

- Yes N/A
 No Unknown/Could not Code

2. When noteworthy results are detected, and the origins of these effects are investigated, the interpretation includes examination of structure coefficients.

- Yes N/A
 No Unknown/Could not Code

3. Interval data are not converted to nominal scale, unless such choices are justified on the extraordinary basis of distribution shapes, and the consequences of the conversion are thoughtfully considered as part of result interpretation.

- Yes N/A
 No Unknown/Could not Code

4. Univariate methods are not used in the presence of multiple outcome variables.

- Yes N/A
 No Unknown/Could not Code

5. Univariate methods are not used post hoc to multivariate tests.

- Yes N/A
 No Unknown/Could not Code

6. Persuasive evidence is explicitly presented that the assumptions of statistical methods are sufficiently well-met for results to be deemed credible.

Yes

N/A

No

Unknown/Could not Code

Quality Indicators D - Confidence intervals for reliability coefficients, statistics and effect sizes

1. Confidence intervals are reported for the reliability coefficients derived for study data.

Yes

N/A

No

Unknown/Could not Code

2. Confidence intervals are reported for the sample statistics (e.g., means, correlation coefficients) of primary interest in the study.

Yes

N/A

No

Unknown/Could not Code

3. Confidence intervals are reported for study effect sizes.

Yes

N/A

No

Unknown/Could not Code

Summary:

	Yes %	Score (<33% = 1, 33-66% = 2, >66% = 3)
Overall score for A (Measurement)	40%	2
Overall score for B (Practical and Clinical Significance)	100%	3
Overall score for C (Avoidance of some common macro-analytic mistakes)	67%	3
Overall score for D (Confidence intervals for reliability coefficients, statistics and effect sizes)	0%	1
Total score (Average)		2.25

[Coding Protocol for Group Experimental and Quasi Experimental Research, taken from Gersten et al., 2005]

Name of coder:

Date: 1.2.18

Full study reference: Fung, P.-C., Wing-Yin Chow, B., & McBride-Chang, C. (2005). The Impact of a Dialogic Reading Program on Deaf and Hard-of-Hearing Kindergarten and Early Primary School-Aged Students in Hong Kong. *Journal of Deaf Studies and Deaf Education*, 10(1), 82.

Essential and Desirable Quality Indicators for Group Experimental and Quasi-Experimental Research Articles and Reports

Essential Quality Indicators - Quality Indicators for Describing Participants

6. Was sufficient information provided to determine/confirm whether the participants demonstrated the disability(ies) or difficulties presented?

Yes

N/A

No

Unknown/Could not Code

7. Were appropriate procedures used to increase the likelihood that relevant characteristics of participants in the sample were comparable across conditions?

Yes

N/A

No

Unknown/Could not Code

8. Was sufficient information given characterizing the interventionists or teachers provided? Did it indicate whether they were comparable across conditions?

Yes

N/A

No

Unknown/Could not Code

Essential Quality Indicators - Quality Indicators for Implementation of the Intervention and Description of Comparison Conditions

5. Was the intervention clearly described and specified?

Yes

N/A

No

Unknown/Could not code

6. Was the fidelity of implementation described and assessed?

Yes

N/A

No

Unknown/Could not code

7. Was the nature of services provided in comparison conditions described?

Yes

No

N/A

Unknown/Could not code

Essential Quality Indicators - Quality Indicators for Outcome Measures

1. Were multiple measures used to provide an appropriate balance between measures closely aligned with the intervention[^] and measures of generalized performance?

Yes

No

N/A

Unknown/Could not code

2. Were outcomes for capturing the interventions effect measured at the appropriate times?

Yes

No

N/A

Unknown/Could not code

Essential Quality Indicators - Quality Indicators for Data Analysis

1. Were the data analysis techniques appropriately linked to key research questions and hypotheses? Were they appropriately linked to the limit of analysis in the study?

Yes

No

N/A

Unknown/Could not code

2. Did the research report include not only inferential statistics but also effect size calculations?

Yes

No

N/A

Unknown/Could not code

Essential Quality Indicators Total Score: 10

Desirable Quality Indicators

1. Was data available on attrition rates among intervention samples? Was severe overall attrition documented? If so, is attrition comparable across samples? Is overall attrition less than 30%?

Yes

No

N/A

Unknown/Could not code

2. Did the study provide not only internal consistency reliability but also test-retest reliability and interrater reliability (when appropriate) for outcome measures? Were data collectors and/or scorers blind to study conditions and equally (un)familiar to examinees across study conditions?

