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Vocabulary intervention for adolescents with language disorder: a systematic review.

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Abstract

Background: Language disorder and associated vocabulary difficulties can persist into adolescence, and can impact on long-term life outcomes. Previous reviews have shown that a variety of intervention techniques can successfully enhance students' vocabulary skills; however, none of them have investigated vocabulary intervention specifically for adolescents with language disorder.

Aim: To carry out a systematic review of the literature on vocabulary interventions for adolescents with language disorder.

Methods: A systematic search of 14 databases and other sources yielded 1320 studies, of which 13 met inclusion criteria. Inclusion criteria were: intervention effectiveness studies with a focus on enhancing oral receptive and/or expressive vocabulary skills in the study's aims; participants in the age range 11:0 – 16:11 with receptive and/or expressive language difficulties of any aetiology.

Main contribution: There was a high degree of diversity between studies. Types of intervention included: semantic intervention (4 studies); comparison of phonological versus semantic intervention (2); and combined phonological-semantic intervention (7). The strongest evidence for effectiveness was found with a combined phonological-semantic approach. The evidence suggested a potential for all models of delivery to be helpful (individual, small group, and whole-class).

Conclusions: Tentative evidence is emerging for the effectiveness of a phonological-semantic approach in enhancing the vocabulary skills of adolescents who have language disorder. Future research needs to refine and develop the methodologies used in this diverse group of studies in order to replicate their findings and to build consensus.

Running Head: Vocabulary intervention: systematic review

Key words: language disorder, adolescents, vocabulary, intervention

What is already known on this subject. Intervention can successfully enhance vocabulary skills in primary school age children with language disorder, and with adolescents in the context of second-language learning. Vocabulary intervention research in the context of adolescents with language disorder is a relatively new area of research.

What this study adds. The current paper provides an overview of the current evidence for vocabulary interventions for adolescents with language disorder.

Clinical implications of this study. Tentative evidence is emerging for the effectiveness of a phonological-semantic approach in enhancing the vocabulary skills of adolescents who have language disorder, justifying this choice of intervention for practitioners.

Introduction

Research has shown that 7.6% of five-year-old children have language difficulties as their primary need, and a further 2.3% have language needs in association with another condition (Norbury *et al.* 2016). The current paper will use the term *language disorder* to describe children and adolescents who show difficulties with acquiring proficiency in their first language, to include those whose difficulties are specific to language, known as developmental language disorder (Bishop *et al.* 2017), as well as those whose language difficulties are associated with another condition, such as hearing loss or Down's syndrome. Language disorder can persist into adolescence, and has long-term influences on a range of academic, social, emotional, and mental health outcomes (Johnson *et al.* 2010).

Vocabulary difficulties are a central component of language disorder (Leonard 1998). The school curriculum is delivered through the medium of language, with vocabulary becoming more technical and abstract through adolescence (Nippold 2007). Moreover, language and literacy difficulties frequently go hand in hand (McArthur, Hogben, Edwards, Heath, and Mengler 2000).

Consequently, difficulties with language necessarily have an impact on academic success (Stothard *et al.* 1998), and the link between vocabulary knowledge and academic progress is well-established (Dockrell *et al.* 2007, Nation and Snowling 2004).

The types of vocabulary difficulty which children and adolescents with language disorder experience pertain to both breadth and depth of word knowledge (McGregor *et al.* 2013): they have fewer words in their vocabularies, and their words have sparser semantic representations. Semantics refers to the meaning of words, with semantic information being organised according to properties such as function, location, attribute, and category. As well as inadequate semantic representations, there is evidence that children and adolescents with language disorder also have weak phonological representations due to phonological processing difficulties (Stackhouse and Wells 1997).

Phonological information about a word includes the word's initial sound, how it rhymes with other

words, and its syllable structure. Leonard (1998) suggests that phonological and semantic weaknesses affect both word storage and word retrieval, thereby affecting both receptive and expressive vocabulary skills.

There is a wealth of educational research advocating methods of vocabulary teaching for typically developing children and adolescents. For example, the robust vocabulary instruction of Beck *et al.* (2013) has been widely promoted for teaching typically developing children and adolescents. Robust vocabulary instruction involves choosing words of maximum functionality to teach, fostering an atmosphere of interest in words, and providing opportunities to discuss what words mean and to use the words in personally meaningful contexts. Following this type of approach, Snow, Lawrence, and White (2009) implemented a class-based intervention with 11 – 14-year-olds, many of whom who had low vocabulary levels in association with second-language learning, for the duration of one academic year. The participating 697 students made progress relative to 319 controls on a multiple-choice task involving 40 of the 120 intervention words. Vocabulary improvement was found to significantly predict scores on the Massachusetts Comprehensive Assessment System, a curriculum assessment used in the USA. In a similar study with 2,082 11-year-olds, Lesaux *et al.* (2014) found significant gains in bespoke reading comprehension tasks containing the taught words, and also reported numerical increases in standardised reading comprehension assessments, which would indicate generalisation of independent word learning skills, though the gains on these measures just fell short of significance.

With their focus on access to the school curriculum, such vocabulary intervention studies frequently target and assess reading comprehension, rather than oral vocabulary, and yet for children with language disorder, who are less able to absorb meanings of new words through written contextual abstraction, direct teaching of new vocabulary is particularly important (Justice *et al.* 2005). To enhance the oral vocabulary skills of primary-school-age children (5 – 11 years) with language disorder, many have advocated a combined phonological-semantic approach (Easton *et al.* 1997, Motsch and Marks 2015, Parsons *et al.* 2005, St John and Vance 2014, Wilson *et al.* 2015).

Semantic intervention includes providing opportunities for children to develop their awareness of function, location, attribute, category, similarities and differences, how to describe what words mean, and how words link with other words which have morphological similarities. Phonological intervention includes providing opportunities for children to develop their awareness of the phonemes within words, the number of syllables, and to recognise and generate rhyming words. Combined phonological-semantic interventions include both these strands of information, and link them together. An example of a phonological-semantic activity is a word map, in which phonological and semantic information are both mapped onto a word in a visual diagram. A key element of phonological-semantic intervention is to provide opportunities to say words aloud and to use them in a meaningful context. Further examples of phonological and semantic intervention are available in Hyde Wright (1993) and Ebbels *et al.* (2012).

A phonological-semantic approach has been studied in a range of educational settings, looking at different models of delivery, and with varied agents of change. The educational setting refers to the type of school; for example, whether it is a mainstream school, or a specialist language educational setting such as a school (or a class within a school) for pupils with severe and complex speech and language disorders, staffed by specialist teachers and speech and language therapists (SLTs). The model of delivery refers to whether the intervention was delivered individually, in small groups, or as a whole class. The agent of change is the person who carries out the intervention, and could be a range of practitioners including SLT, SLT student, teacher, or teaching assistant (a member of school staff who supports a teacher in the classroom). In a clinical therapy setting, the agent of change may also involve the parent; however, most research in this field has taken place in educational settings.

Assessing the enhancement of vocabulary skills typically takes two main perspectives: first, to measure the increase in knowledge of a set of words targeted in the intervention; and second, to measure the impact of the intervention on independent word learning as a consequence of improved transferable word learning skills. To measure increase in word knowledge of targeted words,

author-created bespoke outcome measures are used; to measure impact on independent word-learning, either bespoke outcome measures involving targeted and untargeted words can be used, or standardised vocabulary assessments are administered. A gain on standardised assessment could be taken to indicate a generalisation effect of therapy to independent word learning, and a potential closing of the achievement gap between children and adolescents with language disorder and their typically developing peers. A further perspective in assessing the enhancement of vocabulary skills is to examine the wider impact of intervention on academic attainment.

Examples of studies looking at primary-school age children with language disorder and examining phonological-semantic intervention include Wilson *et al.* (2015), working in a specialist language educational setting with 12 7 – 10-year-olds, intervention being delivered individually by SLTs. In contrast, St John and Vance (2014) used a small group setting in a mainstream primary school with 18 5 - 6-year-olds, with the intervention being delivered by the teacher. These two studies reported significant treatment effects both in increased word knowledge and in independent word learning skills.

However, many changes take place during adolescence, both neurologically (Blakemore and Choudhury 2006) and socially (Whitmire 2000); and, moreover, students moving to secondary school in the UK at 11 years of age encounter an increasingly complex and exam-orientated educational environment. It cannot, therefore, be assumed that therapeutic approaches suitable for primary school age children are applicable to the secondary school age group (11 – 16 years).

Seven previous systematic reviews relevant to vocabulary intervention are known to the current authors. Two reviews covered an adolescent age range (11 – 16 years), but did not include adolescents with language disorder (Ford-Connors and Paratore 2015, Stahl and Fairbanks 1986); four included participants with language disorder or low academic attainment, but did not include 11 – 16 year olds (Cirrin and Gillam 2008, Cirrin *et al.* 2010, Marulis and Neuman 2010, Steele and Mills 2011); and one included the adolescent age range but only considered children with specific

learning difficulties (Jitendra *et al.* 2004). None of these reviews investigated vocabulary intervention specifically for secondary-school-aged adolescents with language disorder.

The current review builds on and extends previous research by addressing the following specific question: What evidence is there for the effectiveness of vocabulary intervention in enhancing the vocabulary skills of adolescents who have language disorder?

Methods

Ethical approval was obtained from the School of Health Sciences Research Ethics Committee, City, University of London. The review was registered in the PROSPERO International prospective register of systematic reviews on 24.5.15, under the title “Vocabulary intervention with adolescents who have language difficulties: a systematic review”, registration number 42015020846. The title was updated on 19.6.17 to “Vocabulary intervention for adolescents with language disorder: a systematic review” to reflect current terminological usage (Bishop *et al.* 2017).

Search strategy

The following databases were first searched between 5.6.15 and 9.6.15: Embase 1974 to June 2015; Medline 1945 to May, week 5, 2015; Cochrane Central Register of Randomised Control Trials (RCTs); Cochrane Database of Systematic Reviews, British Education Index; Cinahl Plus with Full Text; Education Abstracts; ERIC-PsycArticles; PsycINFO; Academic Search Complete; Communication Source; Web of Science; BASE; and Open Grey. No date limits were set except for the Embase and Medline databases, in which date ranges are compulsory. Table 1 shows the concepts which were searched using subject terms and key word searches. Citation searching was carried out from the studies eligible for inclusion. The database searches were fully updated on 15.9.16. From this date, searches were kept up to date through database alerts, hand searching of journals and social media.

INSERT TABLE 1 ABOUT HERE

Study eligibility criteria

Criteria for the inclusion of studies in the systematic review were: intervention effectiveness studies; experimental studies of any methodology on the hierarchy of evidence (Greenhalgh 2014); age range 11:0 – 16:11; language disorder of any aetiology; a focus on enhancing oral receptive and/or expressive vocabulary skills in the study's aims; written in the English language. In order to capture all relevant studies, the search was not restricted to peer-reviewed articles as long the studies met all the above criteria.

Data extraction

An adapted Cochrane Group data extraction form was used to screen for eligibility and to record exclusion codes. Abstract screening and full-text eligibility assessment was carried out by a second reviewer. There were three discrepancies between first and second reviewers on abstract screening, which were resolved once full texts were examined, resulting in 100% agreement. The data extraction form was then used to assess included studies for quality and risk of bias.

Quality appraisal

Studies were awarded a classification according to the American Academy of Neurology Classification of Evidence Scheme: Therapeutic (AAN: Gronseth *et al.* 2011). In this scheme, Class I is the highest rating (RCTs with blind assessment, concealed allocation, clearly defined outcomes, and attrition accounted for). Class II includes RCTs lacking one criteria for Class I; Class III includes other controlled trials with blind assessment; and Class IV is the lowest rating for studies not meeting Class I, II, or III criteria. Detail about the quality of included studies was recorded according to study design, sample size, blinding of assessment, fidelity, control measures, and statistical validity. These features were chosen as being indicators of quality according to the AAN. For each study, the features were recorded as present, absent, or unclear, according to the criteria listed in Table 2.

INSERT TABLE 2 ABOUT HERE

Study characteristics

Outcomes of intervention were examined in relation to: age of participants; model of delivery used (individual, small group, or whole-class), agent of change delivering the intervention; the setting; dosage; assessments; and type of intervention.

Results

Study selection

The search strategy yielded 1320 references. These were screened by title, and exclusion codes recorded. The remaining studies were screened by abstract, using the adapted Cochrane Group data extraction form, and exclusion codes recorded. Seventy-three studies remained for full-text eligibility assessment, of which 60 were excluded. Three references yielded by the systematic search (Lowe & Joffe, 2012; McNamara, 2014; NBSS, 2015), were reports on studies which have since been published in peer-reviewed journals: therefore, for the purposes of this review, further information about NBSS (2015) and McNamara (2014), was taken from Murphy et al. (2017), and information about Lowe and Joffe (2012) was taken from Lowe and Joffe (2017). One reference (Joffe, 2011) was a published intervention manual and contained little detail about the research, and so further information was obtained from Joffe (2017). Thus 13 studies remained for inclusion. The study selection process is illustrated in Figure 1.

INSERT FIGURE 1 ABOUT HERE

Quality appraisal

Study design: Five studies were randomised controlled trials where individuals or groups were randomised to treatment condition (Ebbels *et al.* 2012, Joffe 2006, Joffe 2017, Murphy *et al.* 2017, Spencer *et al.* 2017) and one used a matched-participants design (Hyde Wright *et al.* 1993). Three were case studies or case study series (Bragard *et al.* 2012, Cross *et al.* 2001, Haynes 1992) and

four used a within-subjects design (Lowe and Joffe 2012, Sim 1996, Sim 1998, Wright *et al.* in preparation).

Sample size: Six studies had 10 or fewer participants, limiting their generalisability to a wider population; nonetheless, overall, the 13 studies yielded data on 778 participants, of whom at least 678 were aged 11 – 16 years (see section below on age of participants for more details). This sample size would afford some external validity if the studies were sufficiently homogeneous and of high quality.