Yes

No

N/A

Unknown/Could not code

3. Were outcomes for capturing the intervention's effect measured beyond an immediate posttest?

Yes

No

N/A

Unknown/Could not code

4. Was evidence of the criterion-related validity and construct validity of the measures provided?

Yes

No

N/A

Unknown/Could not code

5. Did the research team assess not only surface features of fidelity implementation (e.g., number of minutes allocated to the intervention or teacher/interventionist following procedures specified), but also examine quality of implementation?

Yes

No

N/A

Unknown/Could not code

6. Was any documentation of the nature of instruction or series provided in comparison conditions?

Yes

No

N/A

Unknown/Could not code

7. Did the research report include actual audio or videotape excerpts that capture the nature of the intervention?

Yes

No

N/A

Unknown/Could not code

8. Were results presented in a clear, coherent fashion?

Yes

No

N/A

Unknown/Could not code

Desirable Quality Indicators Total Score: 2

	Total	Score
Essential Quality Indicators Note: Total of >9 = Score 1 Total <9 = Score 0	9	1
Desirable Quality Indicators Note: Total of 4-8 = Score 2 Total 1-4 = Score 1 Total 0 = Score 0	2	1
Total Score (3 = High Quality, 2 = Acceptable Quality, <2 = Poor Quality)		2

Study Rating: Acceptable

A summary of the WoE A ratings is below:

Study	WoE A
Aram, Most & Mayafit (2006)	2
Continiso et al. (2018)	0
Desjardin et al (2014)	2.25
Desjardin et al. (2017)	2.25
Fung, Wing-Yin & McBride-Chang (2005)	2

Weight of Evidence B – Relevance of the methodology to the review question

3 criteria were used to determine the relevance of the methodology to the review question:

1. Experimental design – Since experimental studies allow for the manipulation of variables, such as the introduction of an intervention, we are better able to infer causality from these studies. Experimental designs contributed to a higher WoE B rating.
2. Comparison group – Studies that compared either DHI children with NH peers or DHI receiving an intervention with a ‘no intervention’ control group support our understanding of causality. Where DHI are compared with DHI controls for an intervention, we can infer that the intervention caused the difference in language. When DHI are compared with NH children, we can observe any differences in development between the two groups when SBR behaviours are similar.
3. Measures used – In order to obtain an understanding of the relationship between SBR behaviours and language, a study would need to have measured both these variables. These measures needed to be made explicit in the paper in order to obtain a score of at least 1 for WoE B.

	For a high WoE B rating (score of 3), the study must:	For a medium WoE B rating (score of 2) the study must:	For a low WoE B rating (score of 1) the study must:
The study uses an experimental design	√		
The study contains a comparison group	√	√	
The study measures both SBR behaviours and language skills	√	√	√

Study	WoE B rating:
Aram, Most & Mayafit (2006)	1
Continiso et al. (2018)	3
Desjardin et al (2014)	2
Desjardin et al. (2017)	2
Fung, Wing-Yin & McBride-Chang (2005)	3

Weight of Evidence C – Relevance of the evidence to the review question

This WoE rating is based on how relevant each study and its findings are to the review question.

	For a high WoE C rating (score of 3):	For a medium WoE C rating (score of 2):	For a low WoE C rating (score of 1):	Rationale
Sample	The sample is from the UK	The sample is from another OECD country	The sample is not from the UK or an OECD country	Since there are similarities between the education system and services available to DHI children in OECD countries make the findings of such studies more applicable to the UK DHI population
Language outcome measure	Both expressive and receptive oral language skills are measured	Either expressive OR receptive oral language skills are measured	Non-oral language skills are measured	Children’s oral language can be categorised into expressive and receptive skills. In order to obtain a true picture of their language outcomes, it is beneficial for the study to measure both receptive and expressive language.
Intervention details	Parents have received training and/or materials to implement with their child as part of a shared book reading intervention	The study reports on multiple specific shared book reading behaviours from observations of parent-child reading	The study reports on frequency of shared book reading only	In order to assess the impact of parent-child reading behaviours on language outcomes, an intervention that has provided parents with specific training on reading techniques will be the best measure of effectiveness.

A summary of the WoE C ratings is below:

Study	Sample	Language Outcome Measure	Intervention Details	WoE C Rating:
Aram, Most & Mayafit (2006)	2	2	2	2
Continiso et al. (2018)	2	3	3	2.7
Desjardin et al (2014)	2	3	2	2.3
Desjardin et al. (2017)	2	3	2	2.3
Fung, Wing-Yin & McBride-Chang (2005)	1	2	3	2

Weight of Evidence D – Overall rating

To provide an overall weighting for each study, the scores for WoE A, B and C were averaged.

Score	WoE Descriptor
<1	Low
1-2	Medium
>2	High