Blinding of assessment: Studies in which outcome assessors are not blind to participants' treatment status are at risk of bias. Five studies (Ebbels *et al.* 2012, Joffe 2017, Lowe and Joffe 2012, Spencer *et al.* 2017, Wright *et al.* in preparation) reported that assessors were blinded. Two stated that assessment was not blind (Bragard *et al.* 2012, Murphy *et al.* 2017), and in the remaining studies it was not clear.

Fidelity: Fidelity to treatment is important for intervention studies in order to minimise the influence of potential confounding variables. Robust fidelity measures strengthen the conclusions drawn by the authors. Only six studies reported that fidelity measures were taken, of which two (Ebbels *et al.* 2012, Joffe 2017) described their fidelity measures in detail.

Control measures: Three studies did not use any control measures (Cross *et al.* 2001, Sim 1996, Sim 1998). For the remaining studies, control measures varied considerably and are described in the discussion section.

Statistical validity: Ten studies used statistical analysis to support their findings: three did not (Cross *et al.* 2001, Sim 1996, Sim 1998).

Quality appraisal is summarised in Table 3. Studies are listed in the table in chronological order. According to the therapeutic AAN classification, three studies met criteria for class I (Ebbels *et al.* 2012, Joffe 2017, Spencer *et al.* 2017); two studies met criteria for class III (Lowe & Joffe 2017,

Wright *et al.* in preparation); and the remaining studies were rated as class IV, due to lack of blind assessment or lack of clarity regarding blind assessment.

INSERT TABLE 3 ABOUT HERE

Study characteristics

In this section, the included studies will be compared in relation to: language diagnosis of participants; age of participants; model of delivery used: agent of change delivering the intervention; the setting; dosage; assessment measures; and the type of intervention. Study characteristics are summarised in Table 4. Studies are listed in the table in chronological order.

INSERT TABLE 4 ABOUT HERE

Language diagnosis of participants: Inclusion criteria varied from study to study resulting in a range of diagnoses amongst participants. Five studies stated that participants had word-finding difficulties (Bragard *et al.* 2012, Cross *et al.* 2001, Ebbels *et al.* 2012, Haynes 1992, Hyde Wright *et al.* 1993). Three reported low average receptive vocabulary levels (Lowe & Joffe 2017, Murphy *et al.* 2017, Spencer *et al.* 2017). Other diagnoses included “speech and language difficulties” (Sim 1996, p.136); “primary speech and language disorder” (Sim 1998, p.84); “severe and complex difficulties in language and communication” (Joffe, 2006, p.209); “language disorder”, Wright *et al.* (in preparation) and “speech, language and communication needs (SLCN)” (Joffe 2017). Further detail on participants’ language profiles are included in the discussion section of this paper.

Age of participants: Seven studies included participants within the 11 – 16 age range only (N=648) Four studies included participants across different age ranges, but the ages of the participants were stated, so that it is known that 30 in total fell into the 11 -16 range. The remaining studies (Joffe 2006, Wright *et al.* in preparation) included participants ranging from nine to 15 years of age, but mean ages only were stated, so it is not known exactly how many fell within the 11 – 16 age range. Where this was the case, group data for multiple ages was considered in the discussion section of this review.

Model of delivery: The model of intervention delivery used is one area of diversity in these studies. Five studies reported individual interventions, three used a small group model, and four investigated a whole-class model of delivery. One study (Cross *et al.* 2001) was a single case study which involved both one-to-one and group intervention.

Agent of change: The professional role of the person who carried out the intervention also varied from study to study. Individual intervention was administered by a SLT in all cases. One of the small group interventions (Joffe 2006) was administered by speech and language therapy students, the second (Joffe 2017) was administered by teaching assistants, and the third (Spencer *et al.* 2017) by SLTs. Of the whole-class interventions, two were administered collaboratively by the class teacher and SLT (Sim 1996, Sim 1998), and two by class teachers (Lowe and Joffe 2012, Murphy *et al.* 2017).

Setting: Six studies took place in a specialist school for children and/or adolescents with language disorder, one took place in a school with “special education classes” (Bragard 2012, p.224), five in mainstream secondary schools, and one in a specialist childcare setting.

Dosage: Where intervention was embedded within the classroom curriculum, it was not possible to estimate dosage accurately. In those studies reporting individual intervention, intervention regime varied widely. Excluding Cross *et al.* (2001), which has an outlying cumulative intervention dosage of 52 hours, the cumulative intervention dosage ranged between 2.5 hours and 7.5 hours, with a mean of 4.55 hours. Dose frequency in studies reporting individual intervention ranged between one and three times a week, and intervention duration ranged between four and eight weeks.

Assessment: Eight studies used only bespoke word knowledge outcome measures (Bragard *et al.* 2012, Haynes 1992, Hyde Wright *et al.* 1993, Lowe and Joffe 2012, Sim 1996, Sim 1998, Spencer *et al.* 2017, Wright *et al.* in preparation). Of these, seven reported increased word knowledge of targeted words. Bespoke assessments measured vocabulary knowledge in diverse tasks: receptive (e.g. picture pointing tasks), expressive (e.g. naming, sentence production); definition production

tasks, which involve expressive language skills but also indicate depth of word knowledge; and lexical knowledge (e.g. identifying syllable number).

Four studies used only standardised vocabulary assessment, in order to measure the impact of the intervention on independent word learning skills (Cross *et al.* 2001, Ebbels *et al.* 2012, Joffe 2006, Murphy *et al.* 2017), and one study used both bespoke and standardised assessment (Joffe 2017). All of these reported progress on some of the assessments used but not others. Again, there was a wide range of assessments used, each tapping different aspects of word knowledge. Receptive assessments such as the British Picture Vocabulary Scale, third edition (BPVS-3: Dunn *et al.* 2011) or the Receptive One-Word Picture Vocabulary Test (ROWPVT: Brownell 2000) are multiple-choice tasks providing breadth of knowledge information only. Tasks in which the child is required to define words, such as the word definition subtest of the Clinical Evaluation of Language Fundamentals, fourth edition, UK (CELF-4 UK: Semel *et al.* 2006) assess a child's depth of word knowledge and semantic representations in a way that multiple-choice tasks do not, but they rely on expressive language skills. Other assessments aiming to tap into a child's semantic representations include the word classes subtest of the CELF-4 UK, in which the child identifies which two out of four words are related (receptive score), and explains why (expressive score). A naming task such as the picture naming section of the Test of Adolescent/Adult Word Finding (TAWF: German 1990) gives information on a child's expressive vocabulary and also gives insight into any word-finding difficulties.

A further indication of generalisation to independent word learning skills would be to measure academic attainment, to evaluate the impact of the vocabulary intervention on wider access to the curriculum. None of the included studies addressed this.

Type of intervention: The type of intervention varied from study to study, but all took phonological and/or semantic approaches. Interventions included: semantic intervention (4 studies); comparison

of phonological versus semantic intervention (2); and combined phonological-semantic intervention (7 studies). These will be explored further in the discussion section.

Overall, there was a large degree of methodological diversity amongst the studies, with a trend of increasing empirical rigour over time. Therefore, it was felt appropriate to review these studies through a narrative synthesis rather than a meta-analysis.

Discussion

This narrative review will appraise the included studies in relation to the type of intervention used: semantic intervention; comparison of phonological versus semantic intervention; and combined phonological-semantic intervention.

Semantic intervention

Four studies delivered semantic intervention. One of these (Haynes 1992) used an individual model of delivery; two (Sim 1996, Sim 1998) used a whole-class model of delivery; and one used a small group model of delivery (Joffe 2006).

Haynes (1992) investigated the effectiveness of semantic vocabulary intervention, comparing an elaboration condition with a definition condition in individual intervention, with two boys aged 10 and 11 years. One boy's percentile rank on the BPVS (edition not stated) was 24, the other's 34, indicating age-appropriate receptive vocabulary, but both had expressive vocabulary difficulties, achieving percentile ranks of 7 and 1 respectively on a word finding assessment (described in the paper as "German"; Haynes 1992, p.4), and presenting with indicators of word-finding difficulty such as pausing while searching for a word, or making semantic or phonological naming errors. A list of 30 words was chosen according to the particular interests of each boy and used in the elaboration intervention condition. Each boy's word list acted as the control list for the other boy, in the definition intervention condition. In the elaboration condition, words were used in a context in which the boys were actively involved; in the definition condition, the words and their definitions were read aloud to the boys who listened passively. Dosage of intervention was 25 minutes, three

times a week, over a period of four weeks. The outcome measure was a definition production task. The plan was to continue intervention, reversing the condition in which the words appeared; however, after four weeks, one boy had made minimal progress with the definition set of words, and the other boy had made no progress with either set (though statistical analysis was not used), so the study was discontinued. This decision appears to have been made on the basis of discontinuing ineffective intervention. The author acknowledged methodological weaknesses such that the word lists were not matched, and word knowledge baselines were not equated. As such, the value of this paper lies in its discussion of the issues around carrying out clinical research in real-life settings rather than the empirical evidence it provides.

The two papers by Sim (1996, 1998) described the development and evaluation of a “compensatory approach” (Sim 1998, p.84) to the teaching of science vocabulary and concepts with 12 – 13 year olds in a specialist language school. Neither study gives language assessment scores for the pupils but describes them as having speech and language difficulties (Sim 1996) and primary speech and language disorder (Sim 1998). Intervention took place in the classroom, and encompassed four elements: practical demonstration; language integrated into the teaching by all the staff involved; motivation created by the resources in the “mystical” environment of the science laboratory (Sim 1998, p.86); and increased exposure by lengthening the duration of the topic. Children additionally received vocabulary support through individual speech and language therapy sessions. In Sim (1996), progress in vocabulary acquisition for a group of 26 students following one lesson was reported for four words, though the bespoke outcome measure “expressive vocabulary recognition” was not explained (Sim 1996, p.142). In Sim (1998), progress for a group of 10 students following one topic (duration not stated) was reported for 13 words on measures of naming and semantic representation, using questions about the targeted words e.g. “Which of these items is a material?” (Sim 1998, p.88) No information was given, however, about the relative impact of the classroom intervention compared to the individual speech and language therapy sessions, neither were any control measures nor statistical analysis used. The author presented these two papers as an

opportunity to explore and promote multi-disciplinary collaboration in order to achieve curriculum differentiation.

Joffe (2006) conducted a RCT with a cohort of 54 adolescents aged 10:0 - 15:3. The participants had “severe and complex difficulties in language and communication” (Joffe 2006, p.209), defined as scoring 85 or below on a range of standardised assessments including the British Picture Vocabulary Scale, second edition (BPVS-2: Dunn *et al.* 1997), the Clinical Evaluation of Language Fundamentals, third edition (CELF-3: Semel *et al.* 2000), and the Assessment of Comprehension and Expression 6-11 (ACE 6-11: Adams *et al.* 2001). Participants were randomised into two groups to receive intervention delivered by student speech and language therapists in small groups in mainstream secondary schools, for two 50-minute sessions a week over a six-week period. One group received vocabulary intervention, which included semantic strategies such as categorising words through mind maps, as well as the use of synonyms, antonyms, multiple meanings, and definitions; and the other group received narrative intervention which included story structure, story description and inferential understanding. Both groups made significant progress on the BPVS-2, the recalling sentences subtest of the CELF-3, and the non-literal comprehension subtest of the ACE 6-11. These results suggested a generalisation effect of intervention, but there were no differential effects between the narrative intervention and the vocabulary intervention.

Given that only one of these studies (Joffe 2006) demonstrated enhancement in vocabulary skills in an empirically sound design, and that, further, both vocabulary and narrative groups in this study showed enhanced vocabulary skills, the evidence for the effectiveness of semantic-only therapy in the adolescent age-group is limited.

Comparison of phonological versus semantic intervention

Two studies attempted to establish the relative merits of phonological versus semantic intervention in enhancing the expressive vocabulary skills of children with language disorder. Hyde Wright *et al.* (1993) compared the effect of phonological and semantic intervention on naming ability, working

with 30 children who had word-finding difficulties aged 8:1 – 14:6. Twelve of these children were aged 11 or over. All the children had standard scores ≤ 85 on the Test of Word Finding (German, 1989). In a matched-group design, children received individual intervention three times a week over a period of five weeks, one group receiving phonological intervention and the other group receiving semantic intervention. The phonological intervention entailed the presentation of stimulus pictures, about which the children were asked questions eliciting phonological information e.g. “Is it a short word or a long word?”, following which the SLT named the picture and modelled the phonological strategies (Hyde Wright *et al.* 1993, p. 220). The semantic intervention followed the same format, with the same stimulus pictures, but this time the questions elicited semantic information e.g. “Can you describe it?” (Hyde Wright *et al.* 1993, p. 220). The authors found that semantic intervention was significantly more effective than the phonological information in improving the naming of untrained pictures. The dosage of semantic intervention (approximately 30-minute sessions), however, was higher than that of the phonological intervention (approximately 15 – 20-minute sessions), so the result could be accounted for by increased dosage rather than type of intervention.

Using a similar intervention, Bragard *et al.* (2012) reported a case series of four children with word-finding difficulties aged 9:6 – 13:9. Three of these children were aged 11 or over. The children scored on the 6th, 1st, 18th, and 1st percentile respectively on the picture naming subtest of a French language assessment, the Evaluation du Langage Oral (Khomsi 2001). The four children presented with differing linguistic strengths and weaknesses; two showing semantically-based word-finding difficulties, and two showing phonologically-based word-finding difficulties. Phonological intervention for 24 words was compared with concurrent semantic intervention for a different set of 24 words. Progress in naming these words was compared with a control set of 24 words which received no intervention. How the words were allocated to experimental or control conditions was not described. Children received 30 minutes’ individual intervention once a week over a period of five weeks. Intervention occurred in two phases: using picture stimuli, the phonological intervention focussed on phoneme segmentation in the first phase and initial phoneme recall in the second phase;

the semantic intervention focussed on semantic associations (similarities) of two pictures in the first phase, and on definition production in the second phase. Outcome measures included: picture naming; phoneme segmentation; initial phoneme recall; semantic associations; and definition production. The authors interpreted the results such that the children with a semantic deficit responded better to phonological intervention, and that the children with a phonological deficit responded better to semantic intervention, positing that this was due to intervention supporting within-child strengths. However, the pattern of results is not so clear-cut as to provide firm evidence for this conclusion, and as this is a small case series design, without blind assessment, the authors acknowledged that these findings need replication.

Thus, the evidence provided by these two studies does not clarify the relative merits of phonological versus semantic intervention with the adolescent age group.

Combined phonological-semantic intervention

Seven studies investigated a combined phonological-semantic intervention approach. Three studies delivered this using an individual model of delivery (Cross *et al.* 2001, Ebbels *et al.* 2012, Wright *et al.* in preparation); two delivered the intervention in small groups (Joffe 2017, Spencer *et al.* 2017); and two delivered it in a whole-class model (Lowe and Joffe 2012, Murphy *et al.* 2017).

Cross *et al.* (2001) reported on a single case study of a 14-year-old boy who had a complex profile of language disorder and emotional, behavioural, and learning difficulties, in a specialist childcare setting (providing “foster care, education, speech and language therapy, psychotherapy and social work for children and families with complex special needs” (Cross *et al.* 2001, p.320)). At baseline, the boy had scaled scores on subtests of the Test of Word Knowledge (TOWK: Wiig and Secord 1992) as follows: synonyms 3, figurative usage 3, word definitions 6, and multiple contexts 7. The vocabulary component of the intervention entailed developing phonological and semantic word-finding strategies, and word definition skills. Dosage was a one-hour individual speech and language therapy session once a week over a period of one year, which included vocabulary

intervention as well as other speech and language targets, and in addition the participant received weekly small group intervention targeting social skills. The participant's scaled score on the figurative usage subtest of the TOWK was reported to have risen from 3 at pre-intervention to 5 at post-intervention; however, post-intervention scores in the synonyms, word definitions and multiple contexts subtests were not reported. Furthermore, no control measures were undertaken and no statistical analysis was reported, so it is difficult to distinguish between the effects of the intervention, other input, or the effect of maturity. Thus, although this paper describes the value of multi-disciplinary collaboration, it provides weak empirical evidence of effectiveness.

Stronger evidence for the phonological-semantic approach in individual intervention was provided by Ebbels *et al.* (2012), in a RCT in a specialist language setting. Participants were aged 9:11 – 15:11, and all but one were 11 years or over. The participants (N=15) all had word-finding difficulties, with a mean standard score on the TAWF of 63 (range 44 – 81). The intervention was predominantly semantic, although inspection of the intervention schedule reveals that it did contain opportunities to practise phonological word-finding strategies as well as semantic strategies.

Examples of semantic strategies included questions eliciting semantic information e.g. “What does it look like?” (Ebbels *et al.* 2012, p. 51); examples of phonological strategies were not given.

Individual intervention was delivered to seven participants 15 minutes twice a week over a period of eight weeks, and progress on the TAWF and Test of Word Finding in Discourse (TWFD: German, 1991) was compared with a waiting control group of eight participants. The authors reported significant progress for the experimental group, but not for the control group, and concluded that this indicated a generalisation effect of intervention, although no progress was made on the TWFD. This study has a high quality-rating, and although it had a sample size of only seven in the experimental group, which limits the generalisability of the results, the findings give some support to the use of a phonological-semantic approach in individual intervention in a specialist language setting.

Wright *et al.* (in preparation) implemented a within-subjects pre-post study design with 25 participants with language disorder in the same specialist language setting as Ebbels *et al.* (2012). Ages ranged between 9:4 and 16:1 (mean 12:5) but it is not stated how many were within the 11 – 16 age range. The group mean standard score on the BPVS-2 was 75.9 (SD 15.1). Participants received individual intervention with their usual SLT, following a manualised phonological-semantic intervention for 10 words (five nouns and five verbs), for 30 minutes once a week over a period of seven weeks. Intervention consisted of creating a poster for each new word containing phonological and semantic information. Two target words were introduced in each session, with an additional individual revision session of five minutes once a week, consisting of a game to recap on all words introduced so far. Two sets of words were matched by frequency, and randomly assigned to treatment or control conditions, with one set acting as experimental words, and the other set acting as a control set for each participant. Progress was measured on bespoke tasks involving lexical decision, definition (multiple choice), definition (production), and sentence production. On all tasks, participants made significantly greater progress with experimental than with control words; furthermore, on the more linguistically complex tasks (sentence production and definition production), participants showed greater gains on nouns than verbs. This study has a larger sample size than Ebbels *et al.* (2012) in the experimental group, and although conclusions cannot be drawn about generalisation of intervention to independent word learning skills, or to other settings, the findings further support the use of a phonological-semantic approach in individual intervention in a specialist language setting.

Two studies have explored phonological-semantic intervention using a small group model of intervention delivery (Joffe 2017, Spencer *et al.* 2017).

Joffe (2017) conducted a large RCT involving 358 12 – 13-year-olds with SLCN in mainstream secondary schools. The mean standard score for this group on the BPVS-2 was 85.21 (SD 12.28). Intervention comprised the Vocabulary Enrichment Programme (Joffe 2011), which was developed from the programme used in Joffe (2006) to include greater detail and a phonological component.

The programme was centred around curriculum vocabulary, providing opportunities to explore semantic connections, morphological connections, word finding strategies, idiomatic usage, and the use of words in context. Intervention was delivered in small groups of 2 - 6 students by trained teaching assistants, for 40-60 minutes, three times a week over a period of six weeks. Participants were randomised into four groups: vocabulary; narrative; combined (narrative and vocabulary); and waiting control. No statistically significant progress was made for any group on standardised assessments of vocabulary from pre to post intervention. A significant group by time interaction effect indicated that the vocabulary group made more progress on a bespoke vocabulary idiom awareness measure in comparison to the control group. The combined narrative/vocabulary group also performed significantly better over time than the control group on the bespoke idiom awareness task, as well as on a bespoke definition production task. This study provides some evidence of the effectiveness of phonological-semantic intervention on idiom awareness, and stronger evidence for the effectiveness of a combined narrative/vocabulary intervention in enhancing idiom and general expressive vocabulary knowledge, in a small group model in a mainstream setting, delivered by trained teaching assistants with a manualised programme. Performance on standardised vocabulary tests and receptive vocabulary tasks proved more resistant to change.

The study by Spencer *et al.* (2017) also supports the effectiveness of vocabulary intervention in a small group model within mainstream secondary schools. These researchers included 35 12 – 13-year-olds who had low receptive vocabulary levels, and who attended a mainstream secondary school in an area of social disadvantage, using a matched-groups delayed intervention design.

Participants' mean standard score on the BPVS-3 was 81.69 (SD 9.51). The intervention, carried out by SLTs, for one hour once a week for a period of ten weeks, comprised phonological-semantic intervention for ten cross-curricular verbs, e.g. evaluate. One new word was introduced in each session, each intervention session including activities where the students personally experienced the meaning of the word (e.g. they evaluated something), a main topic activity where they had opportunities to use the word, and activities to explore phonological and semantic features of the

word. The mean number of sessions attended was 7.42 for the intervention group, and 6.63 for the control (delayed intervention) group. Progress was measured using a bespoke depth of word knowledge assessment measure, and compared with ten control verbs matched for phonological complexity and frequency. The intervention group did not make significant progress in experimental word knowledge compared with control word knowledge, though the control group did, following their delayed intervention. Combining the results of the two groups, significant progress was made relative to zero in knowledge of the experimental words, but not the control words. The mean number of words learnt was 1.17 which although a small gain, was a large effect size ($\eta_p^2 = .42$). The study took place in a single school, and the authors noted that factors in the school, such as behaviour management, were critical to the outcomes of intervention.

The remaining two studies (Lowe and Joffe 2017, Murphy *et al.* 2017) focussed specifically on enhancing vocabulary skills by applying a phonological-semantic approach within a mainstream whole-class setting. Lowe and Joffe (2017) used a within-subjects design with a class of 15 students, whose mean scaled score on the Receptive One-Word Picture Vocabulary Test (Brownell 2000) was 7.7 (SD 2.5), and whose mean scaled score on the recalling sentences subtest of the CELF-4 UK was 3.6 (SD 2.7). Their teacher taught 10 science curriculum words using phonological-semantic activities, and 10 words using routine teaching practice, which consisted of semantic activities such as matching written words to definitions. The phonological-semantic activities included using word maps as a whole class while teaching the content of the curriculum, and giving phonological and semantic clues during a bingo game to revise the words. The outcome measure was a bespoke definition production task. Progress in the five lowest frequency experimental words compared to the five lowest frequency words taught through routine teaching practice was of borderline significance. Methodological weaknesses, such as the inclusion of high-frequency words resulting in ceiling effects, and difficulty achieving close matching of the experimental and control words, limited the potential of this study to demonstrate increase in word knowledge; however, comments elicited from the students and their teacher through interview and

questionnaire revealed that they viewed the word learning activities favourably, demonstrating the feasibility of phonological-semantic intervention through a whole-class model of delivery.

Murphy *et al.* (2017) also investigated whole-class vocabulary intervention, using a RCT with 203 participants aged 11:11 – 13:11, attending mainstream secondary schools in areas of socio-economic disadvantage in the Republic of Ireland. Sixty-one percent of participants had a BPVS-3 standard score greater than -1.25 SD below the mean, and the group mean was 83.72 (SD 13.03).

An adapted Vocabulary Enrichment Programme (Joffe 2011) was delivered by 12 English teachers to 128 participants in a whole-class model, and progress was compared with 75 waiting controls.

Murphy and colleagues reported significant improvement for the experimental group following intervention on standardised scores in the word classes receptive, word classes expressive, and word definitions subtests of the CELF-4 UK, and on the BPVS-3. However, the waiting control group also made significant progress on the word classes receptive and word definition subtests, so improvements on these two measures cannot be accounted for by the intervention. Nonetheless, following their delayed intervention, the waiting control group made significant progress on the word classes expressive subtest and the BPVS-3, adding strength to the evidence of the effectiveness of phonological-semantic vocabulary intervention in a mainstream secondary whole-class setting, for both receptive and expressive vocabulary skills measured on standardised tests. For the experimental group there was no baseline period, so the effects of maturation could not be completely ruled out.

These seven studies investigating combined phonological-semantic intervention, although methodologically diverse, provide initial evidence for the effectiveness of phonological-semantic intervention in increasing word knowledge.

Generalisation to independent word learning

Four studies reported progress following semantic or phonological-semantic intervention on standardised assessment, which could be an indicator of improved independent word learning. One

of these studies was a single case study with no control measures (Cross *et al.* 2001). It could be argued that the control in this study was comparison with the normative mean; however, these authors did not support their conclusions with statistical analysis. The remaining studies reporting improvement on standardised outcome measures (Ebbels *et al.* 2012, Joffe 2006, Murphy *et al.* 2017) demonstrated higher internal validity due the use of control measures and statistical analysis, and therefore provide stronger evidence of a generalisation effect, though it should be noted that these studies did not demonstrate significant improvement on all the standardised tests they used.

Although these four studies suggested some generalisation effect of intervention to independent word learning, none of them used any curriculum assessments as an outcome measure. Therefore, even those that demonstrated some enhancement of participants' vocabulary skills were not in a position to assess whether this had a positive impact on academic attainment. Further, improvement on standardised assessment does not measure the potential functional impact of intervention, for example on a student's confidence or attitude towards word learning.

Summary

Overall, the available evidence for the effectiveness of intervention designed to enhance the vocabulary skills of adolescents is at best mixed.

Evidence for semantic-only intervention is inconclusive, as is the evidence for the relative merits of phonological versus semantic intervention in the adolescent age group. Evidence is stronger for a combined phonological-semantic approach to intervention with this age group, although it is not robust due to the wide variability in study designs. Some evidence (Joffe 2017) suggests that outcomes are better when the intervention is embedded in a wider language context such as a narrative approach.

Bespoke outcome measures have shown more positive results than standardised measures (e.g. Joffe 2017, Spencer *et al.* 2017, Wright *et al.* in preparation), even though often only small gains are made. This is to be expected, as author-created measures are weighted towards the content and

target of the intervention, whereas standardised measures are more psychometrically robust yet more conservative (Marulis and Neumann 2010). Studies reporting progress on standardised assessment, which would suggest a treatment effect on independent word learning, have found progress on some assessments but not others (Ebbels *et al.* 2012, Murphy *et al.* 2017). A wider goal, given the importance of vocabulary knowledge for long-term outcomes, would be to assess the impact of intervention on academic, social, and emotional outcomes. None of the included studies used such outcome measures.

The evidence needs to be considered in the light of a wide range of variables. The diagnosis of the participants, and consequently the purpose of the intervention, was confined in some cases to participants with word-finding difficulties, and in other cases included a wider remit to include those with low receptive vocabulary levels. The participants receiving individual intervention in specialist settings may have had more severe and complex language disorders than cohorts of participants recruited from mainstream schools, in which intervention was delivered in small groups or via a whole-class model. The factors influencing the choice of model of delivery, and frequency and duration of dosage were not fully explored in each study. The lack of homogeneity between studies makes it difficult to amass converging evidence applicable to particular populations and settings.

An added obstacle faced by researchers is the challenge of conducting effectiveness studies in real-life contexts, where extraneous factors such as teacher or teaching assistant variables and time-tabling constraints may contaminate the purity of the intervention. Taking a pragmatic outlook, which acknowledges these challenges and differences, the tentative evidence collated by this review encourages confidence in the potential for a phonological-semantic approach to intervention with the adolescent age-group, with the caveat that there is further work to be done.

The types of intervention approach did not diverge widely from those used in research with primary-school-age children, (e.g. Easton *et al.* 1997, Motsch and Marks 2015, Parsons *et al.* 2005,

St John and Vance 2014, Wilson *et al.* 2015), comprising phonological-semantic techniques presented in an age-appropriate way. However, as social and educational demands change and intensify during adolescence, perhaps further consideration needs to be given to other factors such as the most effective frequency and duration of intervention, and model of delivery (individual, small group, or whole class), as well as the preferences of the students themselves.

Limitations of the review

There are a number of limitations to this review. First, only studies in English were included, possibly excluding some relevant research. Second, the terminology used for language difficulties has varied widely in the research community, the speech and language therapy community, and the teaching community. To overcome this, a wide range of search terms was used to maximise the yield of studies, enabling confidence that relevant studies were found. Even so, the inclusion criteria varied from study to study resulting in a collection of studies with participants of differing diagnoses. The advent of a common terminology when describing language disorder (Bishop *et al.* 2017) will assist in enabling comparison between studies in the future. Third, only 13 studies were found that met criteria for inclusion, and due to the lack of statistical analysis in several of them, and a wide degree of heterogeneity between studies, it was felt inappropriate to carry out a meta-analysis. This reflects the fact that research in this field is in its infancy, and limits the potential of the review to identify a strong body of converging evidence. It is hoped that this narrative synthesis will result in greater understanding of the current evidence base and stimulate further research.

Conclusion and suggestions for future research

The aim of this systematic review was to synthesise the evidence for effective vocabulary interventions in adolescents with language disorder. As this is a relatively new area of research, evidence is emerging from methodologies at all levels on the hierarchy of evidence. Thirteen studies met criteria for inclusion in this review, and although they all used a phonological and/or semantic approach to intervention, there was wide disparity in terms of assessment measures,

participant characteristics, and methodologies, as well as varying degrees of quality, producing a limited amount of converging evidence. Only three studies were of high enough quality to gain a class I AAN rating.

From this back-drop, evidence is beginning to emerge of the effectiveness for a phonological-semantic approach to intervention in enhancing the vocabulary skills of adolescents who have language disorder, justifying this choice for practitioners. There is initial evidence for individual intervention in specialist schools, small groups and whole class in mainstream settings, but, as findings in one setting are not necessarily replicable to other settings, more research is needed. The evidence must be considered in the light of the participants' diagnoses, the aims of the intervention, and the outcome measures used; for example, the cognitive and language profiles of participants, whether expressive or receptive vocabulary skills are being targeted, and whether the aim is to demonstrate increased knowledge of targeted vocabulary items, independent word learning, or longer term academic success.

Hence, the evidence needs to be strengthened through replicated, robust, high-quality peer-reviewed research, and this should be a priority for future investigations, as well as new and creative research. Questions remain regarding the most effective aspects of intervention, the most effective model of intervention, the influence of the agent of change, and the recommended dosage of intervention. Future studies need to have clear rationales for these choices in their study design, so that practitioners can consider this information when weighing up intervention options in the light of other factors faced in real-life situations, such as staffing, financial resources, and student preferences.

Increased commonality between studies would help in the accumulation of a robust evidence base. The dual use of standardised vocabulary outcome measures in addition to bespoke word knowledge measures would increase the consistency between studies, and would also address the crucial issue of independent word learning skills. Further, studies should incorporate an outcome measure which

assesses the impact of intervention on curriculum access, as well as on other long-term outcomes implicated in language disorder including social skills, emotional well-being, and mental health. It is also important that future studies describe the content and procedure of interventions in detail, to give clear indications of the recommended intervention approaches.

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List of figures:

Figure 1. A flow chart of the review process.

Table 1. Subject terms and key words used in searches

Person	Condition	Intervention	Type of study
adolescen*	“language impairment”	vocabulary	intervention
teenage*	“language disorder”	“word finding”	treatment
“young pe*”	“language delay”		therapy
“young adult”	“language difficult*”		instruction
	“language disabilit*”		teaching

Table 2. Quality rating indicators

	High quality	Low quality
Study design	Randomisation used	No randomisation or matching used
Study design	Matching used	No randomisation or matching used
Sample size	Over 10 in experimental group	10 or below in experimental group
Assessment	Outcome measures assessed by assessors blind to treatment status	Outcome assessors not blinded to treatment status
Fidelity	Fidelity measures used	No fidelity measures reported
Control measures	Control measures used	No control measures reported
Statistical validity	Statistical analysis used	No statistical analysis reported

Table 3. Quality appraisal of intervention studies

Study	Randomisation of participants	Matching of participants	Sample size over 10 in experimental group	Blind assessment	Fidelity measures used	Control measures used	Statistical analysis used	AAN Class	Reason for AAN rating
Haynes (1992)	No	No	No	?	?	Yes	Yes	IV	Blind assessment not stated
Hyde Wright, Gorrie, Haynes, and Shipman (1993)	No	Yes	No	?	?	?	Yes	IV	Blind assessment not stated
Sim (1996)	No	No	Yes	?	?	No	No	IV	Blind assessment not stated
Sim (1998)	No	No	No	?	?	No	No	IV	Blind assessment not stated
Cross, Blake, Tunbridge, and Gill (2001)	No	No	No	?	?	No	No	IV	Blind assessment not stated
Joffe (2006)	Yes	No	Yes	?	?	Yes	Yes	IV	Blind assessment not stated
Bragard, Schelstraete, Snyers, and James (2012)	No	No	No	No	Yes	Yes	Yes	IV	Not blind assessment
Ebbels et al. (2012)	Yes	No	No	Yes	Yes	Yes	Yes	I	RCT
Murphy et al. (2017)	Yes	No	Yes	No	No	Yes	Yes	IV	Not blind assessment
Spencer, Clegg, Lowe, and Stackhouse, (2017)	Yes	No	Yes	Yes	Yes	Yes	Yes	I	RCT
Lowe and Joffe (2017)	No	No	Yes	Yes	Yes	Yes	Yes	III	Not randomised or matched
Joffe (2017)	Yes	No	Yes	Yes	Yes	Yes	Yes	I	RCT
Wright, Pring, and Ebbels (in preparation)	No	No	Yes	Yes	Yes	Yes	Yes	III	Not randomised or matched

Key: ? = Information not clear in paper.

Table 4: Summary of study characteristics

Study	Study design	Number of participants	Age of participants in years and months (number aged 11–16)	Model of delivery and agent of change	Setting	Type of intervention	Dosage	Key conclusions	Limitations
Haynes (1992)	Case study series	2	10:1 and 11:5	1:1. SLT	Specialist language education setting	Semantic: elaboration vs definition	25 mins 3 times a week for 4 weeks	No demonstrable progress on bespoke assessment.	Words not matched. Study not completed.
Hyde Wright, Gorrie, Haynes, and Shipman (1993)	Between-subjects (age-matched) experimental study	30	8:1 – 14:6 (12)	1:1. SLT	Specialist language education setting	Semantic vs phonological vs waiting control	30 mins semantic or 15-20 mins phonological 3 times a week for 5 weeks	Semantic therapy was more effective, measured by bespoke assessment.	Dosage of semantic therapy was higher than phonological therapy.
Sim (1996)	Within subjects repeated measures	26	11 – 12	Whole class. Teacher	Specialist language education setting	Compensatory approach (including direct vocabulary teaching in class) pre to post comparison	In science lessons for four months	Word learning improved on bespoke assessment. Mutual trust required for effective multi-disciplinary collaboration..	No statistical information. No control measures.
Sim (1998)	Within subjects repeated measures	10	12 – 13	Whole class. Teacher	Specialist language education setting	Compensatory approach (including direct vocabulary teaching in class); pre to post comparison	45 mins 3 times a week Duration not stated	Word learning improved on bespoke assessment. Multi-disciplinary collaboration can be effective.	No statistical information. No control measures.

Cross, Blake, Tunbridge, and Gill (2001)	Single case study	1	14	1:1 and small group. SLT	Specialist childcare setting	Phonological-semantic, word finding strategies, definition practice: pre to post comparison	One hour twice a week for one year	Progress on Figurative Usage subtest of TOWK.	No statistical information. No control measures. Incomplete reporting of results.
Joffe (2006)	RCT	54	10:0 – 15:3 (Not stated. Mean age 12:8)	Small group. SLT students	Mainstream secondary school	Semantic vocabulary intervention vs narrative	50 mins twice a week for 6 weeks	Progress on BPVS-2, ACE 6 – 11 non-literal comprehension, and CELF recalling sentences for both groups.	No control group.
Bragard Schelstraete, Snyers, and James (2012)	Case study series	4	9:6 – 13:9 (3)	1:1. SLT	Specialist language education setting	Semantic vs phonological	30 mins once a week for 5 weeks	Children with phonological deficit responded better to semantic therapy and vice versa, on bespoke assessment.	Small sample size. Ceiling effects. Not blind assessment.
Ebbels et al. (2012)	RCT	15	9:11 – 15:11 (14)	1:1. SLT	Specialist language education setting	Phonological-semantic: intervention vs waiting control	15 mins twice a week for 8 weeks	Progress on TAWF but not on TWFD.	Small sample size. Limited generalisability to other schools.
Murphy et al. (2017)	RCT	203	11:11 – 13:11	Whole class. Teacher	Mainstream secondary school	Vocabulary Enrichment Programme (Joffe, 2011) intervention vs waiting control	40 mins twice a week for 12 weeks	Progress on CELF-4 UK Word Classes (Expressive) subtest, and the BPVS-3.	No baseline period. Not blind assessment.
Spencer, Clegg, Lowe, and Stackhouse (2017)	RCT	35	12:1 – 13:11	Small group. SLT	Mainstream secondary school	Phonological-semantic: experimental vs control words; and intervention vs waiting control	One hour once a week for 10 weeks	Delayed intervention group made progress in word knowledge of experimental words.	Limited generalisability to other schools.

Lowe and Joffe (2017)	Within subjects repeated measures	15	13:3 – 14:1	Whole class. Teacher	Mainstream secondary school	Phonological-semantic vs routine teaching practice	50 mins 3 times a week for three weeks	Progress on bespoke assessment of borderline significance.	Ceiling effects.
Joffe (2017)	RCT	358	12 – 13	Small group. TA	Mainstream secondary school	Vocabulary (phonological-semantic) vs narrative vs combined vs waiting control	40-60 minutes 3 times per week for 6 weeks	No significant difference on standardised vocabulary assessment, but significant progress on bespoke assessment.	Not yet peer reviewed.
Wright, Pring, and Ebbels (in preparation)	Within subjects repeated measures	25	9:4 – 16:1 (not stated: mean age 12:5)	1:1. SLT	Specialist language education setting	Phonological-semantic: experimental vs control words, and nouns vs verbs	30 minutes once a week plus 5 minutes once a week for 7 weeks	Greater progress with experimental than with control words on bespoke assessment.	Not yet peer-reviewed.

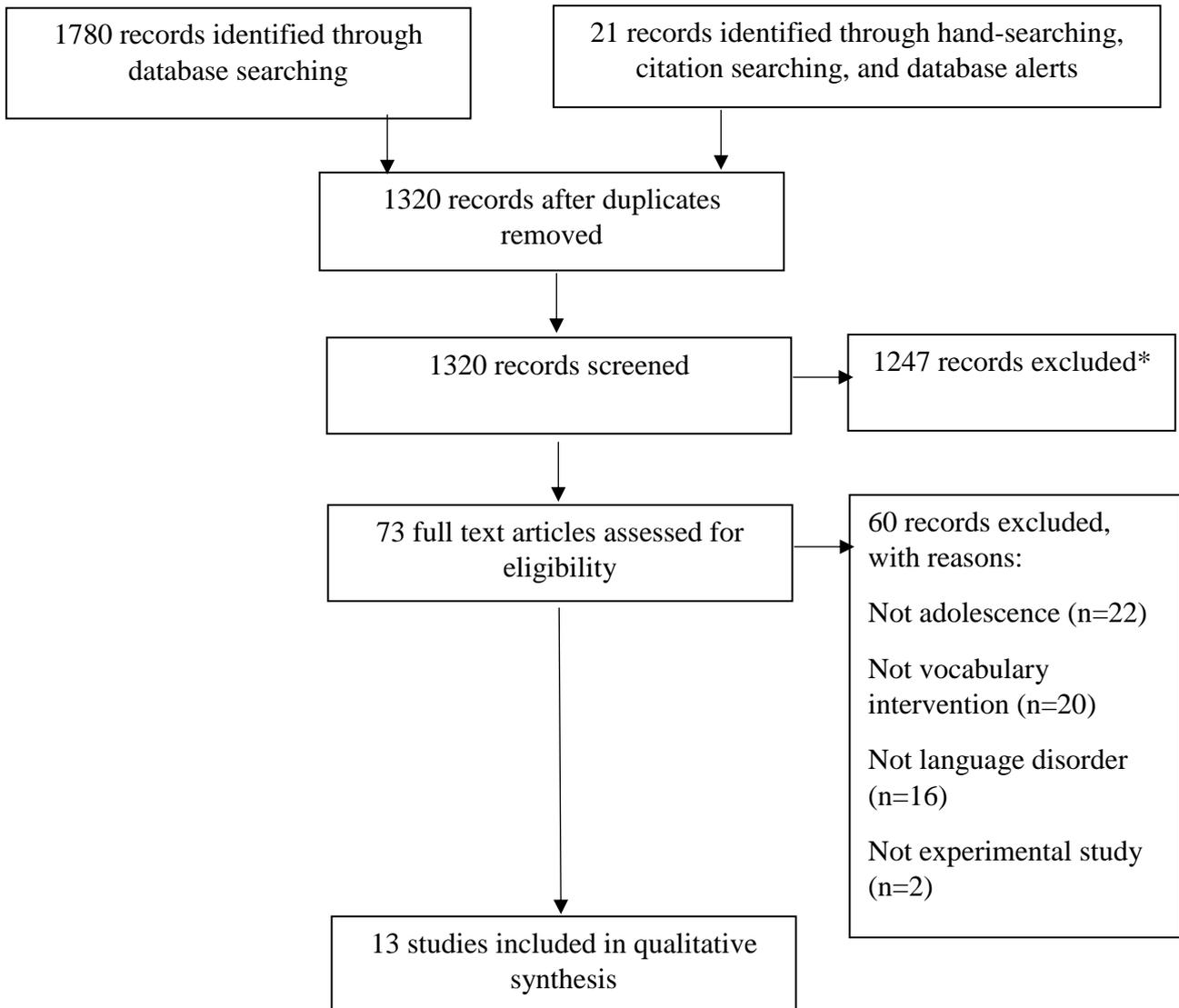


Figure 1. A flow chart of the review process.

*Reasons for exclusion at the screening stage included: not adolescence; not vocabulary intervention; not experimental study (book review, call for papers or studies, whole book, conference programme, or editorial); original publication replaced by later publication in peer-reviewed journal; not in English.